Aligners

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Treatment of Class II, subdivision with orthodontic aligners

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Aim: A 16-year old female patient presented to our observation with class II subdivision malocclusion, with molar and canine class II only on the right side. In malocclusions like this, it is very important to perform a correct diagnosis, and discriminate the malocclusion of dental origin from malocclusion of skeletal origin. The aim of this paper is to show the sequence of treatment, the attachments and the class II elastic protocol used to treat with reproducibility and success this kind of malocclusion with orthodontic aligners.
Methods: Dental impressions, photos, and orthopanoramic and lateral ceph xrays were examinated, and it was diagnosed a II class malocclusion of dental origin, with molar and canine of the right side in II class malocclusion. Both dental arches were contracted with deepening of Wilson curve and mild crowding was present on the upper and lower arch. Curve of Spee was quite deep, associated with augmented overbite. Upper dental midline was deviated to the left side. Silicone impressions were taken and shipped to program the dental movements to correct the malocclusion. It was asked to follow these instructions: Expand and align dental arches with derotation of the molars and distalize the teeth with a "modified V pattern", that means that the first movements were performed just on the upper molars, and then sequentially on the other teeth only on one side, in this case the right side. In particular, it was first moved the upper 7, and after 5 aligners, it was moved also the upper 6. The upper 4 was moved to I class only when the occlusion of upper 7 was corrected to class I. With this sequence of movements it was possible to take advantage of the anchorage of the other teeth to have the best predicibility of movement. It was also necessary to apply conventional 3 mm long vertical attachments on the upper right molars, and optimized attachments on the upper right premolars. It was also necessary to prescribe precision cuts on upper canines and lower molars and to add for these teeth conventional 3 mm attachments. It was also programmed interproximal reduction of lower incisors and their retroclination to contrast the tendency of the lower incisor to procline in class II mechanics.
Results: The treatment was conducted with 40 aligners changed every 7 days. The patient was instructed to wear class II elastics ¼ 4,5 oz full time for both sides for all the treatment. After the first phase, class I on the right side and it was conducted just one refinement of 14 aligners to better expand and rotate teeth. After 1 year and 2 months the treatment was concluded with resolution of the malocclusion. It was asked to the patient to wear vacuum-formed retainers during the night for retention.
Conclusions: Class II malocclusion subdivision of dental origin can be treated successfully with aligners respecting the right protocols and with the collaboration of the patient.

Open bite orthodontic treatment with aligners in an adult patient: a case report

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Aim: Open bite malocclusion is one of the highly challenging orthodontic problems. The prevalence of anterior open bite ranges from 1.5% to 11% and varies between ethnic groups according to chronologic and dental ages. Open bite is less common in adult population than in young population. It is caused by different factors, like muscular malfunctions and abnormal habits or skeletal or dental developmental anomalies. If open bite malocclusion is due to dental anomalies, it can be treated with only orthodontic treatment. In this case report the aim is to describe the protocol of treatment with aligners of an open bite malocclusion of dental origin.
Method: A 20 years old male patient was presented to our attention asking for an improvement of functional and aesthetic occlusion. The patient was not suffering of any general health problem. Orthodontic problems were also: narrow upper arch wih diastemas between upper incisors, and narrow lower arch with moderate crowding, and severe rotation of upper incisors. Skeletal analysis showed little postrotation of the mandible. The patient was in dental and skeletal Class I. Teeth 18 and 28 were present in the arch. It was proposed a treatment with orthodontic aligners, because it is known that aligners can be more successfull in open bites than multibrackets therapy because they have a "bite block effect", that means that intrusion of posterior teeth is more predictable because the patient has the tendency of biting with more strenght while wearing aligners. In this case, it was useful because the patient did not require an extrusion of upper incisors, but an intrusion of the posterior teeth, to correct the open bite. The sequence of movements was the following: move upper third, second and first molars while blocking premolars. After intrusion of molars, upper premolars were intruded. The rotation of upper incisors started from the first aligner and was performed during all the treatment. In the lower arch, the first molar and second premolar were intruded first, and after their intrusion, second molars and first premolars were intruded. Both arches were expanded, and that was necessary to solve inferior crowding. Spaces between incisors were closed with reduction of overjet. No attachment was necessary on upper incisors.
Results: After 25 aligners with the first phase and 23 aligners with the second phase, in about one year the case was completed with the closure of the spaces of the upper incisors, the resolution of the inferior crowding, and the correction of the anterior open bite.
Conclusions: Aligners can be predictable in open bite orthodontic therapy with the help of the right sequences of movements.

Predictability of orthodontic movement using invisible aligners

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Aim: The purpose of this study was to assess the predictability of orthodontic movements using invisible aligners. The use of this type of device in the adult population is increasingly required, due to its low aesthetic impact and its reduced risk of plaque accumulation on teeth.
Methods: Nine patients (average age 27 years) undergoing treatment with invisible aligners at the Dental Clinic of the University of Foggia have been enrolled for the evaluation of this study. All patients have been treated with Dooris Invisible Aligners, made of modified PET-G (Glycol Modified Polyethylene Terephthalate). For each patient included in the research, we requested the STL format models at the initial state of therapy (Pre), the final STL format models of the first orthodontic phase processed by the software (Virtual) and, after the first phase of treatment, the STL format models with the results actually achieved by the patient (Real). The orthodontic movements obtained and, therefore the treatment error delta were evaluated by comparing the differences between the STL models of the virtual treatment and the models with the dental movements actually obtained. Through the Software Geomagic 10, the "superimpositions" of dental arches at the beginning of treatment with both virtual and real arches after the therapy have been created, with the best fitting mechanism. The measurements were made taking the interincisive papilla as a reference point, using the Sofware Fusion 360.
Results: The results of linear and rotational movements can be observed mainly in the frontal sector, infact the diathoric teeth require more time and more aligners to get results. A statistical analysis of error delta's difference between the initial linear and angular measurements and those achieved according to the virtual set up and the real set up was carried out. The difference between the linear displacements of the dental elements between pre-virtual and pre-real from a clinical point of view is minimal; the error delta, i.e. the difference between the delta rejection of the average values of linear movements is 0.227 mm. Taking a minimum error

delta of 0.5 mm as reference, linear movements below this threshold are 71%. For rotary movements, the error delta calculated as the difference between the average values of the rejection delta is about 3°. Taking an error delta of 5° as the threshold value, rotary movements below this threshold value are 82% of the total, the remaining 18% exceeds the threshold value of the delta error.
Conclusion: The results obtained are consistent with the scientific literature. Linear movements (that concerned vestibularization, palatization/lingualization and expansion) are absolutely predictable, especially buccolingual tip movements. The vestibularization movements are more predictable with the help of attachment and IPR method. Rotational movements are less predictable than linear movements, according to literary results, but, in this study, the percentage that is above the threshold value of the error delta is attributable to only one patient, which translates into not being rilevant, the reasons could certainly be the poor compliance or the different response of the periodontal tissues.

The influence of composite attachments on clear aligner treatment: a systematic review

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Aim: The purpose of this systematic literature review is to identify and select the available scientific studies about the use of attachments in orthodontic treatment with clear aligners and to determine what is the best number, shape, position and size for each dental movement.
Methods: Eight databases were examined up to May 2019 to identify all the articles potentially relevant to the research. The review also included gray literature. The process of selecting studies, extracting data and assessing risk of bias was autonomously carried out by two different authors. Then they proceeded to the analysis of the outcomes by evaluating the aligner retentive capacity and six types of movement (anterior B-L tipping/torque; extrusion; intrusion; M-D tipping/bodily tooth movement; rotation; posterior B-L tipping or arch expansion).
Results: At the end of the selection procedure a total of twenty-one studies were identified. More specifically, ten finite element analysis, six experimental tests and five clinical studies were included. Most of them were identified as having a low risk of bias, whilst the others were labeled with a medium risk. Aligner retentive capacity could be improved by the addition of attachments but the outcome may be affected by several factors. Most of the articles highlighted the efficacy of attachments in different orthodontic movements, such as M-D movement, anterior B-L tipping and torque. On the other hand, it is difficult to draw clear conclusions about extrusion and intrusion because of the few sources in scientific literature and contradictory results were found about rotation. Finally, no articles analyzed posterior B-L tipping or arch expansion. The most frequently assessed shapes were optimized, rectangular, ellipsoid and rectangular beveled. As far as concerning the number, some studies also considered the addition of two attachments (placed on both sides of the tooth) or the use of attachments on a greater number of teeth. Moreover, some articles analyzed changes in attachment placement, while attachment size was rarely evaluated. However, not all the selected studies compared different attachment configurations and not all the configurations were systematically analyzed.
Conclusion: Attachments appear to have a positive influence on clear aligner treatment, although the available data are sometimes insufficient. More specifically, there is a lack of evidence about the effects of attachments on extrusion, intrusion and posterior B-L tipping or arch expansion. Moreover, the results about rotation seem to be contradictory. Further studies could therefore be useful to analyze the effects of attachments on these movements and to define the most effective attachment configuration.

Treatment of an extraction case with clear aligner therapy

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Aim: Dental crowding can be responsible for the inclusion of dental elements. Dental extractions could represent the best therapeutic choice in some crowded cases. The closure of extractive spaces carried out by clear aligners has long been considered a challenge for the orthodontist and it is still a debated topic. The aim of this case report is to show how a complex case may be treated with aligners, in order to highlight the potential of this kind of treatment.
Methods: A 12 years old female patient came to our

attention. The orthodontic check-up (dental arch impressions, intra- and extra-oral photographs and radiographic examination), followed by cephalometric analysis, made it possible to draw up a problem list for this clinical case. The diagnosis was: class II malocclusion, hyperdivergent facial type, dental crowding, midline deviation and inclusion of element 23. After careful consideration, the chosen treatment plan included the extraction of four premolars (14,24,34,44) in order to get the space for the impacted canine, to solve the crowding, to manage the midline and to achieve the class I relationship without affecting the profile. Invisalign clear aligner therapy was chosen in order to achieve the treatment goals. More specifically, the Invisalign protocol G6 allowed us to manage posterior dental anchorage, vertical control and root parallelism. The initial phase of treatment consisted of 40 aligners and it was followed by two refinements. Aligners were changed every 7 days: the first phase lasted 9 months, the second one 8.5 months and the third one 6 months, for a total of 23.5 months of treatment. Finally, active therapy was followed by the use of upper and lower Vivera retainers.

Results: At the end of the treatment, the achieved therapeutic goals were: resolution of dental crowding and midline deviation, upper arch expansion, eruption of element 23, closure of extractive spaces, correction of class II relationship, leveling of the curve of Spee and root parallelism.

Conclusion: This clinical case shows how clear aligner therapy could be effective even in some complex cases. It is worth noting that several limits of clear aligner treatment can be overcome only with the use of auxiliary elements, such as attachments or power ridges. Moreover, a thorough knowledge of biomechanics and patient compliance are essential for a successful therapy, as aligners are removable devices. Considering the advantages of this kind of treatment (aesthetics, comfort, hygiene) and the increasing demand from patients, it is easy to understand the importance of being able to treat even complex cases with aligners. Further clinical studies could therefore be useful to highlight potential and limitations of clear aligner treatment and to constantly improve it.

Biomechanical effects of different attachment designs for the extrusion of maxillary incisors with clear aligners: a Finite Element Analysis

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Aim: The aim of the present study was to evaluate the biomechanical effects of some different auxiliary-aligner combinations and the relative attachments during the correction of the open bite malocclusion. The tested attachments were designed specifically for the extrusion of the maxillary incisors during the clear aligner therapy (CAT). For the correct evaluation of the biomechanical outcomes, an innovative finite element analysis (FEA) was implemented in order to simulate the force vectors for each orthodontic movement.

Methods: A Computer Aided Design (CAD) model including a complete upper dental arch of an orthodontic open bite configuration was modeled for the finite element analysis. It was designed by combining the cone beam computer tomography (CBCT) volumes and the surface-structured light scans of the occlusal pattern of the patient. The clear aligner morphology was also virtualized and numerically discretized and four different therapeutic configurations were compared: (1) standard aligner, (2) 150 degrees beveled buccal attachments, (3) rectangular palatal attachments and (4) rectangular buccal attachments. The reconstructed digital models were analyzed with a finite element solver and the resulting force-moments (MF) delivered by the aligner to the target teeth and their displacement were calculated. The direction of the vectors was also graphically represented for each tooth and the intensity of the applied forces was evaluated. Moreover, the pressure distribution pattern along the aligners surface was analyzed for each tested configuration.

Results: Models with attachments showed a greater orthodontic efficacy than models without attachments. The maximum tooth displacement along the z-axis was obtained with the rectangular palatal attachment, while the highest undesired moments (Mx and My) were found in the standard aligner configuration. The finite element analysis showed that the maximum pressure against the periodontal ligament was expressed in the cervical portion of the mesial aspect of the central incisors and was about 76,5 g/cm^2. The more favorable pressure distribution pattern on the aligner surface was correlated with the use of the rectangular attachments even in correspondence of the posterior teeth.

Conclusion: The present finite element study demonstrated that the rectangular palatal and buccal attachments could be able to improve the extrusion of the maxillary incisors during the correction of the

open bite with the use of clear aligners. Moreover, the use of rectangular and vertical attachments on posterior teeth may be suggested during this kind of therapy.

Case report: treatment of mild to moderate malocclusion with Donatello aligner system

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Aim: We present a new fully printed aligner system for correction of mild to moderate malocclusion, directly built with 3D printing without need to print model set.
Matherials and methods: Aligner systems are present in orthodontic therapy since 1999. Several aligners are available in the orthodontic market and allow treatment of several malocclusions. Production of aligners is based on 3D software management system, starting from impressions that can be taken with traditional method, developed and scanned with lab scanner or directly acquired by intra oral scanner. A software generates a series of impressions reporting minimal movements of the elements that have to be moved, a 3D printer creates a set of models and aligners are built spreading a vinile disk on the surface of the models. Aligners are cut from the models, refined and ready for use. Donatello Aligner System is a methodic for alignment that doesn't need model set printing, and is fully created with a 3D printer using a transparent material. Here we present a case report showing orthodontic movements, in a case of mild malocclusion and re alignment. Orthodontic movement is managed by 3D software and movements are generated. A number of ten aligners is necessary for the pursuit of orthodontic therapy. A direct 3D printer using a transparent material directly prints a set of aligners.
Results: Donatello alignment system eliminates the need to print a set of models in order to build aligners. Time and printing material can be saved, and can be directly made by the clinician, without need of lab or third part operators.
Conclusions: Donatello Aligner System is a new, affordable and easy system for treatment of mild to moderate malocclusion.

Comparative effectiveness of orthodontic treatment with Invisalign or braces in first premolars extractive cases using the american board of orthodontics objective grading system

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Aim: The purpose of this prospective case-control study is to compare and validate the orthodontic clinical outcomes of premolars extraction treatment protocol with Invisalign® and straight-wire fixed appliances.
Material and methods: Twenty-four patients with a mean age of 18±4.0 years for the Braces group and 19±3.0 years for the Invisalign group, were included in this research. The Objective Grading System score prescribed by the American Board of Orthodontics was used to assess the treatment outcomes. Additionally, skeletal, dental and facial pattern measurements were calculated according to the American Board Orthodontics' cephalometric analysis, using pre- and post-treatment lateral cephalograms to compare the two groups.
Results: The results indicated that Invisalign appliances produced similar treatment effects as straight-wire appliances in four premolars extractive cases. The statistical analysis showed that marginal ridges, occlusal contacts, occlusal relationships, overjet, interproximal contacts and root angulation were not meaningfully different (P>0.05) between the groups at the baseline. The mean final Objective Grading System scores were not statistically significant different between the Invisalign group and the Braces one, and a passing treatment value (<30) was observed for all patients. Cephalometric measurements and changes after orthodontic-extractive therapy demonstrated to be analogous within Braces and removable Aligners group (P>0.05).
Conclusion: This study demonstrated the efficacy of both the Invisalign and fixed appliances modality in treating complex cases requiring the extraction of four first premolars as assessed by the Objective Grading System score prescribed by the American Board of Orthodontics.

Management of anterior cross - bite in growing subject treated with invisalign first: a case report

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Aim: The purpose of this study was to analyse early

orthodontic therapy and to intercept certain types of malocclusion and directing treatment to remove the responsible factors. Therefore, it is possible to restore normal skeletal development and the right dental eruption, exploiting natural forces of growth. Anterior cross bite is a condition in which the mandibular anterior teeth overlap the maxillary anterior ones. The condition is often due to the lingual position of the maxillary anterior teeth relative to the mandibular anterior part teeth. It is a serious aesthetic and functional anomaly. Early correction is recommended: avoid future III class malocclusion, facial impairment and mobility and fractures of the front teeth. Interceptive treatment using Invisalign First protocol with sequential expansion permitted to eliminate the interferences, to manage better oral hygiene, and to obtain a normal occlusion.

Material and methods: The case of an eight-year-old girl with an pseudo class III, mixed dentition, anterior cross bite, deviation midline teeth, misalignment of the lower incisors with a flat profile and the protrusion of the mandible. The cephalometric analysis confirmed the alteration of 1 Go – Gn 101° and overjet – 1. The time of treatment is 6 months with 29 aligners changed every 5 days. The application of these aligners will be active during daylight and overnight hours, instructing the patient to use the device gradually for 23 hours during the day. The Clincheck plan forecasted 2 mm of advancement every eight stages, and after 20 aligners is head to head. Meanwhile 28 aligners have resolved the anterior cross bite. Thanks to 1° refinement with 22 aligners is corrected the midline teeth in 5 months. Attending final dentition to complete the case, now in retention with a 2° refinement.

Results: In this case, early intervention made it possible to avoid the development of a class III malocclusion. This has contributed a significant improvement in the facial profile of the girl after 13 months of treatment and an important correction of the proclination of the upper incisors. We also obtain the expansion of the dental arch, the recovery of space for 12 and 22 and the improvement of the overjet and overbite. In the same way, using the device and solving the anterior cross bite, a forward movement of the jaw is obtained, which prevents the advancement and excessive development of the jaw aids displacement in the posterior direction. All these effects can be achieved with these devices in 6-12 months, in some cases they avoid the use of other mobile or fixed devices simplifies and minimizes any other treatment.

Conclusion: The perception of facial profile improvement motivated the patient and helped to reinforce treatment compliance. It is essential to intervene during the deciduous dentition, possible future skeletal problems are resolved which, if treated in early period, restore the correct function. If preceded by a correct diagnosis of occlusal and functional alterations, early preventive treatment with Invisalign First devices result in avoiding dysfunctional, thus reaching a balance between bone basis and muscular components. These devices have other several advantages: time - saving for the patient and for the dentist, comfort, easy oral hygiene, cooperation detector that allows to control the frequency of use.

Somatosensory changes following standardised orthodontic tooth movement

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Aim: To analyse, by means of a standardised battery of intraoral quantitative sensory testing (QST), the effects of experimental orthodontic tooth movement on the intraoral somatosensory functions.

Materials and methods: The study sample consisted of 19 adult patients, 5 men and 14 women (mean age ±SD: 26.8 ± 9.8 years). Each individual was provided a set of experimental clear aligners, to provide a standardised model of orthodontic tooth movement: Aligner 1 (AL1) did not determine any dental movement; Aligner 2 (AL2) was manufactured to deliver a standardized buccal tooth movement (0.5 mm) on a the 2.1. The participants were blinded to the existence of the sham aligner. The standardised battery of intraoral and extraoral QST included thermal and mechanical detection threshold tests. The thermal thresholds were detected on the buccal side of the attached gingiva of the 2.1 (planned for the orthodontic tooth movement), 1.1 (contralateral tooth on the same arch) and 4.1 (correspondent tooth on the opponent arch). Also, one extra-oral control site (right hand palmar thenar eminence) was used for control. The mechanical thresholds were measured on the same gingival and extra-oral sites of the thermal stimulation. Furthermore, the mechanical test were also performed directly on the tooth, and the force was applied perpendicularly to the crown and vertically along axis of the teeth. All the QST measurements were performed before the delivery of AL1 (T0), before the delivery of AL2 (T1) and 24 hours after delivery of AL2 (T2), when the maximum level of pain was expected. Comparison of mean values was computed using a one-way Analysis of Variance (ANOVA) for each measured variable. Statistically significant difference was set at $p<0.05$.

Results: Hyposensitivity to cold stimuli (i.e. increased cold pain threshold) and hypersensitivity to heat stimuli (i.e. reduction of the threshold of sensitivity to heat) of the moving teeth was observed at T2. Also,

significant decrease in the pain pressure threshold at the contralateral maxillary tooth was found. No significant differences were observed for all the other variables in the remaining intra-oral and extra-oral testing sites.
Conclusions: Quantitative assessment of the intraoral somatosensory function is a valuable contribution to a better understanding and description of the basic neurobiological mechanisms related to orthodontic pain. Signs of sensitization of the trigeminal nociceptive system after minor tooth displacement and orthodontic pain have been observed as immediate effects. Future studies are needed to verify the long-term changes following an orthodontic treatment.

F22 hybrid: a new clinical approach

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Aim: The rotation movement is very difficult to be obtained with aligner, especially for canines and premolars teeth. When this movement is greater than 15 degrees, auxiliaries are needed to make the rotation more predictable. The aim of this study is to evaluate the effectiveness of the hybrid approach and subsequently compare it with the predictability of the rotation movement using only the clear aligners.
Material and methods: In order to find a more effective approach to resolve severe rotation, the postgraduate School of Orthodontics of the University of Ferrara has developed a new system, called "F22-hybrid". This technique is based on the combination of F22 aligner (Sweden & Martina, Due Carrare, Italy) and fixed lingual appliance. In particular this system consists of buttons suitable for bonding on the lingual surface of the teeth. The correct position on lingual surface are precisely established on the digital set-up. These buttons have a slot of 0.018 which can accommodate arcs of NiTi or steel up to 0.018, that will help aligners to develop the programmed movement. A sample of 4 patients for a total of 13 teeth were analyzed, where these teeth presented as a criterion of inclusion a rotation to be performed at least 13 degrees. Pre-treatment, post-treatment and ideal set-up virtual scans were performed and the measurements were taken using the VAM software (Vectra, Canfield Scientific, Fairfield, NJ, USA). Then the measurements were collected and compared with an Excel spreadsheet, in order to calculate the accuracy of the movement.
Results: The general accuracy of the rotation movement with F22 hybrid was 91,4%. This figure is significantly higher than that obtained with studies on F22 aligner (68,1%) and on Invisalign Aligner (43,2%). Specifically the average movement accuracy of the 4 upper incisors analyzed is 90.7%, of the 5 lower incisors is 91.6%, of the 3 lower canines is 90.3% and of the only lower premolar is 96.4%. All these results are significantly better than the respective values of the treatment with only clear aligners. Especially as regards the lower canines, in which the rotation movement is less predictable than all the other dental types.
Conclusions: Combining clear aligner therapy and fixed lingual appliance is an esthetic means of treating malocclusions including important rotation movements, with high predictability. This result may determine the possibility of expanding the range of patients treatable with the clear aligners, one of the main objectives of modern orthodontics, which is confronting itself with ever higher aesthetic needs of patients.

Periodontal health in patients with fixed orthodontic appliances and removable aligners. Review of the literature

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Aim: Orthodontic devices represent therapeutic devices that can promote the accumulation of bacterial plaque which is the main etiological factor of periodontal inflammation. In patients with periodontitis, orthodontic devices could adversely affect and accelerate the destruction of the periodontium. Therefore, the clinician must carefully consider whether to subject the patient with periodontal problems to orthodontic treatment or not. The purpose of this literature review is to evaluate the microbiological changes caused by fixed and removable orthodontic appliances in order to identify plaque control techniques in patients with the aforementioned orthodontic devices.
Methods: The present work has been carried out by perfoming a search on the electronic database PUBMED. Keywords such as "plaque index", "periodontal disease", "gingival recession" have been used, in various combinations, associated with the terms "fixed devices" and "removable aligners".
Results: Patients with fixed orthodontic appliances present a greater risk for periodontal health than patients with removable aligners. This is due to the presence of attacks that act as an obstacle to hygiene maneuvers. By promoting plaque accumulation and superficial bacterial colonization, a periodontal inflammatory condition is established, initially

reversible, but which can worsen if not managed properly with severe clinical effects. On the contrary, the removable aligners allow to perform the oral hygiene maneuvers more easily and therefore easen the access to all the dental surfaces. Consequently, in patients with aligners the plaque index, gingival inflammation, bleeding and probing depth are less than in patients with fixed orthodontic appliances.
Conclusion: Removable aligner treatment ensures better periodontal health. In addition, their clinical use brings various advantages such as greater aesthetics, no impediment to the use of a toothbrush and dental floss and no need for food restriction. Therefore, the removable aligner can be considered the first choice therapy in patients with non-active periodontal disease who need orthodontic therapy.

Effect of different attachment shape on rescanning accuracy in orthodontic patients treated with clear aligners: an in vitro study

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Aim: In clear aligner therapy (CAT) attachments could be defined as predeterminate composite geometries applicated on teeth, which represent the necessary operative pressure points helping the expression of mechanical forces created by aligners. Composite attachments shape is supposed to be of crucial importance, together with aligner' fitting accuracy, in order to apply the desired force system to each tooth during clear aligner therapy. The aim of this pilot in vitro study was to investigate the effect on attachments impression accuracy of keeping them in place during rescanning for treatment mid-course correction or refinement.
Material and methods: Different types of attachments were applied to an ideally aligned upper arch virtual model (Master model, MM) and twenty copies, ten without and ten with attachments, were printed in epoxy resin using a 3D printer. Ten attachment templates were produced thermoforming a thin thermoplastic foil over the ten resin models with attachments and they were consequently used to bond composite attachments on the ten clean models, obtaining ten starting models (SM) that were scanned using an intraoral scanner (IOS), 3D printed and rescanned again (Rescanned models, RM). STL files of MM, SM, and RM models were imported into the Geomagic Qualify™ software, and a best-fit matching superimposition was used to obtain colorimetric maps. If data were normally distributed, repeated measures ANOVA was used in order to detect the presence of statistically significant intra-attachment differences. When ANOVA test was significant ($p < 0.05$), post-hoc Tukey test was applied. The non- parametric Friedman test was conducted if data were not normally distributed, applying post-hoc Wilcoxon test in case of statistically significant differences detection. Analyzing inter-attachments differences, ANOVA was used in order to detect the presence of statistically significant differences if data were normally distributed. When ANOVA test was significant ($p < 0.05$), unpaired t test was applied to identify where the differences occurred between groups. Kruskal-Wallis analysis was conducted if data were not normally distributed, applying post- hoc Mann-Whitney test in case of statistically significant differences detection.
Results: Sixteen (n = 16) different shapes of attachments were considered. The C shape attachment was excluded from the measurements for continuous bonding failure of the composite, obtaining a final sample of 15 different shapes of attachments. Measurements obtained were not normally distributed, therefore non-parametric statistic tests were used. The results of this study showed that differences between MM and SM were higher than differences among SM and RM. The mean differences between MM and RM resulted higher for all the attachments than all the other sessions. The T shape attachment was the least accurate of all other shapes for both scanned and re-scanned models. Furthermore, the beveled rectangular attachments resulted the most precise shapes.
Conclusions: loss of precision after attachments rescanning varies according to their original shape, and it is higher in sharp-edged geometry. If a high precision of this type of attachments is requested, these should be removed before rescanning during the mid-course correction or the refining phases of CAT.

Agenesis of the upper lateral incisors: open or close the space? Invisalign case report

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Aim: In this paper we will evaluate the management of agenesis in adult subjects and the consequent therapeutic choice. The absence of one or more elements of the deciduous or permanent series is considered one of the number anomalies most frequently found; it

involves the aesthetic, functional and psychological aspect of the patient. A correct multidisciplinary approach is required: orthodontic, periodontal and prosthetic starting from the diagnosis that ends in aesthetics. By evaluating various factors such as the type of malocclusion, the shape of the teeth and the arch, the gingival parables and biotype, the amount of space, the age of the subject, for a multisciplinary and personalized treatment for the individual patient. In order to plan the most suitable therapeutic option, it is necessary to outline a protocol that responds to the prosthetic and profilometric needs of the face.

Materials and methods: The subject we considered had undergone 22 years previously an orthodontic treatment which led to the opening of the spaces for implant rehabilitation. Unfortunately, osseointegration did not occur and they went to fenestration, therefore removed due to bone deficiency. The patient comes to our clinic for an orthodontic assessment and orthodontic planning with aligners. After a careful setup, it is decided to treat the patient by guaranteeing an aesthetic result. We proceed with the avulsion of two lower premolars and the closure of the upper spaces. Elements 1.3 and 2.3 are mesialized to cover the agenetic teeth and restore canine guidance with the first upper premolars. After the request for new OPT and LL, intraoral scanners are used to take the impressions, in order to obtain a better setup with Invisalign. After using 44 upper and 34 lower aligners with weekly changes, slight lower and upper spaces remain and need to center the midline. Then we decide to refine the case with a refinement of 43 other upper and lower masks. The case of the facets on the elements 13 and 23 ends to make them similar to the upper lateral ones and use Vivera only at night. After 20 months the case was concluded with normal cephalometric values and an excellent root parallelism.

Conclusion: Thanks to the aligner therapy, a good orthodontic result was obtained, thanks also to the use of composite veneers, the case report ended with an excellent smile line and gingival parables. We can therefore affirm the Invisalign treatment is an excellent substitute for traditional fixed orthodontic therapy, especially in adults even in the case of extraction or closure of spaces, especially in those patients who require a great aesthetic impact of the therapy and where we do not find excellent compliance in home hygiene with very thin periodontal biotypes.

Cleaning of clear aligners

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Aim: Plaque is the main etiological factor of periodontal inflammation. If the inflammatory state continues, it causes irreversible damage to the periodontium. Periodontal damage is more severe when orthodontic treatment occurs in presence of an inflammatory state. Therefore, the need for correct oral hygiene and the cleaning of orthodontic devices to reduce the bacterial load is evident. This prospective randomized study evaluates the quantitative changes in the bacterial load on the surface of removable orthodontic appliances (Invisalign and Ef braces) after their insertion in different sanitizing solutions.

Material and methods: The present study involved 20 patients deemed suitable for treatment with Invisalign or Ef braces. At T0, each patient underwent a professional oral hygiene session, and was subsequently motivated and instructed to learn the correct home oral hygiene maneuvers. The 20 patients were then divided into two groups: G1 was treated with Invisalign, while G2 was treated with Ef braces. G2 patients were instructed to wear Ef braces for 4 hours during the day and overnight. G1 patients were instructed to wear Invisalign 20-22 hours a day. Both groups were therefore provided with indications for cleaning the appliances with the various sanitizing solutions studied. 3 different cleaning methods ("phases") were tested. Phase 1 involved washing the device with running water. Phase 2 involved washing the device with 0.12% chlorhexidine spray (curadent prototype) and rinsing with water. Phase 3 involved immersion in a solution of water and sodium carbonate and sulphate crystals (Cleaning crystals Invisalign), without rinsing. At the end of each of the 3 phases, samples were taken with sterile stubs for microbiological examination. All 20 patients experienced the 3 stages. G1 performed each of the 3 phases for a week; G2 performed each of the 3 phases for 2 weeks, so that the total hours of use of the appliance before the withdrawal were equal between the two groups. The microbiological samples were analyzed on solid culture media in LB agar. Bacterial colony growth was assessed after 24-48 hours of incubation at 37 °.

Results: the study showed that the use of running water alone does not lead to significant cleansing. With chlorhexidine 0.12% spray there is a reduction of the bacterial load compared to water alone of about 20%. With the solution of water and crystals of sodium carbonate and sulphate there is a 50% reduction compared to water alone. The reduction of the bacterial plaque is more evident in the Ef braces devices rather than Invisalign for both the cleaning methods applied.

Conclusions: the results obtained through the study conducted allow us to affirm that the cleaning of removable appliances with the solution of water and sodium carbonate crystals is the most effective. It is also essential that the clinician properly instructs the patient to properly clean the orthodontic devices.

Invisalign first treatment with mandibular advancement of a Class II malocclusion in a growing patient: a case report

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Aim: Orthodontic treatment with aligners is spreading more and more as a valid alternative to traditional multibrackets orthodontic treatment. Patient compliance and satisfaction are the main reasons that drive research to identify new protocols and new techniques to expand the potential of this type of therapy, increasing the number of malocclusions and patients who can benefit from this type of approach. The use of Invisalign First allows to perform a treatment specifically designed for young patients, combining the advantages of the functional and aesthetic correction of the malocclusion with the possibility of obtaining it with an invisible treatment, leading to aesthetic and social benefits that can be of great importance in quality of life of young patients and mandibular advancement method has proven effective in correcting Class II malocclusion in growing patients. This approach uses the Precision Wings built on the upper and lower aligners to bring the jaw to an advanced position while the front teeth are aligned. This method allows to reduce the use of the intermaxillary elastics at least in the early stages, thus reducing the patient compliance problem in using the elastics. The introduction of the aligners change protocol every 5 or every 7 days allows to reduce, always respecting the limits of biological adaptation to the dental movement, up to 50% of the duration of the treatment. The aim of this case report is to describe the management of a case of II dental and skeletal class in a 9-year-old patient with the mandibular advancement method associated with invisible treatment.
Material and methods: The patient treated in this case report was seen for the first time at the age of 8 years and 10 months. Clinical and radiographic examination revealed a dental and skeletal class II malocclusion (ANB: +5°) with an 8 mm overjet, hyperdivergent profile, lower and upper crowding, narrow upper arch form, deep Spee curve and deviation of the midline.
The treatment was divided into two steps: a pre-advancement mandibular step, obtained with 25 aligners changed every 5 days, designed to dento-alveolar expand the upper arch, derotate the first upper molars, level the arches, normalize the Spee curve and align the anterior group. The second step was the active phase of mandibular advancement, obtained with 40 aligners changed every 7 days. At the end of the treatment the last aligners were used as temporary retention pending a possible final phase of therapy in permanent dentition.
Results: The whole treatment lasted 13 months. The treatment goals were achieved, with the expansion of the upper arch, the recovery of space and alignment, the mandibular advancement, the correction of the deviation of the midline and the improvement of the overjet and overbite. The patient had an excellent compliance and she was very satisfied with the treatment and with the result.
Conclusions: Orthodontic treatment to solve a class II problem in young patients can be performed with Invisalign First with mandibular advancement devices, in a short time and with great satisfaction for the patient.

Thickness of orthodontic clear aligners at the anterior region

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Aim: Clear aligners (CA) are among the most chosen orthodontic therapies for patients who require an invisible treatment. Nowadays, thermoplastic materials are widely used for the fabrication of CA due to their excellent characteristics. These materials allow the fabrication of highly precise devices via a thermoforming process on accurate models of patients'malocclusions. Previous studies showed that the thermoforming process is reliable, but no information is present, if the thickness of the aligner varies according to the vertical height. The aim of the current study was to assess the thickness changes of the CA of the anterior region at different vertical heights.
Materials and methods: Forty CA were included in this study. The thickness of the unused CA was measured at different occlusal points on a 3D model with a dedicated software (Geomagic Qualify 2013; 3D Systems, Rock Hill, South Carolina, U.S.). The software was used to measure the whole thickness of the aligners, by one trained operator. Three points for each tooth from canine to canine were placed on the aligners, both on the left (L) and right side (R) of the maxillary arch. On each tooth were placed a GP (Gingival point), MP (Medial point), IP (Incisal point). All the aligners were studied as passive (no tooth

movement; no shape for attachments). A repeated measures ANOVA, with post hoc tests, was used to assess the differences in thickness among the three point for each tooth.
Results: The repeated measures ANOVA showed that for all the assessed teeth the gingival thickness was thinner than the incisal thickness. In particular for the right upper incisor (U1GR=0.48±0.07; U1IR=0.66±0.08, P<0.001) and the left upper incisor (U1GL=0.49±0.07; U1IL=0.64±0.07, P<0.001) there were the highest differences of more than 0.15 millimeters. The right lateral incisor (U2GR=0.52±0.08; U2IR=0.59±0.09, P=0.043 and the left lateral incisor (U2GL=0.52±0.08; U2IL=0.61±0.08, P<0.001) there were the smallest difference, of less than 0.1 millimeters. Finally, the right canine (U3GR=0.50±0.07; U3IR=0.61±0.09, P<0.001) and the left canine (U2GL=0.51±0.09; U2IL=0.61±0.08, P=0.001) also showed a statistically significant difference. Interestingly, the thickness in all the assessed area ranging from a minimum value of 0.50 mm to a maximum value of 0.66mm, resulted all reduced of more than the 10% respect to the original thickness of the thermoplastic foil used for the aligner manufacturing (0.75mm).
Conclusion: Considering the thickness changes, the CA examined showed different thicknesses on the anterior region according to the vertical heights.

Assessment of somatosensory changes by quantitative sensory testing after 6 months of clear aligners treatment

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Aim: to quantitatively assess the intra- and extra-oral somatosensory changes in patients treated with clear aligners in a 6-months follow-up.
Materials and methods: fourteen (14) healthy adult subjects (10 women and 4 men) free from orofacial pain complains and temporomandibular disorders were treated with a customized set of clear aligners (AIRNIVOL®, Navacchio, Pisa, Italy). To study the somatosensory function standardized quantitative sensory testing (QST) were used before the start of the orthodontic treatment (T0), after 1 month (T1) and after 6 months (T2). In particular, cold and warm detection thresholds (CDT; WDT), cold and heat pain thresholds (CPT; HPT) and pressure pain threshold (PPT) were measured. Both the thermal and mechanical thresholds were measured in the region of the attached gingiva adjacent to the right upper and lower incisors (intra-oral sites), and at the thenar eminence of the right hand (extra-oral control site). The mechanical thresholds were also measured on the dental elements, and the force was applied directly to the crown and vertically to the long axis of the teeth. For each of the variables analyzed the comparison between the time-points was carried out by means of a one-way analysis of variance (ANOVA). Statistically significant difference was set at p<0.05.
Results: With regards to the thermal thresholds a slight reduction of the CDT between T1 and T2 (21.45 ° vs. 17.89 °; p <0.005) at the attached gingiva of right lower incisor was found, while were no statistically significant differences were observed at the thenar eminence and at the right upper incisor. A significant reduction of the PPT at the right upper incisor after 6months (T2) compared to both T0 and T1 (PPT T2: 155.5 kPa, PPT T1: 201.1 kPa PPT T0: 200.6 kPa ; p <0.005) was observed directly on the tooth crown. Moreover a significant reduction of PPT was found at the lower central incisor between T1 and T2 (280.5 kPa vs 209.2 kPa; p <0.005) placing the algometer vertically to the long axis of the teeth.
Conclusion: In a 6-month follow-up, orthodontic treatment with clear aligners does not determine significant changes of the extra-oral somatosensory function. Slight thermal and mechanical intra-oral changes were observed, maybe as a consequence of a structural alteration of the periodontal receptors stimulated by the orthodontic tooth movement.

Evaluation of intra- and inter-operator reliability of a new method for assessing success of aligner orthodontic therapy

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Aim: The use of aligners has spread widely in orthodontic practice because it represents an aesthetic and comfortable alternative to conventional fixed equipment. It is mainly used in the treatment of adult patients who are particularly careful and demanding about the aesthetic tolerability of the devices used. Despite frequent use, not much scientific evidence accompanies the aligners. Studies on the predictability of the orthodontic movement and the efficacy of the treatment are few and not very consistent. Even before studying the efficacy of treatment, it is necessary to find a method that is repeatable and effective to study the dental movements with the aligners. This study aims at verifying the intra- and inter-operator reliability of a novel method for assessing dental

movements after aligner orthodontic therapy.
Materials and methods: A sample of 6 digital dental models belonging to adult patients (2 Males and 4 Females; mean age 38 ± 9 years) who underwent orthodontic treatment with aligners were acquired pre-treatment (T0) and at device removal (T1). All dental models were processed by means of an extraoral laser scanner (Dental Wings). A 3D-3D superimposition procedure was performed by VAM © software to reach the minimum point-to-point distance between the two arches from each patient (T0 and T1). Values of RMS from the entire surface were automatically calculated. After that, those teeth which were expected to shift during treatment were manually isolated and RMS for only the moved teeth was also obtained. Reliability of the manual procedure was tested: the whole procedure was repeated by the same operator twice and by a second operator. Relative technical error of measurement (rTEM) and the Bland-Altman method were used to assess inter- and intra-observer error of the method.
Results: Intra- and inter-operator agreement on the entire model was maximum, with an rTEM of 0.0% and a Bland-Altman of 100%. Intra- and inter- operator agreement for the single shifted teeth was acceptable, with an rTEM of 5,5% and 5,2%, respectively for intra- and inter-observer error. Moreover, Bland-Altman system obtained a value of 84,5% and 87,1%, respectively for intra-operator and inter-operator reliability.
Conclusion: Since studies on the predictability of the orthodontic movement with aligners are not very consistent and most represented by case reports, it is still necessary to find a study method that is repeatable and effective in the analysis of the efficacy of therapy. The exposed novel procedure proved to be a reliable method for the assessment of dental movements after aligner orthodontic therapy.

Correction of anterior cross-bite with "Invisalign first" treatment

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Aim: Anterior cross-bite is a severe aesthetic and functional disorder which frequently occurs during the development of occlusion in children. An early intervention may be crucial to prevent the development of class III malocclusion, as well as anterior teeth mobility, fracture or dental wear and, finally, gum disease. Literature provides us several solutions to treat this malocclusion, including both mobile and fixed appliances. This case report aims to show how the protocol "Invisalign First" may solve anterior cross-bite, allowing us to treat children at an early age in order to intercept the problem.
Materials and methods: We present a case of an 8-year-old girl with the following orthodontic problems: anterior cross-bite of elements 12 and 22, deep bite, midline deviation and narrow upper arch. Through the radiographic examination included in the orthodontic check-up, we also diagnosed skeletal class II malocclusion, hyperdivergent facial type and mandibular incisors lingual inclination. The treatment with Invisalign aligners involved upper arch expansion and correction of cross-bite, deep bite and midline deviation. The first phase consisted of the use of 39 aligners and it was followed by two phases of refinement. The last aligners were designed to maintain the obtained results, before carrying out a future phase of orthodontic Invisalign treatment. The patient changed aligners every 5 days; the first phase lasted 6 months, whilst the second one 8.5 months and, finally, the third one 6 months, for a total of 13 months of treatment.
Results: The obtained results were satisfactory. Invisalign clear aligners allowed us achieving upper arch expansion and gaining space. Moreover, we obtained the correction of cross-bite involving elements 12 and 22, anterior deep bite and midline deviation.
Conclusion: Invisalign treatment is increasingly widespread. Its advantages, such as aesthetics and comfort, make it the first choice for adults and teenagers. Nowadays, the introduction of "Invisalign First" allows treating a wide range of dental malocclusions in younger patients, such as dental crowding, diastema and narrow arches. Its ease of removal improves oral hygiene and the absence of metal elements ensures greater comfort for children, who often accept it more than other appliances. Further clinical studies about the "Invisalign First" protocol are therefore suggested in order to have more scientific evidence on this subject.

Invisalign mandibular advancement in a patient with Class II malocclusion

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Aim: Angle Class II is the most frequent malocclusion in

growing individuals. Skeletal Class II malocclusion can result from either maxillary protrusion, mandibular retrusion, or a combination of both. Nowdays a lot of patients are treated by distalization of the upper arch, although McNamara has shown that 4 out of 5 patients have a mandibular retrusion component. The protrusion of the maxilla does not exceed the 20% of the total cases of Class II malocclusion, and the majority of these cases are significantly caused by mandibular retrusion. The so-called Fränkel manoeuvre, by which the mandible of Class II individuals is moved forward in dental Class I relationship, is important to discern the type of malocclusion and its sagittal discrepancy. Literature shows that the Class II malocclusion division 1 is associated with an increased risk of incisor trauma, due to the increased overjet (OVJ). Early orthodontic treatment for children with Class II malocclusions and overjet more than 6 mm is recommended as a method to prevent incisor trauma and its related long-term sequelae. Typically, these deformities are treated by using functional appliances not very accepted by patients who could compromise the treatment plan. Today patients, even the youngest ones, look for treatments able to improve their aesthetic and bite-jumping performed by Invisalign Mandibular Advancement seems to be well tolerated. Invisalign Mandibular Advancers have "precision wings" which, like all functional equipment, allow mandibular propulsion with forward sliding of the jaw and stimulation of condylar growth. The AIM of the present case report is to describe the early management of a dento-skeletal class II malocclusion division I in growing patients with aesthetical devices.

Materials and methods: 9 years old male patient came in our department with a dento-skeletal Class II malocclusion, a short and retrusive mandible and a convex profile. X-ray evaluation and clinical observation confirmed the mandibular deficiency with mesodivergent growth pattern and increased OVJ (10 mm). Treatment plan consisted in three steps. The first step was performed by 22 aligners, changed every 5 days, in order to expand the dental arches. The second one was performed by 32 aligners with the "precision wings" for the mandibular advancement. These aligners were changed every 7 days for 7 months. Finally, the last step was performed by 25 aligners changed every 5 days. The last aligners are used as contention appliances while waiting for the eruption of the permanent teeth in order to proceed with the final phase of the treatment.

Results: The whole treatment lasted 14,5 months. Class I molar and canine relationship with a normal OVJ and OVB (overbite) were achieved.

Conclusion: The orthodontic treatment performed with Invisalign Mandibular Advancers in the pubertal growth peak can be effective in correcting Class II malocclusion division 1 also through a greater patient compliance compared to conventional functional devices.

Oral surgery

The evolution of surgical techniques in complex rehabilitations of the atrophic maxilla

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Aim: The purpose of this article is to analyze and compare the conventional dento- skeletal rehabilitation techniques of the atrophic maxilla with alternative ones. In order to rehabilitate reduced volume sites, treatment options are either non-invasive therapy that adapts to the clinical situation (short/ angulated/ zygomatic implants) or additional surgical therapy, that relies on augmentation procedures in order to increase bone volume (GBR, sinus floor elevation, onlay bone graft).
Methods: The available literature was screened for randomized clinical trials, prospective cohort and retrospective studies, published in the last 5 years up to May 2020, on the prognosis of implant rehabilitations of the atrophic upper jaw. Twenty-one studies were found, of which only eight met the inclusion criteria. The search keyword used was: "implant rehabilitation atrophic upper jaw".
Results: In these studies 302 patients took part, a total of 988 implants have been placed of which 485 implants had a traditional bone reconstruction associated with a standard implant length. The remaining 503 implants have been rehabilitated with alternative procedures such as zygomatic (141), short (339) and tilted (23) implants. The survival rate of long implants was in the range of 90 - 100%, while the survival rate of non-conventional implants was between 93,3 - 100%. Despite short implants showed fewer biological complications (14), much more were found in zygomatic and tilted implants, which seems to be similar to the complications verified in long implants placed in augmented bone (48). No statistically significant differences were observed. Clinical data, on the other hand, reported that short implants are associeted with less comorbidity.
Conclusions: Even if more complications were reported for zygomatic implants, they proved to be a reliable rehabilitation modality for severely atrophic maxillae. In the past, the use of short implants in clinical practice was reduced as they were associated with high failure rates, which was mainly due to their previous smooth surfaces. Their application has considerably increased due to their superficial treatment, and they can be considered a suitable, cheaper and faster alternative to longer implants placed in an augmented bone for rehabilitating edentulous atrophic jaws. Considering the results of the different studies we can assert that short implants, zygomatic implants and tilted implants are a valid alternative to conventional implants with bone graft for the complex rehabilitation of the atrophic maxilla.

Dental implant-prosthetic rehabilitation using a conical abutment connection in a type I diabetes mellitus patient

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Aim: Implant-prosthetic rehabilitation in diabetic patients has always been a matter of challenge because of the high prevalence of peri-implant

tissue remodeling that occurs in these subjects. The considerable amount of research performed in the field of implants led to the development of new types of connection, which allowed minimizing the bacterial invasion within the micro-gap present between the implant platform and the prosthetic component. The aim of this report was to verify whether using a conical abutment connection in diabetic patients could help in achieving any benefit in terms of peri-implant mucosal tissue and bone resorption.

Methods: A 28 years old female patient, suffering from type 1 Diabetes Mellitus, presented to our clinic because of severe pain at tooth 26 due to a severe carious process involving the furcation. Extraction of the profoundly compromised tooth was required. Subsequently, considering the paucity of the remaining bone as well as patients' general conditions, a two-step implant-prosthetic rehabilitation protocol of the edentulous area was proposed. After three months from the tooth extraction, an endoral radiography was performed and a CBCT (Cone Beam Computed Tomography) was prescribed for an adequate surgical planning. Second level radiological evaluation showed a vertical amount of residual bone of 0,8 mm, thus an implant of diameter 3.8 mm and length 11 mm was inserted using Summers' technique. Considering the complicated management of vertical bone and mucosal tissue loss in diabetic patients, an implant with a conical abutment connection was used. During surgery, the implant site was prepared up to a length of 8 mm, then a crestal sinus lift was performed according to Summers' technique. The implant (TTC, 3.8 x 11, Winsix, Ancona, Italy) was inserted with a 35 N torque, submerging the platform by 1 mm. The flap was sutured with a 4/0 absorbable stitches. After a recovery period of three months, the fixture was uncovered and a dental impression was immediately taken. A temporary prosthesis was initially used and then, after three months, replaced by a definitive one made with metal-ceramic. A control x-ray was performed at baseline, after six months and after one year.

Results: At each radiographic control, peri-implant tissues showed high stability with an almost absent reduction in parameters. Changes in bone level were assessed using a calibrated endoral x-ray, while the mucosal level was measured with a periodontal probe.

Conclusions: The conical abutment connection is a very effective method to prevent peri-implant bone and mucosal reabsorption, especially in patients with comorbid conditions such as type I Diabetes Mellitus, thanks to the ability to drastically reduce bacterial invasion between the implant platform and the prosthetic component.

Stabilized techniques and regenerative technologies for horizontal increments in atrophic bone crests

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Aim: Implant-supported prosthetic rehabilitations are constantly growing and often require complex surgical interventions, as it is necessary to obtain qualitative and quantitative standards of suitable bone support. The early loss of dental elements can result in a loss of bone volume in the area of interest. In the last decade, guided bone regeneration (GBR) has been very successful, given the ability to regenerate the alveolar bone. The principle on which GBR is based is that of using membranes whose function is to exclude from the graft certain tissues defined as rapid proliferation to promote the growth of tissues defined as slow proliferation such as bone tissue, in association with a bone graft scaffold.
The case report examined aims at restoring the correct bone volumes for implant-prosthetic rehabilitations through guided bone regeneration (GBR). In the case report, a resorbable type membrane was used in association with a mixed bone graft, of a heterologous and autologous type in order to provide structural support to the defect site and to promote the intrinsic regenerative potential of the host tissue. In a second step, two endosseous implants were inserted in the regenerated site, finalized with temporary crowns in resin and final in metal-ceramic.

Methods: In the case report examined, a prosthetic implant rehabilitation was decided by performing a cone-beam CT scan of the dental arches for this purpose. The three-dimensional images showed a serious horizontal bone defect and proceeded, therefore, by planning a guided bone regeneration of the site. After local anesthesia, a flap is set up for bone uncovering. Following passivation of the flap, the site, which will accept the graft at the same time as the membrane, is prepared by scraping with bone scraper. Then the membrane is positioned on the vestibular side, which is stabilized by using 2 titanium pins. Only after stabilization of the membrane is a bone mix prepared 70% with autologous bone and 30% with heterologous bone of porcine origin inserted. Once the membrane covering the graft is placed, it is stabilized with absorbable sutures. Finally, after the flap has been turned over, mattress sutures and

stitches to close the wound are applied. After 10 days, the sutures are removed. After 4 months, we proceed with the acquisition of new cone beam CT images aimed at verifying the bone volumes regenerated after surgery using the GBR technique and at the same time the position of the arch implants is examined and determined. Implant insertion is therefore scheduled.
Results: The treated case did not present post-operative complications such as suture dehiscence, membrane exposure or secondary infections. From the three-dimensional images (TC Cone Beam) performed before and after the regenerative intervention we can see a considerable volume of regenerated bone, about 4 mm, such as to allow appropriate programming for implant insertion in a prosthetically guided manner.
Conclusion: This case-report, thanks to an accurate diagnosis and a correct treatment planning, aims to overcome the problems of bone atrophy of the edentulous crest by using the GBR protocol, restoring the bone volumes suitable for the type of planned rehabilitation such to be able to insert the implants in the correct prosthetic position.

Correlation between the position of the lower third molar and the mandibular morphology: a three-dimensional analysis

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Aim: The aim of this study was to evaluate the correlation between the position of mandibular third molar and mandibular morphology, through the use of CT Cone Beam (CBCT) scans and 3D elaboration of the mandible.
Methods: The retrospective study was conducted at the Oral Surgery clinic, Department of Health Sciences, of the Magna Graecia University of Catanzaro. The study population was represented by all patients with 3.8 and / or 4.8, from the age of 18 to 32 years, who had performed a CBCT. CBTC scans were acquired in DICOM format, processed using the SimPlant O&O software and subjected to a morphometric analysis. For bone segmentation, the "bone" window was set to a minimum value of 250 HU and a maximum of 2310 HU. 3D reconstructions of the mandibular structures were carried out in order to perform a morphometric analysis. For each jaw, specific cephalometric points and related measurements were identified: gonial angle (Co-Go-Me), mandibular ramus high (Co-Go), mandibular ramus width (R1-R2), mandibular ramus divergency (Co-Go-R2), distance between the distal surface of the second lower molar and the anterior border of mandibular ramus (M2-R). The results obtained were analyzed through a descriptive, bivariate and multivariate statistical analysis using the STATA software (STATA 11, Texas, USA). Alpha = 0.05 was set as the significant level.
Results: In the study, 29 women and 42 men were enrolled, with an average age of 26.3 ± 4.6 years. 124 lower third molars were analyzed, with an average GA value of 121.2 ° ± 3.8 °. This value allowed to distinguish two study groups: High-Gonial Angle group (H-GA), with an average value of 125 ° ± 2.5 ° and Low-Gonial Angle group (L-GA), with an average value of 118.5 ° ± 1.9°. The bivariate analysis performed showed a statistically significant difference between the two groups: both the height and the width of mandibular ramus are significantly greater in the L-GA group ($p < 0.0001$). The analysis of the position of the third molar showed a statistical significance with age and sex, with the GA, with the M2-R, with the R1-R2 and, finally, with the Co-Go-R2.
Conclusion: The results obtained confirm a statistically significant correlation between the position of the lower third molar and the mandibular growth pattern. Specifically, the impaction of the lower third molar was related to a reduction of the gonial angle value.

Zinc-l-carnosine mouthwash after third molar surgery: a split-mouth study on oral surgical wounds healing

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Aim: The primary goal of wound management after dental extractions is to obtain wound closure in the shortest possible time with minimal pain and discomfort and without complications, thus achieving by modulating of the inflammation phase and initiation of proliferation phase in the wound healing process by heterogeneous substances. Zinc-L-Carnosine suppresses Nuclear Factor k chain transcription in B cells, reduces the expression of Tumor Necrosis Factor α and stimulates the expression of Heat Shock Protein 72, possibly resolving inflammations and enhancing repair of injured mucosa. The aim of this split-mouth study is to evaluate the effects of zinc-L-Carnosine on the healing of oral mucosa after dental removal.
Methods: A split mouth observational study was performed on 20 patients (8 males, 12 females) needing extraction of lower wisdom teeth on both sides with open flap surgery, followed at the Complex Operative Unit of Odontostomatology of University of Bari

Aldo Moro. After the first extraction, patients were instructed to clean wound only with saline solution (NaCl 0,9%) 4-5 times per day. The extraction of the contralateral molar was performed after 1 month but during the post-operative period the patients received a zinc-L-carnosine mouthwash (Hepilor® Liquido, Azienda Farmaceutica Italiana) for wound cleaning to be used 4 times per day until the complete mucosa healing. The same post-operative therapy was prescribed to all patients (Amoxicilline 1gr tablets, 3 times per day, acetaminophen 1000mg tablets, 2 times per day). Surgical wound healing was assessed by periodic clinical follow-up at the 7th (during which the stitches were removed), 10th, 15th, 20th day after the surgery. Patients were invited to complete a questionnaire for evaluation of the post-operative pain (measured through a 10-cm Visual Analog Scale for Pain, ranging from "no pain" to "worst pain").

Results: The mean time for healing using Hepilor® Liquido mouthwash was 9.43 ± 2.37 days (mean ± SD), and the reported mean pain was 5.71 ± 3.30 cm (mean ± SD); in contrast, the mean time for healing without Hepilor® Liquido mouthwash was 12.86 ± 2.19 days (mean ± SD) and mean pain was 6.43 ± 2.07 cm (mean ± SD). The difference between the healing times of the two observations was significative (P=.002), instead of the reported pain (P=.454).

Conclusions: This study results suggest that Hepilor® Liquido mouthwash after lower wisdom extraction seems to accelerate the healing of surgical wounds, but it doesn't represent an adjunctive aid for the management of post-operative pain.

Conservative surgical removal of a maxillary intrasinus ameloblastoma: A 24-months follow-up

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Aim: The purpose of this study is to present a clinical case of ameloblastoma treated using a conservative surgical enucleation with a 24 months follow-up. Among odontogenic oral tumors of epithelial origin, ameloblastoma is the most common, it usually doesn't form metastasis and it is considered as a benign tumor with a locally invasive growth pattern and destruction of the jaws and surrounding tissues. This lesion is usually found randomly in routinely dental radiographic checks but the diagnosis is primarily histological. Mostly present in the mandible and has to be detected and treated as soon as possible to avoid a much more complex therapy.

Methods: A 68-years-old woman was referred to the Dentistry department of San Raffaele hospital for a well-defined, unilocular radiolucent lesion in the posterior right maxilla, accidentally found on routine dental check. A conventional intraoral examination revealed a bony hard, non-compressible, non-fluctuant and non-painful swelling in the right posterior maxillary vestibule. The presence of the osteolytic lesion was confirmed by a I level (OPT) and II level (CBCT) radiographic exam, which also revealed an involvement of the right maxillary sinus. The treatment plan consisted of a conservative surgical removal limited to the healthy margins of the lesion under local anesthesia with articain 4% and adrenaline 1:100.000, far from the site to avoid a biopsy impairment. After a full-thickness trapezoidal flap was elevated, a trap door has been created by ostectomy and the enucleation of the lesion was carefully performed. Subsequently an adipose Bichat bulla flap was performed and placed on the entirely bone defect using a 3/0 resorbable suture to close the defect, then the sample (whitish, nodular, of 4 cm maximum diameter) was sent for histopathological examination.

Results: The histological examination showed solid basal cell type ameloblastoma (beta chain+, p63+,CK19+, CKpool+, D240 focal+, actina-, SOX10-, CD117-). The patient has referred no post-operative pain and the lesion healed without any complication. At the 24 months follow-up visit no recurrence of the lesion was observed in the patient on both clinical and radiological examination.

Conclusions: The clinical and radiographic appearances of ameloblastoma are variable, therefore the diagnosis is often very difficult and must be validated and confirmed by histological exams. Management of ameloblastoma is still controversial. Various treatment methods of ameloblastoma have been suggested in relation to many factor, such as the tumor type and clinical presentation. Unicystic ameloblastomas are usually treated conservatively with curettage, enucleation and cryosurgery, while solid of multicystic ameloblastomas are usually treated with radical surgery that often requires plate reconstruction or more extensive reconstructive surgery. Two other major problems are associated with recurrent ameloblastoma: the development of metastasis, termed malignant ameloblastoma, and the transformation into an ameloblastic carcinoma, both with rates of 2% in recurrent ameloblastoma. The therapeutic use of adjuvant radiotherapy with or without chemotherapy for positive margins of recurrent and un-resectable ameloblastomas have resulted in mixed outcomes. However, their use is still strongly advocated to treat ameloblastic carcinoma

and recurrent ameloblastoma after multiple post-surgical recurrences. During treatment planning, it is imperative to balance the efficacy of radiotherapy with risks of developing future life-threatening malignant transformations. Considering the absence of relapses at 24 months, a minimally invasive approach of surgical removal of ameloblastoma seems to be an effective treatment.

Surgical treatment of MR-ONJ with minimally invasive surgery: A case report

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Aim: Medication-related osteonecrosis of the jaws (MRONJ) is an uncommon condition that can occur after exposure to drug agents used to prevent bone complications, such as Bisphosphonates or Denosumab, or treatment with other agents, such as angiogenesis inhibitors. In a review article of February 2019, patients scheduled to receive high-dose of Bisphosphonates or Denosumab and individuals who have received low-dose of Bisphosphonates or Denosumab for at least three years or more deemed at high risk of development of MRONJ. An American Association of Oral and Maxillofacial Surgeons (AAOMS) position paper on MRONJ stated that a 2-month drug suspension before and after dental surgery in patients receiving Bisphosphonates might be wise. The purpose of this paper is to present a case report of mandibular osteonecrosis due to the placement of implants in an elderly patient undergoing treatment with high doses of Bisphosphonates.
Methods: A 92-year-old woman came with a referral from her GPD to the Dentistry department, San Raffaele Hospital, Milan. Her medical history included: breast cancer (healed), severe osteoporosis, cardiovascular disease, partial nephrectomy, hypothyroidism, hypertension, and chronic gastro-intestinal pathologies treated with different pharmacological therapies. The patient had been taking Bisphosphonates per os formulation for more than ten years: the first seven years with low doses, then at high doses. The intraoral examination revealed in the right mandible a vegetating neoformation of 2 cm and an area of osteonecrosis of circa 1.5 cm in correspondence of three implants. Incisional biopsy of the neoformation was performed and, suspecting BRONJ, OPT, and CBCT scan of the lower jaw demanded. Antibiotic prophylaxis and rinses with chlorhexidine mouthwash 0,20% also prescribed. During hospitalization at another hospital, for the treatment of blood anemia and waiting for a transfusion, she had a partial spontaneous expulsion of bone seizure from the right mandible; after the dismission, the surgery was scheduled. Under local anesthesia, right mandibular degloving was performed, and bone sequestration with contextual dental implants was removed from 41-43 ridge. Then bone cavity revision was achieved at 44-48 site, preserving sensitivity and functionality of the lower alveolar vascular-nervous bundle. After suturing with 4/0 Vicryl, the cavity was filled with povidone-iodine to reduce the infectious burden, and the patient received dedicated post-surgical instructions.
Results: Unfortunately, due to the old age and the precarious patient's condition (hypertension, anemia, aortic stenosis), it was not possible to document this clinical case over time. However, the first clinical follow-ups after the surgery were positive, with the disappearance of the erosive and granulomatous signs in the mucosa and a presumable bone-healing pathway.
Conclusion: Patients receiving high-dose Bisphosphonates for more than three years are at high risk of BR-ONJ. The European Society for Medical Oncology has stated that "before the beginning of Zoledronic acid or Denosumab therapy, patients should undergo an oral examination and appropriate preventive dentistry, and b advised on maintaining good standards of oral hygiene". Therefore, in this type of patient, great care must be taken before performing invasive dental procedures, such as dental extractions or implants placement.

Modified Khoury technique using a xenogeneic cortical lamina in treating horizontal ridge defects: a clinical and histomorphometric prospective study

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Aim: Khoury's split bone block technique, based on harvesting an autograft from the mandible buccal

shelf, demonstrates excellent regenerative results but is associated with significant patient's morbidity due to the necessity of a donor site. The aim of this study is to assess clinical, radiological and histologic outcomes of a modified Khoury technique, consisting in a xenogeneic cortical lamina and autogenous cortical bone chips, in the treatment of horizontal ridge defects prior to implant placement.
Methods: Patients requiring horizontal ridge augmentation prior to implant insertion were recruited, after eligibility assessment according to systemic and local inclusion and exclusion criteria. After full thickness flap reflection and accurate debridement of the defect, a porcine cortical lamina (Lamina Hard, Tecnoss, Italy) was shaped and fixed with micro-screws to recreate the bony envelope. The entire defect, comprised between the lamina and the residual bone crest, was then filled with autogenous bone chips harvested from the buccal cortical plate surrounding the defect with a manual scraper (Safescraper Twist, Meta, Italy). After 5 months of healing, bone core specimens were retrieved with a trephine bur mounted on an implant handpiece and dental implants were inserted in the biopsy sites. Histologic and histomorphometric analyses were performed, together with quantitative radiological evaluation of CBCT scans obtained at baseline and before the second surgery.
Results: Nine patients were enrolled and treated with the insertion of 13 implants. No post-operative complications were recorded during the healing period. Nine bone specimens have been harvested and histologic assessment showed absence of inflammatory infiltrate, almost complete resorption of the bone chips, which were substituted with mature lamellar bone (mean volume 36 ± 12%), together with marrow spaces. Mean gain of horizontal width was 5.44 ± 2.7 mm. All the 13 implants resulted satisfactorily in function at 12-month follow up. Histologic signs of lamina remnants were found in almost all the samples.
Conclusion: This preliminary study suggests that horizontal ridge defects can be safely treated with this low morbidity approach, obtaining excellent clinical and histomorphometric results. Future trials will better explore the efficacy of this procedure, in comparison with treatment alternatives.

Surgical extraction of an impacted mandibular canine: Case report

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Aim: The present study describes the case report of a transmigrated canine associated with a follicular cyst located near the inferior border of the mandible in a 15-year-old female patient.
Methods: The patient (female, 15-year-old) came at the Department of Dentistry of the San Raffaele Hospital with a slight pain in palpation in the region of the mandibular symphysis. In the anamnesis no previous trauma occurred and during the objective examination a deciduous canine in the 4th quadrant was discovered. All lower anterior teeth had positive results when subjected to the vitality test. Then, an orthopantomography and a computerized tomography were prescribed.
The radiographic investigations showed the presence of an included transmigrated canine in the 4th quadrant with an attached cyst. This tooth was positioned horizontally along the lower edge of the mandible, under the roots of the lower incisors and in accordance with the type T2 of the classification of Mupparapu In the light of these radiographic considerations, the extraction of the transmigrated canine with the contextual enucleation of the cyst was planned.
Results: Under local anesthesia (Optocaine 20 mg/mL with adrenaline 1:80,000) a paramarginal incision from canine to canine and release incisions from both sides were realised to preserve the interdental papillae and the periosteal vascular-nervous structures. An osteotomy was then realised to expose the crown and part of the root. To remove the impacted element, a small notch at the amelocementitious junction was made and the canine was dislocated and avulsed with the aid of a Berry lever. After the enucleation of the cysts, the curettage of the alveolus was made and the residual cavity has been irrigated with copious physiological solution. Collagen sponges were applied to promote blood clot of the alveolus and the correct bone regeneration. The flap was adapted and the suture in the various muscular and mucous planes were performed with 3–0 resorbable thread. An extraoral compression bandage was performed and a postoperative theraphy with 875 mg amoxicillin + 125 mg clavulanic acid three times a day for 6 days was prescribed. The patient could optionally continue the analgesic therapy with ibuprofen 600 mg to reduce the post-operative pain. The evaluation of soft tissues was made after one week and it reported excellent healing. The removal of stitches was performed in order to further improve the patient's comfort degree.
Conclusion: A dental transmigration involving the mandibular canine is a relatively rare developmental anomaly and it's more frequent in women. Nevertheless, the probability of diagnosing this disorder is now greater due to more common CBCT and panoramic radiograph examinations, which are

the radiographic investigations of choice to make the correct diagnosis. Considering the problematics of this case, which are the presence of a dental cyst, painful symptoms and T2 localizations of Mupparapu's classification, the extraction of the transmigrated tooth and the enucleation of the cyst was considered to be the best course of action. Since the transmigrated canine is often associated with the presence in the arch of the corresponding deciduous for a longer time than the normal exchange, the root of the corrisponding deciduous tooth could be left in place if the reabsorption of the root had not occurred.

Left maxillary sinusitis with odontogenic origin in relation to ectopic tooth 2.8 with follicular dentigerous cyst: combined transnasal and oral endoscopic approach. Case report

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Aim: of the study: describe the management of combined transnasal and oral endoscopic orosinusal pathology.
Methods: a 54-year-old patient underwent dental and otolaryngological evaluation for left odontogenic maxillary sinusitis in relation to a radiotrasparent lesion of an ectopic element 2.8. The symptoms reported at the time of access to the hospital were nasal obstruction and nocturnal rhonchopathy. At the ENT evaluation in videorinoscopy with rigid optics, there was a complex deviation of the nasal septum and no evident pathological secretions in progress. While on inspection of the oral cavity the mucous membranes appeared unscathed and there were results of extraction of element 1.6. The radiological examination, face CT, showed the left maxillary sinus almost completely obliterated by a cystic appearance, with slender calcified walls and homogeneous content that has a dental element, probably the 2.8 which fenestrates the vestibular cortex (the lateral wall of the maxillary sinus). This formation erodes the medial wall of the sinus, obliterating the ostio-meatal complex and imprinting the ipsilateral ethmoidal cells. Biohumoral tests showed normal coagulation parameters and normal indices of renal function, liver function and ionemia. The patient underwent a general anesthesia and oral intubation with a combined left anterior FESS operation and a contextual closure of the orosinusal communication with advancement of the Bichat fat pad. The patient then returned to control after 15 days and six months, showing good healing and no sign of recurrence at the rhinoscopic check and on the physical examination of the oral cavity.
Results: based on the clinical and radiological aspect, the diagnosis of a follicular dentigerous cyst (WHO 2017) covered by a multi-layered, non-keratinized paving epithelium, with moderate chronic inflammation, including gigantocellular and cholesteric crystals, can be reached from the microbiological and histological examination. Necrotic amorphous material coexists including rare hyphae and fungal spores, with therefore mycotic and actinomycotic superinfection.
Conclusions: the combined oral and nasal intervention, allowed by the collaboration between the oral surgeon and ENT, has made it possible to shorten the healing time and to resolve the pathology without any sign of recurrence. Furthermore, according to our approach, the optimal management of the sinus pathology related to the odontogenic cause is no longer purely dental or otolaryngology when there is involvement of several paranasal sinuses and a complete or partial obliteration of the osteomeatal complex. Therefore the interventional contemporaneity in order to exclude recurrences and resolve the pathology is desirable.

Computer-guided implant surgery used in a patient with a Kennedy Class III in the upper jaw: A case report

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Aim: The study aims to show how to deal with a case of upper intercalary edentulism in computer guided implantology, instead of with conventional implantology, showing potentially achievable aesthetic results.
Methods: A patient comes to our attention due to an upper intercalary edentulia, in Kennedy's III class. It is decided to perform an implant-prosthetic rehabilitation in computer guided implantology. The case is designed in digital format, combining the STL files of the extra-oral scanner of the plaster models with the files in Dicom format of the 3D examination of the upper jaw arch. A prosthetic template is thus performed on the digital model. Based on the prosthetic design, the implants are positioned and a surgical template is required, to be applied the day of surgery. On the day of surgery the previously performed surgical template is placed on site and the computer-guided implantology drill kit will be used. Only the operculae are performed on the crestal mucosa through the dedicated mucotomes, without opening any flap. After removing these two gingival mucosa capsules, the drills dedicated to computer-guided implantology are passed up to the predetermined diameter for the realization of the implant alveolus.

Always through the surgical template, guided implants are applied. The following diagnostic tests are required a pre-operative orthopantomography (T0), cone beam at the time of the case design (T1), intraoral x ray at the time of dental implants application (T2), an orthopantomography after prosthesis application (T3).
Results: The patient's post-operative period was null with no swelling and tenderness, the operation was not very invasive, with maximum predictability of results. Four months after the surgery, two single prosthetic crowns are screwed onto the two previously placed implants. Having established in a virtual way both the location of the implants and the prosthetic crowns, thus previewing what could have ideally been the finished work, the realization of the treatment as a whole was certainly simpler compared to a surgical technique and "traditional" prosthetic construction.
Conclusions: In computer-guided implantology the application of implants is prosthetically guided, therefore the results are much more predictable and the surgery is much less invasive than the conventional one. Therefore in this type of surgery, the pre-operative component is much more elaborate, but the intra-operative part is much less inquisitive and invasive than conventional implant surgery.

Bone remodeling of alveolar ridges: literature data evaluation

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Aim: Despite tooth extraction usually proceed with no complication for the patient, remodeling of alveolar ridges results in both horizontal and vertical changes of hard and consequently soft tissue dimensions. The extension of these changes is important for decision-making and comprehensive treatment planning. Either if we are assuming to rehabilitate the patient with dental implants or with prosthetic rehabilitation. The clinician should prior know biological events, if don't want to deal with unforeseen complications during treatments. The aim of this review is to evaluate dental literature to assess the medium, both vertical and horizontal, dimension changes of the hard tissues of the alveolar ridge, following tooth extraction.
Methods: A search on the main electronic databases as Pubmed, Chocrane library, Medline was performed. The bibliographies of review articles were checked, and personal references were searched. The searching was made to identify randomised controlled clinical trials and prospective cohort studies that evaluate just human bone healing. No date inclusion criteria were used. Only studies reporting on undisturbed post-extraction dimensional changes were included, articles reporting socket preservation healing were not included. Another inclusion criteria used was the observation time of the healing, that must be more than 3 months. Were included studies which collected data using surgical re-entry evaluation of acrylic stent or intra-operative measurements, or using radiographic measurements and that reported them either by percentages of changes or millimeters of reduction. Average and percentages of the dimensional changes over time were calculated when possible.
Results: Finally we took in consideration articles published between 1997 and 2012. The literature search yields 18 representative articles which comply with the specifics established. Unfortunately some good studies with excellent data were not included because performed on animal model, nevertheless they can help understand better the alveolar healing process. In human hard tissue, horizontal dimensional reduction (3.54 ± 0.8 mm) was more than vertical reduction at 3 months (1.37 ± 0.96 mm) took on buccal plate and (1,73 ± 1,09 mm) after 6 months of healing. Percentage vertical dimensional change is believe to be 11–22% at 6 months and between 29 and 63% at 6–7 months.
Conclusions: The studies evaluated demonstrated rapid reductions in the first 3–6 months, followed by gradual reductions in dimensions thereafter. The horizontal reduction in the coronal area of the alveolar ridge is much more prominent than in the apical part of the ridge that keeps unaffected dimension, the horizontal changes are also more emphasized than the vertical ones, that are still mostly concentrated on the buccal plate. Even if the lingual plate undergoes unavoidable modifications, this area of the ridge seems to be much more preserved by the remodeling events than the buccal area.

Hypertrophic clot: post-extractive complications in patient under anticoagulant therapy

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Aim: Teeth extraction is the most common oral surgical procedure. Teeth extraction may yield intra and post-operative complications, that include: tooth fractures, luxation of adjacent teeth, fracture of cortical plates, displacement of tooth or root in the maxillary antrum, soft tissue lacerations, adjacent bone fractures, hemorrhage, dry and wet alveolitis, trismus and hematoma (1). The hypertrophic clot

is less common: this is a vascularized exophytic neoformation that crumbles during chewing, and cyclically recurs. This lesion takes shape after the platelet phase, when the fibrin cap – which does not go into self-resolution –periodically breaks and generates extravasation, finally resulting in recurrent bleeding (2). Histologically, the hypertrophic clot differs from common vascular lesions as it consists of an accumulation of fibrin. Anticoagulant drugs administration can contribute to the development of this complication. A high percentage of patients undergoing teeth extraction regularly take this category of drugs. However, this dosage must be appropriately tailored in order to reduce any bleeding complications (3). We hereby report a clinical case of hypertrophic clot in a patient on low-molecular-weight heparin (LMWH) therapy.
Methods: A 88-year-old male patient was referred, in emergency, to the Clinica Odontostomatologica for recurrent bleeding in zone 2.5 in the previous 30 days. The symptoms started after an extraction in the same site. Anamnesis reports therapy with: antihypertensive, diuretics, beta-blockers drugs and LMWH at a dosage of 4,000 I.U. twice daily. In the post-extractive examination, an exophytic neoformation of purplish red color with elastic consistency at palpation was detected in the area of the left upper second premolar (2.5).
Results: fter diagnosis of hypertrophic clot, surgical therapy was performed under local anesthesia to remove the lesion, using a cold blade scalpel, followed by local hemostasis with collagen sponge and vycril 3.0 stitches. Subsequently, the patient was discharged and the dosage of LMWH is decreased from 4000 to 2000 U.I. After 7 days, the follow up showed no new hypertrophic clots and the patient reported resolution of clinical symptoms.
Conclusion: In conclusion, the hypertrophic clot requires the clinician to remove it. For the management of a patient under anticoagulant therapy, a combined approach between the dentist and the treated clinician is warranted, as dosage adjustment of concomitant medications may be needed. To prevent hypertrophic clots formation, the operator should optimize local hemostasis techniques.

Sinus lift complications: a retrospective cohort analysis on 68 patients at 9-year follow-up

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Aim: The main aim of the study was to assess the rates of complications for sinus graft surgery.
Methods: A retrospective cohort study was performed on consecutive patients treated at the Oral Surgery Department of University of Florence (Florence, Italy). Patients who had undergone a computer tomography before sinus surgery (T0), an orthopantomography after implant surgery (T1) and a second orthopantomography at the follow-up (T2) were included in the study. Variables for sample description, type of biomaterials and implant characteristics were also collected. At the follow-up, all survived implants were clinically and radiographically (OPT) evaluated. The complications analyzed in the study were divided in complications during surgery (represented by perforations and haemorrhage), and complications after surgery (represented by oroantral communication and infection).
Results: Sixty-eight lateral sinus lifts were performed in 48 patients and 93 implants were inserted. Mean follow-up established was 9±1,8 years. In 14 cases of sinus augmentation, premature complications leading into 3 graft failures were recorded. A total of 19 implants failed. The analysis showed that patients and sinus related factors did not influence premature rate of complications. The complication rate was 20,6%: 9 cases of sinus perforation, 3 cases of infection and 2 cases of oroantral communication (OAC). Stitches and collagen membranes were used to handle the perforation, while the infection was treated with a specific antibiotic therapy (amoxicillin associated with metronidazole). These treatments resulted in 90% of successful sinus surgery. The OAC was resolved with both FESS and intraoral mesh surgery leading to 85% of successful sinus surgery. In a total of three cases it was not possible to insert implant. The residual bone height (RBH) proved to have a significant influence on mid-long term implant failure, with odds ratio (OR) of 3.8 (p-value 0.0034) for each millimeter of bone lost (compared to the residual bone height measured before the surgery). A statistically significant complication rates difference was hihlighted between smokers and non-smokers group, with OR of 8.3 (p-value 0.0173). No statistically significant difference was found when considering implant failure and the biomaterials used for sinus lift, nor among various implants type surfaces.
Conclusions: Lower levels of residual bone height (RBH) prior to the sinus surgery and smoking habits had negative prognostic effects on dental implants placed in grafted sinuses.

Solitary bone cyst of the mandible: a case report

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Aim: Solitary bone cyst (SBC) is a rare nonneoplastic disorder of the jaw bones. It is defined as "an intraosseous cyst having a tenuous lining of connective tissue with no epithelium". Occurrence of SBC is generally seen during the first two decades of life with higher male predilection. This lesion is usually asymptomatic and characterized by slow growth and therefore commonly diagnosed incidentally during routine radiographic examination. Its etiology remains uncertain, though traumatic events including dental extractions have been believed to be the main cause of SBCs. We report a case of solitary bone cyst of the mandible.
Methods: A 17-year-old male patient came to our hospital for a dental visit. The patient gave a history of trauma during childhood. Intraoral examination did not reveal missing teeth. Mandibular and maxillary regions showed no soft tissue abnormality or bony expansion. The periodontium was noted to be healthy with no evidence of gingivitis or tooth mobility, there were no carious lesions either. A routine panoramic view radiograph revealed an oval, well-delineated unilocular radiolucency in left mandibular area. Radiolucency extended into 34-38 area and showed a scalloped appearance. Involved teeth showed no displacement. Pulp necrosis in teeth 35 and 36 was diagnosed and root canal treatments were performed. The CBCT showed intact bone walls and no thinning or periosteal reaction. Surgery was programmed under general anesthesia. A full-thickness mucoperiosteal flap was elevated in the involved area. The surgical approach to the lesion was performed by corticotomy of buccal aspect of the lesion with a round burr, revealing a vacant cavity without an epithelial component. Other two bone accesses were created and curettage of the cavity was performed to induce bleeding into the lesion. The flap was closed with a Vycril 3-0 suture.
Results: Aspiration from the cystic cavity revealed no pus or serosanguinous fluid or haemorrhage. It was done to rule out other types of injuries. The preceding findings suggested the lesion to be solitary bone cyst.
Conclusion: The definite diagnosis of solitary bone cyst is invariably achieved at surgery when an empty bone cavity without epithelial lining is observed. The surgical exploration serves as both a diagnostic maneuver and as definitive therapy by producing bleeding in the cavity.

Third molar extraction: irrigation and cooling with water or sterile physiological solution. A double-blind randomized study

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Aim: The extraction of mandibular third molars is one of the most common dental procedures in oral surgery. The possible side effects and complications are many among which pain, trismus and swelling are the most common. Many attempts have been done, in order to reduce the incidence rate of these complications. The aim of the present study is to evaluate if there is a significant reduction of pain scores, trismus and swelling depending on whether sterile saline solution is used instead of water, for the irrigation of the surgical field and for drill cooling during osteotomy and tooth separation.
Methods: 22 patients have been enrolled for this protocol (11 females and 11 males), in good general health. 18 needed bilateral inferior third molars extractions, whereas 4 required just one tooth extraction. A total of 40 teeth have been removed (half using sterile saline solution and half using water), between April 2016 and May 2017. The Visual Analog Scale scores for pain referred by the patients in the 7 days following the surgery have been considered as the primary outcome of the present study, whereas the sieric concentration of the C Reactive Protein before surgery and 48 hours after surgery has been used to evalutate inflammation. Trismus and swelling have been evaluated immediately before surgery and 2 days after tooth removal. The distance from the tragus to the pogonion (the most prominent point on the chin), the distance from the tragus to the lateral canthus of the homolateral eye, the distance from the tragus to the labial commissure on the homolateral side and the distance from the gonion (the meeting point of lines tangent to the posterior margin of the ramus and to the inferior margin of the mandible) to the homolateral nasal wing have been measured in order to evaluate svelling. The maximal mouth opening (trismus) has been calculated as the distance between the incisal edge of the central upper and lower incisors.
Results: The study was conducted on a sample of 40 extractions performed in patients from 18 to 37 years of age. The VAS scores reached maximum levels two days after surgery, and then they gradually decreased, but the values have been similar in both groups. As far as swelling and trismus are concerned, there were no statistically significant differences. Serum CRP levels did not change significantly during the postoperative period. In two patients those values raised 2 days after surgery, but they returned to normal range 7 days after surgery. There were no long-term complications of the third molar extraction procedure in our series. One patient reported fever (38.5°C) on postoperative day 1. One patient experienced a lesion due to stretching of the labial commissure.
Conclusion: In conclusion, no statistically significant differences have been noticed between the two groups for all the parameters taken into consideration by the present study.

Efficacy of L-PRF plugs for post-extractive socket in reducing bleeding complications in patients under anticoagulation therapy

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Aim: The aim of this clinical study was to assess the efficacy of L-PRF as hemostatic agent, comparing the post-operative bleeding after simple tooth extraction in patients under treatment with Vitamin K Antagonists (VKAs) or Direct Oral Anticoagulants (DOACs).
Methods: Patients under oral anticoagulant therapy (VKA or DOAC) who needed single tooth extraction were enrolled in this study. Each patient underwent simple single tooth extraction with a standardized minimally traumatic technique. Anticoagulation regimen was not modified before and after extraction. All the participants were evaluated pre-operatively, during surgery, thirty minutes after surgery and seven days after surgery (suture removal). Personal data, medical history, pharmacological therapy, local periodontal and dental variables were collected at baseline. Peripheral venous blood withdrawal was performed immediately before surgery by using 9 mL plastic tubes, with no additional chemicals. Subsequently, the blood sample was centrifuged (Intralock®, Boca Raton, USA) at 2700 rpm for 18 min. All dental extractions were performed by the same surgeon (FB) with no elevation of mucoperiosteal flap and/or ostectomy, in the least invasive possible approach and with a maximum surgical time of 15 minutes. After performing the extraction, a careful alveolar curettage was performed and L-PRF plug was positioned in the alveolus as an hemostatic agent. The wound was suture with a 3-0 braided silk. Patients were then instructed on post-operative care to be observed during the 7 days following the intervention. Biological complications were registered and post-extraction bleeding was described according to Iwabuchi classification.
Results: 111 patients were enrolled (52 and 59 in VKA and DOAC group, respectively) and underwent the extraction of 111 teeth. 46 patients were female and 65 male (77,6 ± 10,13 years; age range 32-96). No differences were demonstrated between the two groups in terms of age (T-test for unpaired data; p=0,405) and gender (Fisher exact test; p=1). The results of the present study did not show any statistical difference between VKAs and DOACs regarding the post-extraction bleeding complications (Fisher exact test; p=0,801). The distribution of bleeding events according to Iwabuchi classification resulted homogeneous between the two groups (Chi-quadro; p=NS). In detail: no intra-operative bleeding occurred; 7 patients in VKA group and 8 patients in DOAC group reported a post-operative bleeding managed with a single gauze compression during the week after the extraction; 2 patients of VKA group needed more than two gauze compressions and 1 DOAC patient needed medical intervention the day of suture removal, due to the rupture of hyperplastic clot.
Conclusion: L-PRF may be use as an autogenous, safe and cheap hemostatic agent for the management of bleeding events after dental extractions. Clinicians should be aware of the hemostatic property of L-PRF that may be used routinely in case of patients under anticoagulation therapy to avoid bleeding complications. Patient education for the post-operative care of surgical site appears also strictly necessary.

Follicular cyst: minimally invasive surgery

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Aim: The follicular cyst is a disembriogenetic lesion that originates froma degeneration of the pericoronary portion of the dental follicle. For this reason it is always associated with the crown of an included or erupting tooth. It is the second most common form of jaw bones' cystic pathology. Follicular cysts are frequently found in the mandibular angle in association with the inclusion of the third molar. In its initial stages it is asymptomatic and can be found only through an X-ray examination. Over time it tends to increase in size, arriving at the deformation of the bone involved, thus being able to manifest a symptomatology linked to the process of expansion and compression of the surrounding structures. When the lesion is associated with an included tooth, the therapy of choice is surgical and involves complete enucleation of the lesion and tooth. However, in the case of the possibility of save of the associated tooth it is possible to perform the marsupialization technique with a possible surgery stage.
Methods: The case report presents the clinical case of a 40-year-old male patient who presents himself to our observation complaining of algic symptoms and swelling at the level of the right mandibular angle. On clinical examination of the oral cavity it presents swelling accompanied by abscess in 4.8 site. The vitality test of the adjacent dental elements, 4.7 and 4.6 results negative. Orthopantomography and

computed tomography showed the presence of the 4.8 included with large osteolytic lesion extended in the left mandibular angle and in the mandibular ascending branch. Surgical complications of cyst's enucleation of this size are the possibility of injuring the lower alveolar nerve and the lingual nerve as well as the risk of a mandibular fracture both during surgery and in the post-operative period. Following all these evaluations, the surgical technique of marsupialization aimed to extract the included third molar is chosen. The devitalized tooth in 4.6 site is preserved while the tooth in 4.7 site is extracted. A full thickness flap is set up in correspondence with the cystic lesion. Once the cyst is visualized, a portion of the wall is removed, the cavity is emptied of the cystic content and the cyst wall is sutured with the mucous edge. In the postoperative period the patency is maintained by means of iodoformic gauze positioned in the surgical cavity for a few weeks and periodically replaced. The dental element is tractioned more coronally and reached the right position it is extracted. The cyst will heal spontaneously after several months.

Results: At 1 month follow-up, an excellent recovery of the intervention area is clinically evident, absence of symptoms, no hyposensitivity of the lingual nerve and of the lower alveolar nerve. In the follow-ups after 6 months, 12 months and 18 months after the surgery, the OPTs show excellent bone healing.

Conclusions: The surgical technique of marsupialization was a minimally invasive procedure in the presence of large cystic neoformations affecting the maxillary bones, in order to reduce the post-operative risk of mandibular fracture and to preserve noble anatomical structures that are in close relationship with the cystic lesion.

Surgical management of an impacted mandibular third molar germectomy: case report

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Aim: Introduced in clinical practice around 1950 by Andersen, germectomy is a surgical method that involves the removal of mandibular third molar in its early development stage when it has not yet contracted with the adjacent anatomical structures. It's a surgical practice useful to prevent pathologies such as pericoronitis, periodontitis, second molars tooth-crown resorption, pain, cysts or odontogenic tumors, primary or secondary crowding of the dentition. The purpose of this clinical study is to document the case of a mandibular left third molar germectomy in a 16 years-old female patient.

Methods: The patient (good general health) was sent to the Dentistry Department of San Raffaele Hospital by her trusted dentist for a specialist orthodontic visit in which a 1st level (OPT) and a 2nd level (CBCT) radiographic examination were prescribed. The X-rays revealed the presence of an impacted mandibular third molar in its early development stages. Therefore, based on a joint surgical and orthodontic evaluation, the surgical extraction of the germ was decided to optimize orthodontic treatment.

Results: The surgical treatment was performed under local anesthesia. A full-thickness flap including mucosa, submucosal connective tissue and periosteum was raised from the distal side of second lower molar until mesial portion of first lower molar. The interdental papilla, separated from the flap, remains attached to the periosteum. An osteotomy was then performed with rotatory device to expose the whole crown of the germ. The tooth was separated by a Lindemann bur connected on a straight handpiece. The separation is completed by a lever. In addition to the two fragments, the entire follicular sac is removed. Subsequently, an accurate revision of the cavity was performed using a bone curette. Eventually the flap was sutured with 4/0 absorbable thread, after filling the cavity with a fibrin sponge. Clinical checks at 1 and 2 weeks were made in which a good healing of soft tissues was observed. At 3 months follow-up, the radiographic examinations revealed an adequate bone healing.

Conclusion: In general, the avulsion of the germs of the third molars must be much earlier the more they constitute an impediment to the orthodontic action of a certain treatment. This case report confirmed that based on clinical and radiographic examination, following a scrupulous joint orthodontic-surgical analysis, the early surgical management of impacted third molars is a valuable aid for the resolution of lack of space and of dental-alveolar discrepancy.

Effects of titanium and peek surface's treatments on eukaryotic cells adhesion and proliferation

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Aim: The present study is focused on evaluating the effects of physical and chemical modification procedures on two different biomaterials surfaces, PEEK and titanium. The purpose is to analyze the effects on roughness and wettability after treating

these materials with sandblasting (to increase roughness), plasma cleaning (to increase wettability) and laser micropatterning. Then the adhesion and the proliferation of cell lines and bacterial strains (hDPSCs, MG63, NIH-3T3 and Staphylococcus aureus) on these materials were evaluated.

Methods: Samples consist in disks with 8 mm of diameter and 4 mm of height. Aluminium oxide powder (125µm) was used for the procedure of sandblasting; plasma cleaning process was performed with a PDC-32G plasma cleaner at low power (6.8W) for 5 minutes. The laser modification was performed by Geass s.r.l.. Surface roughness and wettability were measured with profilometry and contact angle analyses, also the presence of external contaminations was tested with Scanning Electron Microscopy coupled with Energy Dispersive Spectroscopy. The analyzed cell lines are MG63 (human osteosarcoma cells), NIH-3T3 (mouse embryonic fibroblast cells), hDPSCs (human Dental Pulp Stem Cells) and the bacterial strain Staphylococcus aureus. Cell adhesion and proliferation were evaluated with the Alamar Blue assay at the day 1, 3, 6 and 9 from incubation. The specimens were also analyzed with SEM. MTT assay was used to test the metabolic activity of the Staphylococcus aureus biofilm on the material surfaces after 1 day of incubation.

Results: Sandblasting and plasma cleaning are both effective treatments to improve PEEK and titanium roughness and wettability. No external contamination occurs during all procedures. All of the surfaces analyzed showed biocompatibility towards cell lines used for the in vitro studies. For the MG63 and NIH-3T3 adhesion at day 1, sandblasted-plasma treated PEEK seems to be the best performing material, no differences were observed for hDPSCs. A better proliferation of NIH-3T3 was observed on sandblasted and sandblasted-plasma treated titanium, and a plateau reached from day 6 to day 9 was observed for all the surfaces. Regarding MG63 proliferation, a linear growth was observed for all the specimens, with a higher rate on sandblasted and plasma treated titanium. The hDPSCs showed no differences among the surfaces till day 6; from day 6 to day 9 a slowdown of proliferation was observed for both laser-treated titanium and laser treated-plasma treated titanium. The analysis of the metabolic activity of the bacterial biofilm showed no significant differences between all the materials, however a lower optical density was quantified for lasertreated and plasma-treated titanium.

Conclusion: The materials and the surface treatments tested in this study show similar properties in terms of cell adhesion and proliferation, and of biofilm formation. Further studies are necessary to clarify if which of these materials and treatments is able to induce a differentiation of hDPSCs, and the mineral matrix deposition from the osteoblasts. Another critical issue for the future is the investigation of the adhesion of bacteria involved in the development of the peri-implantitis.

Application of L-PRF for socket preservation of an anterior fractured tooth in a young patient: a case report

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Aim: In order to preserve soft and hard tissue following dental extraction, several socket preservation techniques have been proposed. Indeed, especially in aesthetic areas, successful prosthetic-implant rehabilitations are no more based only on function stability of the prosthesis, it is fundamental to achieve the best white and pink aesthetic. Among several proposed graft materials, lately, autologous platelet concentrates (APC) have been applied in dentistry for tissue regeneration due to their capability to release supraphysiological doses of autologous growth factors. Among APC, Leukocyte and platelet-rich fibrin (L-PRF) possess excellent physical stability, advantageous for its application in post-extractive socket. The aim of this study is to present a case of socket preservation achieved by mean of L-PRF, and successive implant placement in the aesthetic area of a young patient.

Methods: We report the case of a woman, who was referred to to the Department of Surgical, Oncological and Oral Sciences of University of Palermo due to a suspicious fracture of the upper right central incisor.

Results: A 48 year-old female presented to our attention with a suspected fracture of the upper right central incisor. Anamnestically, the patient reported no health concern and no consumption of tobacco or high consumption of alcohol. The patient presented an orthodontic splint of upper anterior teeth, placed by a collegue to avoid tooth crown loss. Clinical and radiological examination confirmed the tooth fracture of the 1.1. After signed informed consent, we performed the extraction of 1.1 and applied L-PRF clots, until the post extractive socket was completely filled. The tooth crown was adapted on the previous orthodontic splint. Post-surgical antiseptic therapy has been prescribed to the patient. After 3 follow-up months, the patient performed a CT scan. The clinical-radiological evaluations showed the presence of

adequate and ample bone; so the implant placement was planned and performed. During the follow-up period the patient had no complications, 3 months after surgical procedures, the implant was successfully loaded. At the latest follow-up, the clinical examination showed a good pink and white aesthetics.
Conclusion: L-PRF is purely autologous, inexpensive to harvest and easy to prepare. Although all the limitations of a single case-report, the use of L-PRF as a filling material for socket preservation seems promising in order to maintain an adequate volume of soft and hard tissues in order to obtain aesthetic rehabilitations.

Hypercementosis or cementoblastoma? An updated analysis of 790 cases in Abruzzo, Italy

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Aim: Cementoblastoma is an odontogenic benign tumour, characterized by the proliferation of functional cementoblasts that form a large mass of cementum or cementum-like tissue on the root of a vital tooth. This tumor consists of a rounded or nodular mass, attached to one or more tooth roots, criterion which differentiates it from an osteoblastoma (WHO, 2005). Hypercementosis is a non-neoplastic condition in which excessive cementum is deposited in continuation with the physiological radicular cementum. Apart from the idiopathic nature of hypercementosis, this condition is associated with several local and systemic factors. Although hypercementosis and cementoblastoma are typical conditions with distinct clinical evolution, atypical cases may challenge their diagnosis. Cementoblastoma is a neoplasm with unlimited growth potential, so the usual treatment is complete surgical resection, whereas conservative treatment is recommended for hypercementosis. The purpose of this study is to analyse the occurrence of this condition, its location and distribution between age and sex groups in a sample population in Abruzzo, Italy.
Methods: An orthopantomography analysis of 790 cases was performed. All radiographs with radiopaque areas contiguous with roots of vital teeth were considered positive for the inclusion criteria. Samples were divided by age, sex, location groups in order to assess the incidence rate of this disorder.
Results: Among the analyzed radiographs, 11 cases out of 790 showed radiopaque regions related to vital roots, representing 1,4% of the whole relevant population. In our sample, 45,5% of the patients presenting this condition were males while 54,5% were female. 27% of the findings belonged to patients aged between 20 and 30 years old; 27% of the positive patients were aged between 30 and 40 years old; 18% belonged to patients aged between 40 and 50 years old; 9% of the findings belonged to patients aged between 70 and 80 years old; 9% of the positive patients were aged between 80 and 90 years old; finally, 9% belonged to patients aged 90 years and over. With regard to the status analysed, 46% of the findings were associated with first molars; 27% were connected to II premolars; 18% were related to first premolars and 9% to the canine. No lesions were found in the upper jaws or related to deciduous teeth. This radiographic sign was an occasional finding for all the positive patients.
Conclusion: Results are in accordance with literature, revealing that this kind of condition is rare and it is more frequently related to the roots of lower first molars. The prevalence of this finding is equally distributed between males and females. More than 50% of the total radiographic findings have been found in young patients aged between the second and third decades, and the prevalence decreases with increasing age. No patients came to our attention complaining about swelling, pain or neurological signs. This leads diagnostic hypothesis in most cases towards hypercementosis, which is totally asymptomatic and does not require any treatment. However problems may arise when endodontic treatment or extraction of the affected teeth are necessary. Luckily patients did not require any of these therapies at the present time. Therefore, every subject has now been included in a follow-up program scheduled as one-year endoral radiography, barring any complications.

Ameloblastoma or follicular cyst due to the presence of a third molar included? When the biopsy denies the radiographic hypothesis: a retrospective study

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Aim: Ameloblastoma is a benign tumor that, even if widely known, still today presents problems concearning its nosological and etiopathogenetical characteristics and differential diagnosis. Regarding its epidemiology, however, it is well known with a distinctive onset prevalence in the mandibular angle and within the first 3 decades of life. Due to this frequent localization the formulation of a differential diagnosis with frequent pathologies located in the same region, such as follicular and germinal cysts and keratocyst, is needed. In addition an impacted

third molar with cystic lesion represents a challenge for clinicians in the development of a differential diagnosis. The aim of this retrospective radiological study was to evaluate the agreement between presuntive and real diagnosis of ameloblastoma or follicular cyst due to the presence of an impacted mandibular third molar on radiography.
Methods: This retrospective study included one hundred and twenty-six images {74 males and 52 females; mean age: 45.24 ± 12.86 (range: 18–70)} from the radiographic archive of the Department of Oral Surgery of the University of Naples Federico II that met the following inclusion criteria: a good quality of the orthopantomography images (clear, well defined, without any artifacts and interference); impacted third molar with cystic lesion; presuntive diagnosis of follicular cyst; absence of root resorption of the adjacent teeth, availability of histological exam. The concordance between presuntive diagnosis on radiography and hystological exam was established.
Results: One hundred and twenty-six images, out of 250 images, were selected, since they met inclusion criteria, among those from 2012 to 2019. According to the histological exam, 69 (54,7%) were confirmed as follycular cyst but 37 (29,4%) resulted as keratocyst while 20 (15,9%) as unicystic ameloblastoma.
Conclusion: One of the hardest issues in the differential diagnosis is the recurring presence of an included and deeply displaced third molar in the region of the lesion that could lead to a misdiagnosis of follicular cyst. The differential diagnosis is quite simple when pathognomonic signs are present, such as root absorption of the affected dental elements. Nevertheless this does not resolve the problem of the differential diagnosis between ameloblastoma and cheratocystic tumor. A presurgical biopsy is crucial since it gives the only essential information regarding the nature of the wound allowing the adequate diagnostic-therapeutic approach to the biological "local development" behavior of the wound.

Conservative approach to osteoradionecrosis of the jaws: case report

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Aim: Osteoradionecrosis of the jaw causes numerous aesthetic and functional deficiencies that severely compromise the patient's quality of life. Cases are often difficult to treat due to associated co-morbidities, secondary fibrosis to radiant therapy and reduced vascularization. When necessary a free tissue flap is made, which in the event of failure, would lead to more invasive surgical procedures such as important bone grafts or segmental mandibular resections, followed by reconstructions using titanium plates. The patient, subject of this study, is a 72 years old, cardiopathic, with a previous myocardial infarction in 2009, operated several times over the years (98-03-08-15) for the removal of a lingual squamous carcinoma, with a single course of radiotherapy in August 2015. The patient came to our clinical observation with bone exposure in the fourth quadrant, suspected osteolithic lesion in correspondence of 37, marked algic symptomatology and numerous dental elements to extract. The aim of this study is to demonstrate, a lower probability of postextractive osteoradionecrosis and an improvement of the lesion's condition already present through exodontic surgery sessions and toilet of the osteonecrotic lesion, made possible by oxygen therapy sessions (HBOT), specific antibiotic therapy and systematic use of chlorhexidine.
Methods: The 72-year-old patient with a history of heart disease and prior tongue cancer was sent to the Department of Oral Medicine and Clinical of the "A.O.U Federico II of Naples" to perform multiple dental extractions under local anesthesia. The therapeutic protocol, aimed to decrease the probability of incurring osteoradionecrosis and at the same time improving the pathology already set, provided as first step 10 sessions of hyperbaric oxygen therapy (HBOT) before tooth extraction and 10 HBOT after, in combination with intravenous antibiotic therapy (ceftriaxone disodium 2g) on the day of extraction and intramuscular 1g the following days until the wound's complete re-epithelization, the use of a mouthwash with chlorhexidine dicluconate at 0.2% per fifteen days four times a day. The surgery was performed in the least traumatic way possible, in a sterile environment, after the infiltration of local anesthesia we made dislocation, tooth avulsion and a careful review of the residual cavity, removing of bone sequestrums already formed and finally we sutured and checked the hemostasis. We performed several clinical checks one week, 15 days and one month after the tooth extractions. Further a radiographic check one, three and six months after the surgery was made.
Results: Despite a residual area of bone exposure, much smaller in size, the patient's post-operative recovery was excellent with good functional rehabilitation and a decrease in pain symptoms.
Conclusions: It is important to have a deep knowledge of the clinical, radiographic and histopathological characteristics of osteoradionecrosis of the jaw in order to make a rapid and accurate diagnosis and to overcome possible diagnostic dilemmas. The leading of Patient's therapy has proven to be a safe and reliable option for resolving the case.

Impacted third molars and postoperative complications: systematic review of literature

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Aim: The aim of this study was to realize a Systematic Review to evaluate the type and incidence of post-operative complications associated to impacted third molars which required avulsion surgery. Furthermore, the possible factors that can affect post-operative complications have also been examined.
Methods: The Systematic Review was performed following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) principles and the research purpose was achieved using the PICO (population, intervention, comparison, outcome) criteria. The search for identifying relevant studies was conducted on PubMed using the Medical Subject Headings search terms "complications", "sequelae", "extraction", "removal", "impacted", "third molars", "wisdom tooth", "postoperative", "surgery". Eleven studies were selected out of 2268 according to inclusion and exclusion criteria. Only two of these studies were retrospective, the others were prospective. Only one of them dealed with maxillary third molars and so, in this case, the lack of similar studies prevented comparison of data. For each study, variables such as characteristics of the third molars, surgical technique and characteristics of the patients were evaluated.
Results: The selected studies showed a total of 2560 patients, 2896 impacted third molars and 742 post-operative complications. Therefore, the overall complication rate calculated on the total number of wisdom teeth was 25,62%. Particularly, the ten studies dealing with only impacted mandibular third molars showed a total of 2454 patients and 2692 impacted wisdom teeth. So, in this case, the post-operative complication rate calculated only on the impacted mandibular third molars was 27,22% consisting of alveolar osteitis (6%), severe pain (4,94%), trismus (4,68%), bleeding (3,7%), infection (3,1%), bad taste (2,22%), edema (1,34%), paresthesia of the inferior alveolar nerve (0,97%), paresthesia of lingual nerve (0,3%) and root fracture (0,22%). These values agree with the range reduced from the literature that is from 2.6% to 30.9%.
Conclusion: The results suggest that postoperative complications of impacted third molars can be several. Furthermore, the numerous factors that can contribute to the onset of these complications are: patient's age, sex and health; characteristics of the dental element and its relationships with anatomical structures, its angulation (Winter classification), its degree of inclusion (Pell&Gregory classification); operator's experience, surgical technique, indication to the extraction, duration and degree of difficulty of the intervention.

Oral surgery patients: experimental study on a screening test by modified dental anxiety scale for indication to conscious sedation

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Aim: Oral surgeons need to assess preliminary patients' dental anxiety to prevent intra-operative emergencies by a careful planning of a conscious sedation procedure. Among all tools described in literature, Modified Dental Anxiety Scale has been translated and validated in over 10 countries but, despite its popularity, it is essentially related to a subjective psychometric test. In fact, patients by their own declarations may both overestimate or underestimate their dental anxiety level. Authors studied this scale as a screening test to careful evaluate anxious patients that may require conscious sedation before oral surgical procedures.
Methods: Authors observed retrospectively 40 not psychiatric patients that underwent molar extractions at the Complex Operating Unit of Odontostomatology, University of Bari Aldo Moro during 2019, to create a Modified Dental Anxiety Scale's Receiver Operating Characteristic curve. Each patient's score (range 5 – 25 points; taken 1 hour before surgery) has been matched to the anxiety level assessed at dental chair 20 minutes later of pre-operative anxiolysis by oral chlordemethyldiazepam. "Moderate or severe" dental anxiety was diagnosed for patients reporting persistent anxiety and received additional conscious sedation via intravenous diazepam before extractions (2 mg at the first infusion, followed by further 1 mg every 2 minutes, until reaching the top of individual tranquility or the maximum limit of 10 mg), while "not- or low" dental anxiety was diagnosed for patients reporting no residual anxiety, and receiving no additional sedation.
Results: 24 men and 16 women (59.92 ± 19.54 years old) joined this study: 6 American Society of Anestesiologists Physical Status class 1, 14 class 2 and 20 class 3. According to Modified Dental Anxiety Scale,

25 had "not- or low" anxiety (range 5-14 points), 14 had moderate anxiety (range 15-18 points) and only 1 had severe anxiety (phobia; range 19-25 points), while clinical evaluation found 21"moderate or severe" anxious and 19 "not- or low" anxious patients (P = .607). The Modified Dental Anxiety Scale's resulting Receiver Operating Characteristic curve showed an Area Under Curve of 0.785 ± 0.057 (P < .001) meaning for a moderate accuracy of the test, sensitivity of 76.3%, specificity of 73.7%, positive predictive value of 85.3%, negative predictive value 60.9%. Estimated optimal cut-points between not- or low anxiety (not requiring conscious sedation) and moderate anxiety (requiring conscious sedation) was 7 points, instead of 14 as already described in literature.

Conclusion: Authors found that Modified Dental Anxiety Scale could be employed as moderately accurate screening test to assess the true necessity of conscious sedation in patients eligible for oral surgical procedures. Furthermore, according to the current study results, authors suggest to set to 7 the upper limit of "not- or low anxiety" range of the scale.

Surgical management of the partially impacted mandibular third molar: a split-mouth healing comparison between coronectomy and extraction in four cases

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Aim: The extraction of the mandibular third molar is the traditional treatment option in case of dysodontiasis, but it is not always free from incidents and problems. The coronectomy of the mandibular third molar, performed according to the guidelines, aims to prevent the inferior alveolar nerve from a realistic damage, pre-operatively calculated on X-ray exams. The literature reports similar entity of complications after coronectomy in comparison to the extraction procedures, making the first a simple and validated alternative in risky situations. To better understand the real difference between these procedures in terms of healing in time, four split-mouth cases of coronectomy versus extraction were clinically and radiographically monitored.

Methods: According to an X-ray assessment on OPT and CBCT, four female patients (mean age: 25 years) underwent coronectomy of the partially impacted lower third molar on one side and surgical extraction on the other side. Only in one case, the surgery was performed bilaterally at the same time, in general anesthesia. A post-operative complete soft tissue closure was obtained in every case and the same post-operative prescriptions and cautions were adopted for coronectomies and extractions. All patients were clinically assessed at 1 week, 1, 3, 6, 12 months and annually after the surgical intervention, with a periodontal probing evaluation distal to the second molar starting in the third post-operative month. A periapical X-ray was taken at 1, 3, 6, 12 months, and annually thereafter. The average follow-up was 31.2 months.

Results: No complications were reported by the patients and no differences were noted between the two sides in terms of post-operative discomfort, with a good healing of soft tissues. The distal periodontal probing was always <4 mm distal to the second molar. A coronal migration of the roots followed by a complete bone impaction in all cases of coronectomy was recorded. As far as the level of bone it concerns distal to the second molar in respect to the enamel-cementum junction no differences were detected.

Conclusions: This case series further confirms the coronectomy as an alternative to lower third molar extraction in risky situations. More cases and longer follow up with this format of investigation will definitively demonstrate the usefulness of this procedure, completely eliminating the neurological problems associated with the mandibular third molar surgery.

Repair of oroantral fistula with autogenous bone block and palatal flap: a case report

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Aim: Oroantral communication (OAC) is a space created between the maxillary sinus and the oral cavity, which, if not treated, will progress to oroantral fistula (OAF) or chronic sinus disease. It occurs most commonly during extraction of upper molar and premolar teeth (48%). The major reason is the anatomic proximity or projection of the roots within the maxillary sinus. Other causes of OAC/OAF include tuberosity fracture, dentoalveolar/periapical infections of molars, implant dislodgement into maxillary sinus, trauma (7.5%), presence of maxillary cysts or tumors (18.5%), osteoradionecrosis, flap necrosis, dehiscence following implant failure and sometimes as a complication of the Caldwell-Luc procedure. Decision on how to treat an OAC should be based on the size of communication, time of diagnosis, and presence of an infection. Furthermore, the selection of treatment strategy is influenced by the amount and condition of tissue available for repair. Many techniques to close OAC/

OAF have been described in the literature, such as buccal flap, palatal flap, buccal fat pad and relate modifications. The aim of the present case report is to describe the treatment of OAF with autogenous bone block and palatal flap.
Methods: a 33-year old systematically healthy man was referred to the Department of Oral Surgery of the University of Naples Federico II, with the complain of leakage of liquids through his nose while drinking, otherwise, he was asymptomatic. He underwent extraction of the right first molar about 6 months before elsewhere. On clinical examination, there were no signs and symptoms suggestive of acute maxillary sinusitis. Intraorally, a fistulous opening round in shape with normal surrounding mucosa and a bony defect was seen along the maxillary alveus molar region. Valsalva test was positive. Radiographic examination (Ortopantopography and CBCT) confirmed the bony defect and the absence of acute and chronic sinusitis.The intervention was performed under general anesthesia: the fistulous tract was excised in circumscribed manner along the defect, next the cortical bone graft was harvested from the mandibular ramus of size matching the defect.The graft was strictly fit into the defect and did not require screw fixation. Then, the palatal flap was raised and mobilized to cover the graft and sutured. The patient was put on nasogastric tube feed till three days. The first follow up was planned after 7 days. A cold and soft diet was recommended for 2 weeks and sutures were removed 14 days after surgical procedure.
Results: The patient was observed for signs of infection, dehiscence and necrosis. The healing process and the post-operative recovery were uneventful. The patient was clinically evaluated: intraorally no sign of fistula was detected and the patient did not refer the leakage of liquids through his nose. The patient was radiographically (OPG and CBCT) examined just after 3 months showing bone graft well in place and the absence of any sign of infection in the sinus. The patient up now is satisfied from functional point of view.
Conclusion: autogenous bone block and palatal flap has been shown to be effective in the repair of OAF. The graft has been adequate to cover the defect and palatal flap served as an additional support in minimizing any complications related to the graft.

L-PRF in the intraoperative management of post-extractive socket in patients with comorbidities: a case report

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Aim: The aim of this paper is to evaluate clinical outcomes following dental extraction in patients with previous intake of bisphosphonates.
Methods: 55-year-old female patient reports in medical history diagnosis of multiple sclerosis in therapy until 2013 with corticosteroids and INF-b (then replaced with natalizumab), GvHD (clinically investigated at the time of the study) and bone marrow transplantation for non-Hodgkin's lymphoma (Sezary's syndrome). She also reports osteoporosis, familiarity with rheumatoid arthritis, previous intake of risedronate and subsequent 4 infusion cycles of nerhydronate for the treatment of femoral osteonecrosis (2018). She came to our attention asking for aesthetic functional rehabilitation of the oral cavity. Intraoral examination revealed secondary caries affecting the disto-palatal furcation of 27, previously restored using a metal-ceramic crown. Due to its poor prognosis, the tooth was avulsed according to the patient. Preoperative drug treatment included: antibiotic therapy (amoxicillin 1g every 8 hours for 7 days) and mouth rinse (chlorhexidine 0.2%). A minimally invasive extraction of the element was performed, followed by a venous blood sample processed by 27x100 RPM centrifugation for 12 minutes with which it was possible to obtain 3 clots of L-PRF (Low Platelet Rich Fibrin). One of these was used as filling material for the socket, and the other two were turned into membranes and placed to cover it. A 6/0 nylon simple interrupted suture was placed, and no primary wound closure was performed. Upon discharge, the patient continues antibiotic therapy for one more week after extraction, mouth rinse (chlorhexidine 0.2%) and applications of 1% chlorhexidine gel for a further 14 days. The woman underwent follow-up visits at 1, 2 and 4 weeks. The parameters evaluated were the early wound healing score (EHS, Marini et al. 2019) for the post-extraction site and the VAS score for post-operative pain.
Results: The patient reported a VAS score of 1, confirmed by a single intake of paracetamol (1g) in the immediate post-operative period. Febrile episodes and localized cutaneous rush in the limbs were found to be compatible with drug-induced hypersensitivity. This resulted in the suspension of the antibiotic treatment. The parameters included in the EHS were recorded by observation of the photos taken during the check-ups. The score amounted to 2 and 7 at one week and two weeks respectively.
Conclusion: The use of L-PRF is an easily replicable, minimally invasive and relatively low-cost method. The placement of clots and membranes without primary wound closure of the flaps has allowed a rapid re-epithelialization of the socket with an overall improvement in soft tissue quality. Whereas

the purpose of this technique is not to maintain bone volume, the use of L-PRF has been shown to be effective in protecting hard tissue in the early stages of healing. This technique can be recommended especially in the jaw where a primary wound closure - usually recommended in patients with increased risk of medical-related osteonecrosis of the jaw - allows to achieve additional advantages such as a less invasive procedure and fornix depth preservation.

Immediate post extractive implant-prosthetic rehabilitation after surgical extraction of an impacted maxillary canine: case report

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Aim: The purpose of the present case report is to document a post-extraction implant-prosthetic rehabilitation in position 1.3 after the extraction of the corresponding impacted element.
Methods: The patient (female, 53 years old, good general health) was sent to the Dentistry department of San Raffaele hospital by her trusted dentist for the presence of an impacted maxillary canine. After a careful oral examination, the patient was sent to the Oral Hygiene Department for professional cleaning, and then a joint control visit was established with orthodontics specialists. Additionally, a second level radiographic investigation (CBCT) was prescribed to evaluate the element's inclusion degree, its palatal and paraortological position (analysis of the major axis compared to the physiological one) in addition to the morphology of the root. Based on these radiographic and orthodontic considerations, the patient was treated with avulsion of the tooth and contextual positioning of an implant in the same site with immediate loading.
Results: Under loco-regional anesthesia, an intrasulcular incision and a full thickness mucoperiosteal flap were set up to preserve the interdental papillae and the periosteal vascular-nervous structures, minimizing any postoperative pain and swellings. The corticotomy was performed through piezoelectric instrument to create a direct access to the element, allowing preservation of soft tissues, reduction overheating and excellent vision of the surgical field thanks to the cavitation effect and micrometric cutting. Once the element was exposed, osteotomy and subsequently the avulsion of the individual fragments were made. Using the drill kit and the parallelism pin, the implant site has been prepared and axially controlled to let the positioning of the implant fixture (K 3.3x13mm Winsix) at 30N of torque. Finally, the flap was transposed and sutured with transpapillary points with 4/0 absorbable thread, after filling the created cavity with a fibrin sponge to ensure correct bone regeneration. The risk of any occlusal overload on the implant was considered in term of prosthetic-implant rehabilitation and it was deemed appropriate to guarantee the patient an occlusion with group function. Clinical checks were carried out at 1 and 2 weeks and the control of healing was good. Three months after the positioning of the temporary crown, which allowed the correct conditioning of the tissues and the formation of a correct parabola, the precision impressions were carried out to deliver the final prosthetic crown.
Conclusions: Through careful analysis of the case and correct management of soft and hard tissues, it was possible to meet the patient's functional and aesthetic needs, in the least possible time, contrasting the process of resorption of the alveolar bone following the tooth extraction, guaranteeing the same high survival rates as the implants loaded in a deferred way (from 92.7 to 98%). The present case report has therefore confirmed that implant-prosthetic therapy represents a valid therapeutic alternative when the recovery of an impacted element is impossible, offering the immediacy of the results as the main advantage.

Blood components (L-PRF) in oral surgery: application in three different clinical cases

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Aim: During the last decades, research in the oral surgery field moved towards the development of less invasive procedures and treatments that reduce morbidity, enhance functional recovery and lead to a better tissue and bone regeneration. Platelet derivatives are an innovative tool now wildly used in dentistry and beyond, to achieve a better and faster bone regeneration with shorter healing time regarding the soft tissue, and few side effects associated with the surgical trauma. The aim of this paper is to fully understand the potential of APC (autologous platelet concentrate), in oral surgery, which is still a matter of debate.
Methods: Manuscripts were searched to make an overview about the various applications of the platelet derivatives in the dental field. Moreover,

three clinical cases have been selected among those managed at the Oral-Maxillofacial Surgery Unit, at the Policlinico di Modena, Italy. Case 1: third molar impaction. The surgical extraction of tooth 3.8 has been performed and the postextraction site was filled with L-PRF membranes. Case 2: osteolytic lesion at the pre-maxilla. After surgical removal of the cyst, the residual void has been filled with L-PRF mixed with particulated bovine deproteinized bone and the surface of the lesion covered with L-PRF membranes. Case 3: medical-related osteonecrosis of the lower jaw. After the surgical debridement of the necrotic bone, L-PRF has been used to fill of the residual bone defect and to allow for ideal closure of the soft tissue.
Results: Case 1: the post-operative sequelae at the first week post surgery has been very low in terms of pain, swelling and trismus. We did not observe any functional limitation. The surgical wound was still healing. At 6 months we found a good mucous seal, probing depth 3 mm. Intraoral radiographic examination by grayscale revealed a significant radiographic osseous regeneration.
Case 2: the patient did not complain any pain nor swelling during the first week post surgery. At the 7th day follow up there were no signs of infection, untoward reaction, wound dehiscence, and soft tissues were correctly healing. The CBCT performed at 6 months showed progressive radiographic osseous regeneration, a satisfying bone density and a significant thickness in the newborn cortical bone. Case 3: at the 7th day post surgery we found quick soft tissue healing with a good mucous seal, no signs of infection or swelling. The mucous seal was maintained at 6 moths post surgery and the CBCT showed a newborn bone tissue towards maturation within a think completely regenerated cortical bone.
Conclusions: Within the limits of this presentation of only three clinical cases we can confirm the versatility of L-PRF production and application in oral surgery. The post-operative sequelae have been very low in terms of incidence and severity. As a matter of fact, we noted mild post-operative swelling and mild pain. At 6 months re-evaluation, the soft tissue healing was perfectly achieved and upon radiographic examination, bone regeneration could be appreciated. These data goes along with those already existing in the scientific literature. However, more standardization and more prospective studies are needed in order to provide the practitioner with specific guide-lines for the application of L-PRF in the dental field.

Multidisciplinary treatment approach of an odontogenic cyst involving maxillary sinus: a case report

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Aim: Cysts could be defined as benign osteolytic lesions, liquid content, coated with epithelium and a connective capsule. The radicular inflammatory cyst represents 50% of all odontogenic cystic lesions and it could have several causes, including failure of previous endodontic therapy. The aim of this case report is to show a multidisciplinary approach to an odontogenic radicular inflammatory cyst involving the maxillary sinus and to highlight the importance of a correct early diagnosis.
Methods: In April 2019, a forty-three-year-old patient came to the observation of a first dentist, complaining of an algic symptomatology at the level of 2.6, devitalized 10 years earlier: she was prescribed anti-inflammatory therapy and then, due to the appearance of swelling and increased pain, also an antibiotic therapy. The second dentist, from whom the patient went in July for the symptoms' persistence, detecting the presence of suppuration during compression of the mucous membrane to element 2.6, decided to send the patient to an otolaryngologist. The specialist prescribed an Orthopantomography and a CBCT and, in order to reduce intense pain and significant swelling, a drug therapy with antibiotics and cortisone. Given the persistence of symptoms, in September the patient went to San Raffaele Hospital where, through the Orthopantomography and the CBCT previously prescribed, a diagnosis of radicular cyst associated with element 2.6, occupying the entire left maxillary sinus, was performed. To carry out the enucleation of the cyst, after the avulsion of 2.6 in another location, due to the constant severe pain reported by the patient, a FESS (Functional Endoscopic Sinus Surgery) intervention was scheduled at the end of the month.
Results: After 2.6 avulsion, the patient immediately found great pain relief. Indeed, the intervention resulted in the release of a large amount of purulent material from the antral cavity with a consequent strong reduction of the endocystic pressure responsible for severe pain and persistent swelling since July, as reported by the patient. The FESS allowed the cystic wall to be fully enucleated, definitively stopping osteoclastic activity in favor of osteoblastic one, that has led to excellent healing of the lesion, appreciable by the Orthopantomography performed three months after surgical procedure.
Conclusions: The lack of early diagnosis prevented

timely treatment of the osteolytic lesion, favoring its progression. The patient therefore suffered various consequences, both from the symptomatological and the pharmacological point of view, with persistent pain and swelling for about three months and an overload of treatments that guaranteed exclusively temporary relief without solving the problem. The consequence was that the expansion of the lesion required a double surgery in order to remove it. In conclusion, it is necessary to underline the importance both of a correct diagnosis, in order to establish an adequate therapeutic plan, and of the collaboration between the departments of dentistry and otolaryngology, for the resolution of a dental pathology whose expansion extended in a district no longer only of dental, but also otolaryngological competence.

Oral focal mucinosis: a case report

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Aim: The aim of this report is to describe the clinical and histological feature and subsequent surgical treatment of a case of Oral Focal Mucinosis in a 17-year old female patient with spastic quadriparesis subsequent to infantile cerebral palsy, epilepsy in drug treatment and percutaneous endoscopic gastrostomy (PEG) without any oral nutrition.
Methods: The patient was visited at the Dental Clinic of IRCSS Burlo Garofalo for painless and gradually increasing bilateral swelling in both retromolar mandibular regions. The intraoral examination of the maxillary and mandibular arch revealed a poor oral hygiene, complete permanent dentition except for the absence of the third molars, calculus deposits and diffuse gingival hyperplasia. Any previous trauma or infection in the areas of the swelling lesions was not referred. Two tumor-like masses were identified in the buccal retromolar region gingiva of both the right and left mandibula. The maximum diameter of each lesion was 3x4 cm. The volume of both swelling lesions was so large to impede the complete closure of the oral cavity and make swallowing difficult. The bilateral retromolar masses had the same colour of the surrounding oral mucosa. Radiographic examination was impossible due to absence of cooperation from the patient. At first, the clinical diagnostic hypothesis was gingival hyperplasia due to epilepsy's drug treatment. The only possible therapy was surgical removal. The two lesions were completely removed through surgical excision under general anaesthesia.
Results: Following histopathological analysis the two oral lesions were diagnosed as Oral Focal Mucinosis. No postoperative relapses were detected at follow-ups.
Conclusion: Oral Focal Mucinosis is a rare soft tissue lesion that represents the oral analogue of the Cutaneous Focal Mucinosis. Clinically, Oral Focal Mucinosis is most frequently found on the gingiva as a painless, sessile or pedunculate swelling lesion. The histological aspect is characterized by a localized area of myxomatous connective tissue containing mucinous material surrounded by relatively dense collagenous connective tissues. Oral Focal Mucinosis occurs predominantly in adults during the fourth and fifth decade of life, although it has been rarely reported in children and adolescents. The diagnosis is based on histopathological and immunohistochemical analyses. The etiological origin of Oral Focal Mucinosis remains unclear. The aspect is similar to other soft tissue lesions, like fibroma, pyogenic granuloma, mixoma, mucocele or minor salivary gland tumors that must be considered in the differential diagnosis. In conclusion, Oral Focal Mucinosis is not a frequent oral lesion and the histopathological and immunohistochemical analyses are pivotal in the correct diagnosis.

Digital impression scanning in Lesh-Nyhan syndrome

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Aim: The Lesh-Nyhan syndrome is a rare X linked recessive genetic disorder that affects male. Responsable is the inactivating mutations of the HPRT gene (hypoxanthine-guanine phospho ribosyltransferase) that causes overproduction of uric acid, gouty arthritis, neurological and behavioral disorders, choreoathetosis, spasticity and self-injury. At birth there are no signs; between 3 and 6 months, psychomotor retardation, difficulty in sitting and supporting the head, hypotonia, involuntary movements, sandy orange urine and obstruction of the urinary tract appear. Self-destructive behavior, contrary to intentions, appears and worsens with age and stress; with the dental eruption there is the risk of biting the lips, tongue and fingers until amputation. Mental retardation is mild to moderate; the progression of the symptoms is rapid and unstoppable.
Methods: To date, in situations of impossibility of managing the compulsion, the only therapy adopted is the total extration of the dental elements and the physical restriction. A more conservative alternative is the use of protective devices but requires repeated and often difficult impression taking. A protocol for the prevention of self-injury is being tested at IRCSS Gaslini in Genoa: as soon as the diagnosis has been ascertained, the family is referred to the pediatric dental clinic where

the patient and the family are welcome, is performed the first check up with the application of ministerial protocols for hygiene and prevention of oral diseases and extra and intraoral photographic documentation is taken. Periodic check-ups are scheduled to gently get the patient used to the dentist. The digital scans of the two arches and the bite are also detected; this procedure is repeated 1 time per year until complete eruption of the permanent dentition (12-13 years). Digital copy of photographs and scans are delivered to the family.

Results: The use of the intraoral scanner has made possible to achieve the impressions of the arches guaranteeing the patient greater comfort and reducing the stress of the patient himself and the family-care giver. It facilitated and speeded up the procedure for the operator, allowing the models of the arches to be immediately available for the realization of anti-injury devices when it is impossible to manage the behavior pharmacologically (reserve impression), also allowing the creation of new devices in less time when the previous one is no longer usable due to wear, reducing the number of necessary appointments and speeding up the procedure. The technology has also made it possible to make intraoral protection devices remotely, guaranteeing an excellent level of assistance even for patients not resident in Liguria area.

Conclusion: Prevention with programming of the impression is of primary importance in order to guarantee an improvement in the quality of the life of these patients, to limit the use of dental extraction under general anesthesia, reducing the risks for the patient and the health burden for families, who can take advantage of assistance in the area of origin thanks to the use of remote digital technology.

Nonsyndromic tooth agenesis: an updated analysis of 790 cases in Abruzzo, Italy

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Aim: Tooth agenesis is one of the most common craniofacial malformation in the human, characterized by the developmental fail of one or more teeth.

Tooth agenesis is caused by genetic mutations which occur during odontogenesis. Several studies discovered the genetic mutations that explain the causes of non-syndromic tooth agenesis; these have been associated with certain illnesses, because tooth development involves the interaction of several genes that modulate the mesenchymal development. Non-syndromic hypodontia is the most common form of congenital tooth absence. The absence of third molars is the most common in the populations object of the studies. When the third molar is excluded from studies, then the reported prevalence rates for each tooth vary according to the population. Tooth agenesis may cause the affected person to have impaired masticatory function, suffer from speech alteration and develop aesthetic and psychological problems, predominantly where the anterior region is concerned. The purpose of this study is to analyse the occurrence of this condition, its location and distribution between age and sex groups in a sample population in Abruzzo, Italy.

Methods: An orthopantomography analysis of 790 cases was performed. The diagnosis of dental agenesis was based on radiographic examination; primary teeth and third molars were excluded from the evaluation. Samples were divided by age, sex, location groups in order to assess the incidence rate of this disorder.

Results: Among the analyzed radiographs, 11 cases out of 790 presented missing of one or more teeth, representing 1,4% of the whole relevant population. The 82% of the affected people had only one missing tooth, while the 18% presented more than one missing tooth. In our sample, 72,7% of the patients presenting this condition were female while 2,72% were male. The prevalence of this disorder was 1,06% for female and 0,4 for male patients. The average number of missing teeth for affected person was 1,2%. As concerns localization, 46% of missing teeth were lower second premolars; 7,6% were represented by upper second premolars; 15,4% were upper first premolars; 23% were represented by upper lateral incisors and 7,6% were lower lateral incisors.

Conclusion: The most frequently missing teeth were second lower premolars, whose percentage represented almost half of total affected teeth. The second most frequently missing teeth were lateral upper incisors followed by first upper premolars. As evinced by the results, the prevalence of tooth agenesis decreases with the increasing age. However it's necessary to consider the risk of false negatives due to the difficulty to establish if the missing tooth was an effectively agenetic tooth or if it was lost or extracted during patient's life especially in older patients with edentulous areas. In conclusion, it's important to make an early diagnosis of this disease, especially in early ages, in order to make sure to intercept the problem and formulate a proper treatment plan which includes orthodontic, gnathological, surgical and prosthetic diagnosis and treatment.

Treatment of medication- related osteonecrosis of the jaw: a case report

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Aim: During the administration of certain medicines, medication related osteonecrosis of the jaws (MRONJ) may occur. Nowadays there is a large group of drugs involved in this status, including not only the most popular bisphosphonates, but also Denosumab, Bevacizumab, Sunitinib, Everolimus and many other. Despite this, the real prevalence of this adverse event is difficult to estimate, due to lack of reports by clinicians to the relevant bodies. There are a lot of position papers about the management of MRONJ depending on the severity of the disease.
Methods: A 81-year-old man came to our attention complaining about a painful festering -area on his left lower jaw. At physical examination a bone exposed area of about 1 cm and pus were discovered. During the anamnesis collection it was noticed that he took zoledronic acid intravenously administered for at least 18 months because of prostate cancer in 2014, and at the present day he is under aledronic acid therapy taken by mouth because of spread osteopenia and vertebral collapse. After radiographic examination a jagged bone sequestration region of about 2 cm and was found. The case was categorized under a Stage 2 of AAOMS (2009) classification: it includes patients with exposed and necrotic bone or a fistula that probes to bone with evidence of infection; these patients are typically symptomatic and may present with radiographic findings which are localized to the alveolar bone region. The man required a surgical treatment of the area in order to limit the infection. The patient underwent to antibiotic therapy with metronidazole 500mg tablets 2/die in association with azithromycin 250mg tablets 1/die for the first six days, then he continued metronidazole only for the last eight days.
Results: Throughout the fourth day of antibiotic therapy the surgical procedure were performed: after local anesthesia, a detailed bone debridement was conducted after sculpting a flap and using a dental piezo-electric handpiece starting with 50% power,
but it was noticed no effectiveness, so the strength was carried to 100%. Bone reduction was limited until all necrotic grey bone was removed: only in that way
necrotic bone was spontaneously expelled. Finally absorbable sutures linking tightly connective tissue were done. The choice to use piezoelectric technology was made with the goal of being as gentle as possible towards local bone and the flap was minimally designed in order to achieve the most complete closure of the flap, which is an important parameter to avoid a new post-surgical exposure.
Conclusions: The man came back for checking after 3, 7, 14, 30 days: the site seems to be steady. To the present day the plan is checking the development and rearrangement of the bone. The piezoelectric handpiece was effective only at maximum level and it was helpful using blooding surface bone post-debridement as a intraoperative parameter with the aim of figuring out the limit of necrotic bone.

The Italian validation of the level of exposure-dental experiences questionnaire

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Aim: The purpose of this monocentric cross-sectional study was to evaluate the psychometric characteristics of the Italian version of the Level of Exposure-Dental Experiences Questionnaire (LOE-DEQ) into 23 potentially traumatic events. To evaluate the fit of the model, five hypothesis were taken in consideration: the 4 subscales would have good fit indices in the Italian sample (hypothesis 1), each subscale would be positively correlated with dental anxiety (hypothesis 2), each subscale would be positively correlated with a negative view about the dentist and dental treatment (hypothesis 3), all the correlations described in the previous hypotheses would be below 0.60 (hypothesis 4) and distressing dental treatment experiences (DDP) would have the strongest impact on high dental anxiety (hypothesis 5).
Methods: To collect data, all the patients having access to the Dental Surgery Unit of the University of Naples Federico II, if respondent to the established criteria of inclusion for the present study, were asked to participate. A total of 287 participants took part to the survey, but only 253 participants completed the LOE-DEQ constituting the final sample size. The study provided three questionnaires: the LOE-DEQ providing a score ranging from 0–8 for DBPE, 0–5 for DDP, 0–3 for ODDE and 0–7 for GTE, the Modified Dental Anxiety Scale (MDAS) and the revised version of the Dental Beliefs Survey (DBS-R). For the statistical analysis, after a preliminary handling of missing data treated through the MICE method, a total of 5 imputed datasets was created. To evaluate the model fit of the 4-factor model structure behind the LOE-DEQ were chosen the chi square/degrees of freedom (χ^2/df), the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), the comparative fit index (CFI) and the Tucker–Lewis index (TLI). The Cronbach's alpha index was used to evaluate the

internal consistency reliability of each scale and the Pearson's correlation index was used to establish the criterion, convergent, and discriminant validity of the LOE-DEQ relating the LOE-DEQ score with the MDAS score and the DBS-R score. The association between the LOE-DEQ subscales and high dental anxiety was analysed thanks to a binary logistic regression. Finally, estimates for both the Cronbach's alpha and Pearson's correlation coefficient were pooled using the mice R package.

Results: The original 4-factor model was confirmed by the following index: $\chi^2/df = 1.41$; CFI = 0.95; RMSEA = 0.04 (CI = 0.03 to 0.05); SRMR = 0.001; TLI = 0.94. The Cronbach's alpha ranged from 0.66 to 0.75 assessed the internal consistency reliability. The criterion validity ranged from 0.18 to 0.26 was partially confirmed. The convergent validity ranged from 0.14 to 0.42. was partially confirmed. The discriminant validity, below 0.60, was confirmed. Regarding the associations between the LOE-DEQ dimensions and high dental anxiety only DBPE and DDP were significantly associated with high dental anxiety. Considering all the variables together, only DDP proved to be associated with high dental anxiety.

Conclusions: The results obtained confirmed the validity of the original 4-factor structure and the good criterion, convergent, and discriminant validity of the LOE-DEQ in the Italian sample size. Except for the subscale GTE, the Italian version of the LOE-DEQ could be considered as a good and useful instrument for the clinical dental practice because distressing dental experiences lived within the dental setting are more predictive of high dental anxiety.

Osteoma of the jaws as first clinical sign of Gardner's syndrome: a retrospective study from two Italian centers

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Aim: Gardner's syndrome, a variant of familial adenomatous polyposis, is an autosomal dominant disease characterized by gastrointestinal polyps that develop in the colon as well as in the stomach and upper intestine (duodenum), multiple osteomas, and skin and soft tissue tumors. Polyps have a 100% risk of undergoing malignant transformation; consequently, early identification of Gardner syndrome is critical. The aim of this retrospective study is to report 19 cases of Gardner's syndrome in which the first clinical sign was osteoma of the jaws diagnosed at Complex Operating Unit of Odontostomatology of University of Bari and Dental clinic of University of Chieti from 2000 to 2020.

Methods: Ninety-four patients affected by osteomas were diagnosed and surgically treated at University of Bari and University of Chieti from 2000 to 2020. From each patient, the following data were achieved: age, sex, pathological anamnesis (occurrence of intestinal polyposis or intestinal disorders), familiarity with osteomas/polyposis. Once achieved a certain histological diagnosis of osteomas, all the affected patients underwent genetic tests in order to value the presence of APC mutation. Patients with APC mutation, subsequently, underwent total body CT, colonoscopy with histological analysis of polyp detected where appropriate, dermatologic visit. Odontostomatologic follow up of patients affected by Gardner syndrome consisted in clinical oral examination and RX OPT annually.

Results: Nineteen cases showed APC mutations, 10 males and 8 females with average of 56 yo. Rx OPT revealed 24 osteomas (9 posterior mandible, 6 anterior mandible, 6 posterior maxilla, 3 anterior maxilla). Total body CT revealed: 9 osteomas of neurocranium (1 occipital, 1 sphenoydal sinus, 2 ethmoidal cells, 2 frontal sinus, 3 maxillary sinus) and twelve osteomas of long bones (7 femur, 4 humerus, 3 tibia, 1 ulna, 1 fibula). None of the patients complained cranio-facial pain. Six patients showed facial asymmetry as a result of expansion. Colonoscopy showed polyposis in 13 patients one of whom with history of rectal adenocarcinoma. Dermatologic visit highlighted 2 epidermoid cysts and 1 desmoid cyst.

Conclusion: Considering the certain malignant transformation of polyps in Gardner's Syndrome, it is very important the odontostomatologic screening since childhood in order to early detect osteomas as first clinical sign of Gardner syndrome.

Follicular maxillary cyst associated with dental implant: a case report

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Aim: Follicular cyst is a type of odontogenic cyst, which encloses the crown of an unerupted tooth and attached to the amelocemental junction and is the second most common odontogenic cyst contributing about 16.6% to 21.3% of all odontogenic cysts. Occurrence of dentigerous cysts is usually in 3rd and

4th decade. The treatment indicated for dentigerous cysts are surgical enucleation of the cyst, along with removal of the involved tooth or the use of a marsupialization technique, which removes the cyst while preserving the developing tooth. The present case report describes the management of follicular cysts associated with dental implant in an adult male.
Methods: The patient who came to our observation was a 49-year-old man who presented the impacted left maxillary third molar associated with follicular cyst. Intraoral examination revealed absence of left maxillary third molar and an ovular swelling in vestibular fornix. Panoramic radiograph revealed that the left third maxillary molar was unerupted in mesio-version and associated with an osteolytic lesion, surrounded by a sclerotic border, involving the crown of the aforementioned third molar, the first upper molar with a resorption of the mesial root's third apical and the mesial surface of implant fixture in 2.4 site. Considered radiological characteristics, we decided to proceed with the extraction of the left maxillary third molar and with the excision of the associated neoformation. We decided to evaluate the condition of implant fixture during surgery intervention.
Results: The surgical intervention was carried out with a local anesthesia. A para-marginal triangular full thickness flap was executed from 2.3 site to 2.7 site. The neoformation was enucleated in toto and the upper third molar extracted. The distal surface of implant fixture in 2.4 site was exposed but it not showed mobility. Therefore we decided to preserve the integrity of implant fixture. The flap was sutured for closing the wound primarily. The specimen was prepared and sent for histopathological examination and the subsequent histological examination was compatible with the diagnosis of follicular cyst.
Conclusion: During a follow-up visit, 2 weeks later, intraoral examination revealed absence of swelling. The patient reported absence of pain. Moreover, panoramic radiographic at 18 months revealed the bone healing process and the restitutio ad integrum of involved implant.

Postoperative pain and complications related to the avulsion of impacted third molars

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Aim: Surgical removal of the impacted third molars is one of the most commonly performed procedures in oral surgery. Trismus, surgical edema, pain, alveolar osteitis, surgical site infections, bleeding and paresthesia are the most observed complications that occur following impacted third molar surgery. In the majority of cases postoperative pain is said to affect the quality of life of patients. The objective of this study is delineating a reproducible operative protocol for reducing postoperative pain and the early and late complications of surgery of impacted third molars, to make post-operative recovery more comfortable for the patients.
Methods: Twenty-five participants were selected among patients of the Dental Clinical Department of the "Federico II University of Naples", who needed the avulsion of an impacted third molar. Data in relation to tooth inclusion and surgery intervention were recorded. Possible haemorrhagic, infectious and neurological complications were detected and the presence of possible swelling and trismus was analyzed through objective oral and facial measurements at 3, 7 and 21 days. All the patients underwent antibiotic prophylaxis. Furthermore, the measurement of pain and postoperative discomfort was observed at 1h, 2h, 6h, 12h, 24h, 48h, 72h and at 5 and 7 days using a Visual Analogue Scale as a measurement method. The number of analgesic drugs taken by the patient and the time elapsed after each intake was recorded.
Results: In the initial group of 25 patients the facial measurements recorded have registered an average trismus of 7 mm at seven days, and of 0 mm at 21 days. At 3 days the incidence of hematoma was 20% and the incidence of edema was 30% , meanwhile at 7 days their incidence was 0%.Alveolitis has been observed in the 10% of cases. No case of bleeding has been registered. Postoperative pain has been measured as moderate at 12h in the 23% of cases, and as absent at 3, 7 and 21 days.
Conclusion: The initial results obtained don't show significative differences with data reported in the literature. Complications need to be diagnosed and managed early in order to reduce morbidity rate. Morbidity increases with age of the patient, duration of the surgical procedure, and depth of the impacted tooth in the bone. Therefore, meanwhile a larger patient sample will be available, it's possible to assert that postoperative complications can be better menaged with an adequate pharmacological treatment and a less invasive surgical approach.

Effect of primary closure with tube drainage compared with conventional suturing after surgical extraction of mandibular third molars

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Aim: This paper presents a preliminary study on the evaluation of the effects of the drainage tube on postoperative discomfort after the extraction of lower impacted third mandibular molars comparing them with those of the conventional primary closure of the surgical flap. The parameters analyzed were pain, swelling and trismus.
Methods: Preliminary data were collected for a prospective randomized experimental clinical study (split mouth) which was not completed due to the ongoing COVID-19 pandemic and for this reason only 8 subjects were recruited. The patients selected presented both impacted lower third molars in the same position (Pell e Gregory class II, III e A, B, C) and FMBS ed FMPS <15%. Each patient underwent two oral surgeries (test site and control site) for impacted teeth removal with the same surgical technique except for the closure of the flap: in the control group, the flap was approximated without tension and sutured with simple interrupted sutures using 3-0 braided silk, and in the test group, after suturing a small surgical tube drain was inserted into the socket of mesial incision on buccal side. Patients were examined immediately preoperatively and on the first, third, and seventh postoperative days. Pain was evaluated and recorded in the postoperative period via visual analog scale (VAS). The maximum mouth opening was determined measuring the distance between the incisal edges of the upper and lower central incisors. Facial swelling was measured using a measurement scheme consisting of two horizontal and one vertical measurements: the horizontal measurements correspond to the distance between the corners of the mouth to the ear tragus and between soft tissue pogonion to the ear tragus. The vertical measurement corresponds to the distance between the outer canthus of the eye to the angle of the mandible. The data were analyzed with the Mann–Whitney statistical test.
Results: It was noted that the trismus was greater on the first, third, and seventh postoperative days in the control group compared to the experimental group. On comparison of both the techniques, there were statistically highly significant difference only on the third postoperative day ($P = 0.001$). When swelling was being evaluated, highly significant statistical difference was observed between the two groups on the first and third postoperative days ($P < 0.05$), but on the seventh postoperative day, there was no statistically significant ($P > 0.05$). The results show that the pain was at high frequency on the first postoperative day and gradually diminished after 3 days and 7 days. There was no statistically significant difference on first, third and seventh postoperative days between both the groups ($P > 0.05$).
Conclusion: Swelling and trismus after third molar surgery is significantly greater at primary closure sites, mainly due to accumulation of hematoma following surgical trauma, instead the surgical drain probably decreased the amount of pooled blood or serum from the surgical wound. The results of the present preliminary study showed that use of tube drain significantly reduced postoperative discomfort in terms of swelling and trismus after extraction of impacted mandibular third molars.

Minimally invasive extra-oral surgical approach for removal of ectopic lower third molar using piezoelectric device

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Aim: This paper reports a case of extraction of ectopic lower third molar using a minimally invasive extra-oral approach combined with piezo-surgery in order to prevent intraoperative injury of anatomical structures.
Methods: A 64-year-old female patient presented an ectopic impacted third molar positioned next to the lower border of the mandible overcoming it and with a direct contact with the soft subcutaneous tissue and muscle layers. Oral examination underlined a fistula in the retromolar area. The tooth was located immediately below to the inferior alveolar canal (IAC) and it was possible to appreciate a radiolucent area resembling an odontogenic cyst associated with the crown of the tooth. According to the recent operative classifications of lower impacted third molars this clinical condition was classified as TMCIII and an extraoral surgical approach was proposed as treatment option. The skin incision was executed 2 cm below the lower mandible border, between the angle and 3 cm ahead of the masseter muscle (Risdon's procedure), in length reduced to approximately 2 cm if compared to those reported in the literature (4–5cm). After soft tissue dissection, periosteum detachment and osteotomy in the area of the impacted tooth was performed using a piezoelectric device (Piezosurgery Touch, Mectron, Italy) with PR2 and OT12S inserts,

in order to reduce the risk of resection of marginal mandibular branch of the facial nerve (CN VII), facial artery and vein, and submental artery. The extraction of the impacted tooth was successfully performed. After the removal of the tooth and cystic tissue, it was possible to appreciate with a surgical specimen the connection between the intraoral fistula and the extra-oral surgical site. The skin was sutured by intradermal technique using monofilament nylon thread for maximum cosmetic benefit.
Results: The suture was removed after 10 days; the surgical site showed a good healing and intraoral fistula resolved. Two weeks post-operative follow-up was uneventful and no facial weakness was found. At 6-month visit, the patient showed adequate bone healing of the extraction site at X-ray OPT.
Conclusion: The choice of mini-invasive extraoral submandibular surgical approach can be a valid and justified surgical-therapeutic option in the management of ectopic impacted lower third molars localized in an inaccessible region (angle and lower border of the mandible) or when it is completely localized below the IAC and so inferior alveolar neurovascular bundle could be damaged to reach the tooth with an intra-oral approach. Advantages of this approach include good exposure of the surgical site, a lower probability of pathologic fractures and a reduced loss of mandibular bone caused by osteotomy, because the target is closer to surgical access site. The major disadvantages of the extraoral approach include the possibility to injury to vessels and nerves or vessels (CN VII, facial artery and vein, and submental artery), not only during the incision of soft tissues but also during osteotomy and odontomy with bone-drill handpiece, and the cosmetic sequelae of the skin scar. The first one can be avoided through a careful surgical planning and improving the surgical technique with the use of piezoelectric device for periosteum detachment and osteotomy in order to decrease the perioperative complications and morbidity. The cosmetic sequelae of the skin scar can be avoided identifying the "skin crease" referring to Langer lines, and using an intradermal aesthetic suture in order to avoid post-operative scarring.

Pleomorphic adenoma of the cheek: a case report

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Aim: Pleomorphic adenoma (PA) is the most common benign tumour affecting salivary glands. Around 90% of these tumours, related to Major Salivary gland, are affected by parotid gland. Among minor salivary glands, palate is the most commonly affected site followed by lips, cheeks, gingiva, floor of the mouth, and tongue. The aim of this report is to present a case salivary gland PA in an adult patient successfully treated by surgical excision.
Methods: A 40 years-old patient came to our observation without any particular systemic problem referred at the anamnesis. He presented a 1,5 cm wide and rounded shape neoformation to the left cheek, intramural, with sub-zygomatic localization. This neoformation was present since 6 years growing-up. No symptoms related to the neoformation have been reported by the patient, only referred a foreign body sensation. At the intra-oral examination, the neoformation was covered by intact, normochromic and normotrophic mucosa. It was positioned near the outlet of the parotid gland (Stenone's duct). It was not symptomatic on bimanual palpation, but it was mobile with respect to the superficial and deep planes. The neoformation presented a hard-elastic consistency. There was no palpable cervical lymphadenopathy. It was decided to proceed with a complete surgical excision of the neoformation and a histological analysis of its tissues.
Results: The surgical intervention was carried out under local anesthesia. A horizontal intraoral incision was made on the buccal mucosa. The tumour was found between the cheek mucosa and buccinator muscle. The tumor was resected from the surrounding tissue, careful attention was paid in maintaining the integrity of the tumor capsule. The vascular structure along with the parotid duct was visualized and preserved. The mucosa sutured carefully after haemostasis had been secured. The specimen was prepared and sent for histopathological examination and the subsequent histological analysis was compatible with the diagnosis of Pleomorphic Adenoma.
Conclusion: 1 week later, intraoral examination revealed absence of swelling. The patient reported absence of pain. Post operatively, we did not notice any abnormalities and there was no signs of recurrence after 1 year. Complete surgical excision with good safety margins is the treatment of choice. The possibility of late recurrence after many years of surgical excision and malignant transformation as well should be a concern. A regular follow-up for at least 3–4 years has been recommended.

Mandibular third molar displaced in the sublingual space: review of the complications and case report

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Aim: The extraction of mandibular third molars is one of the most frequent procedures in oral surgery. As well as all surgical intervention, it can cause complications if an appropriate clinical and radiographic evaluations didn't make before the surgery. The most serious complications described in literature are the injury of the inferior alveolar nerve (IAN) or lingual nerve and mandibular fracture. Different clinical and radioghraphic variables need to be evaluated before the extraction of a lower third molar: grade of impaction, angulation, available space, depth, bone density, relation with the mandibular canal, buccolingual position, dental morphology. A buccolingual position of the tooth in relation to the mandibular lingual and buccal walls is an important factor to consider when calculating the scale of surgical diffuculty. Sometimes the tooth is totally lingual and the cortical plate is very thin. The aim of this case report was to show a specific complication related to a migration of the lower third molar in the sublingual space.
Methods: A 35-year old male patient was referred to the Department of Oral Surgery of the University of Naples "Federico II" with complaint of pain symptoms, slight swelling on the right side of the mandible, discomfort during swallowing and limitation in mouth opening. Clinical observation shows the presence of a semi-included 4.8, without signs of acute inflammation. Radiographic examination (orthopantomography and CT cone-beam) showed the inclusion of the tooth and its predominantly lingual version, with a thin lingual cortical plate. After locoregional anesthesia, a full-tickness mucoperiosteal flap was raised. The incision of the flap extended from the vestibular side of the retromolar trigone to the marginal periodontal portion of the second molar, corresponding to its distolingual cusp. The incision was continued in a vestibular direction around the intrasulcular surface of the second molar. A vestibular-relasing incision was then made, between the first and second molars, at 45° angle. During luxation, the tooth migrated in the sublingual space. Urgent OPT and CBCT were requested to evaluate the exact position of the tooth. An incision starting from distolingual angle of second molar was extended at gingival margin of the first premolar. The lingual flap was raised and the dislocated tooth was found by means of blunt dissection and grasped with dental forceps and removed. The mucosa was sutured with a 4/0 absorbable suture. Patient was given oral antibiotics and corticosteroids for 1 week.
Results: The healing process and the post-operative recovery were uneventful. No complications occurred such as bleeding, parestesia, excessive edema and sense of constriction of airflow. The patient was clinically examined just after 3 days, 7 days (in concomitance with suture removal), 14 days after, one month after and 6 months after.
Conclusion: An adeguate clinical and radiological evaluation is essential for risk assessment and surgical difficulty in order to prepare an optimal treatment plan. The complications, although rare, are distressing for patients and, sometimes, they could be difficult to manage, if the operator is not experienced.

Carcinosarcoma of the parotid gland with osteosarcomatous differentiation: a case report

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Aim: The carcinosarcoma is a rare and aggressive true malignant mixed tumor composed of epithelial and mesenchymal malignant elements. It may occur from longstanding or recurrent pleomorphic adenoma or arise de novo. We report an extremely rare case of carcinosarcoma de novo harboring an osteosarcomatous component, together with literature review of the reported cases.
Methods: On September 2019, a 68-year-old smoker female subject presented to the Department of Maxillofacial Surgery, Ancona General Hospital, with a painless swelling in the right zygomatic area, which increased in size during the last 6 months. Clinical examination revealed a mobile and tense-elastic swelling without facial weakness or palpable lymphadenopathy. The preoperative Magnetic Resonance Imagine showed oval lesion measuring cm 4.1x3.5x2.3, composed by multiple cystic areas, in the right cheek mucosa in close proximity to the coronoid process of the jaw. No regional lymph nodes metastasis was detected. The patient underwent to right parotidectomy with partial resection of involved masseter muscle. The surgical specimen was sent to the Institute of Pathology of the Marche Polytechnic University.
Results: Macroscopically, the parotid gland showed a whitish, solid and hemorrhagic nodule, measuring cm 5x3. Microscopically, a biphasic neoplasia, composed of a moderately differentiated adenocarcinoma, NOS, (CK7+, CAM 5.2+, p63-, Desmin-, Vimentin-, S100-, BHCG-) and osteosarcoma (Vimentin+, Desmin+, p63+), with spindle cells (SMA+) and osteoclast-like giant cells (CD68+, Catepsin k+), was observed.

The tumor proliferative activity was about 35%. No evidence of benign mixed tumor was found. Thus, a final diagnosis of carcinosarcoma de novo of parotid gland, was rendered. The patient received adjuvant platinum-based chemoradiation therapy. Post-operative chest and abdominal Computed Tomography and Positron Emission Tomography did not reveal any signs of regional or distant metastasis. To the best of our knowledge, only 11 cases of parotid gland Carcinosarcoma with an osteosarcomatous differentiation have been reported. Usually, the sarcomatous elements are chondrosarcoma and fibrosarcoma. The most common epithelial components are poorly differentiated adenocarcinoma and squamous cell carcinoma. Local recurrences and distant metastases affected the 43% and 57% of patients, respectively. The mean disease-free survival and metastasis-free survival were equal to 6±4.2 months and 5.9±3 months, respectively. The death rate was equal to 57% with an overall survival rate of 7.5±3.4 months.

Conclusion: We described an extremely rare case of parotid gland carcinosarcoma with osteosarcomatous differentiation. Preoperative clinical diagnosis is difficult, due to nonspecific clinicoradiological findings. Furthermore, the biphasic nature of the tumour might pose a diagnostic histological challenge. The sarcomatous element tends to predominate over the carcinoma; therefore, immunohistochemistry is recommended to distinguish carcinosarcoma from primary sarcoma. The immunohistochemical investigations also help determinate its origin. There are two main hypotheses for the genesis of carcinosarcoma. Collision theory implies development of two independent elements which then intermingle. Monoclonal hypothesis, more widely accepted, implies a common precursor in the form of dedifferentiated or pluripotent cells that undergo divergent differentiation. More than 99% of carcinosarcoma arise from pleomorphic adenomas, so entire specimen must be processed to look for any component of benign mixed tumor. Although a definitive treatment protocol has not been established, surgery and postoperative adjuvant radiotherapy are recommended. Despite therapy, over half of patients died of metastasis, especially to the lung, bone and nervous central system.

Extraction of mandibular third molars: proposal of a new scale of difficulty

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Aim: Extraction of mandibular third molars is one of the most common procedures in oral surgery and, as with all surgical operations, appropriate clinical and radiographic evaluations are essential to avoid or reduce the incidence of any complications and to prepare an appropriate plan for treatment. The most serious complications are injury of the inferior alveolar nerve (IAN) or lingual nerve, and mandibular fracture. The objectives of the present study were therefore, first, to review the clinical and radiographic variables before extraction of an impacted third molar, and, secondly, propose and validate a new scale of surgical difficulty based on variables not previously considered (relating to morphological abnormalities, the type of undercut, and the transverse position of the tooth).

Methods: Two hundred patients with impacted third molars were enrolled, and a preoperative clinical and radiographic assessment of difficulty was made by an oral surgeon using the new index. The variables considered were: angulation, available space between the ramus of the mandible and the distal side of the second molar, depth according to the position of the highest portion of the third molar related to the occlusal plane and the cervical line of the second molar, bone density, relation with the mandibular canal, buccolingual position and dental morphology. Five oral surgeons with similar degree of experience then evaluated the surgical difficulty during operation. At the end of the operation the duration was recorded and the surgeons, who were not aware of the aim of the study, were asked to record the difficulty of the operation by indicating if it was simple, moderately simple, difficult, or extremely difficult. So, we assessed the reliability of the index according to the level of agreement between the preoperative and postoperative evaluations by using Kappa test.

Results: The preoperative evaluation placed 43 third molars in the "low" difficulty group, and in 36 of these (84%) there was agreement between the preoperative and the postoperative assessment of a "simple" operation. Seventy-two third molars were considered preoperatively as being in the "medium" difficulty group, and in 57 of these (79%) there was agreement between the preoperative and the postoperative assessments of "moderately simple". Thirty-four third molars were considered preoperatively as being in the "difficult" group, and in 25 of these (74%) there was agreement between the preoperative and postoperative assessments of "difficult". Fifty-one third molars were considered preoperatively as being in the "plus" group and in 42 of these cases (82%) there was agreement between the preoperative assessment of "very difficult" and the postoperative assessment of "extremely difficult". The level of agreement was 0.73, indicating a substantial concordance according to the guidelines of Landis and Kock.

Conclusion: An adequate risk assessment and evaluation of surgical difficulty are essential in the preparation

of an optimal treatment plan. Not only the relation between third molar and the IAN is important to establish the difficult but additional previously underestimated variables are also essential, including severe dental abnormalities and the buccolingual position of the tooth. These factors in themselves could complicate an operation that would be considered "simple" using only the other measures.

Innovative diagnostic and therapeutic aspects in dentistry in the geriatric patient

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Aim: Poor oral health is a common condition in patients suffering from dementia. Several aspects of this systemic pathology contribute to causing oral problems: cognitive impairment, behavior disorders, communication and, motor skills deterioration, low levels of cooperation and medical-nursing staff incompetency in the dental field. Objectives: The objectives of this study were to evaluate the prevalence and the characteristics of oral pathology in a demented elderly population, as well as to check the association between the different degree of dementia and the oral health condition of each patient.
Materials and methods: In this observational study (with cross-sectional design) two groups of elderly patients suffering from dementia, living in two different residential care institutions were recruited. The diagnosis of dementia of each included patient was performed using the Clinical Dementia Rating Scale. In order to evaluate the oral health condition of the included subjects, each patient underwent a physical examination of the oral cavity, during which different clinical parameters were analyzed (number of remaining teeth, oral mucosa, periodontal tissues, bone crests). To each parameter, a score was assigned. Spearman's Rho test was used.
Results: Regarding the prevalence of oral pathology in elderly suffering from dementia, it emerged that 20.58% of the included patients had mucosal lesions and/or new mucosal formations (in most cases undiagnosed and therefore untreated). The prevalence of periodontal disease was equal to 82.35% and a marked clinically detectable reabsorption of bone crests was found in almost all patients (88.23%). 24.13% of patients, who underwent the oral examination, had totally edentulous maxillae and/or with retained roots, without prosthetic rehabilitations. The correlation index r showed the presence of a linear correlation (inverse relationship) between the degree of dementia and the state of health of the oral cavity of each patient.
Conclusions: Several factors contribute to poor oral health in the elderly suffering from dementia: cognitive functions deterioration, behavioral disorders and inadequate medical-staff nursing training on oral hygiene. This study also demonstrated that the lower the dementia degree is, the lower tends to be the oral health status. In order to guarantee a complete assistance to these patients, residential care institutions should include in their healthcare program specific dental protocols.

Comparison of the physicochemical characteristics of Bio-Oss® and sphene granules of various sizes

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Aim: The aim of this first part of the present in vitro study is to investigate the physicochemical properties of Bio-Oss® and Sphene granules of various sizes: large, small and pulverized.
Methods: We have investigated 1000-2000 µm (large), 250-1000 µm (small) commercially available Bio-Oss® and 100-200 µm (pulverized) Bio-Oss®, obtained by crushing and subsequent sieving separately the large and small granules. Sphene bioceramic (TiO2*CaSiO3) granules of the same sizes described above, obtained by crushing and sieving of laboratory 3D printed sphene scaffolds and foams were investigated as well. Morphological characterization of the biomaterials was performed by scanning electron microscopy (SEM), equipped with elemental dispersive X-ray spectroscopy (EDS) to determine their chemical composition.
Results: Bio-Oss® granules appeared like typical bone material with rough surface independently from the particle size. Large and small granules were characterized by the presence of large pores with diameters in the range of 30-300 µm, while these were not present on the pulverized granules. On the other hand, small pores of about 1 µm appeared to be present on granules of all sizes. The chemical composition derived by EDS analysis showed the presence of Ca and P. The sphene granules deriving form 3D printed scaffolds, presented a particular macrostructure, characterized by a 3-dimentional reticular organization. Nevertheless,

even for this biomaterial the surface appeared to be rough and large pores of about 300 µm were present on the large and small granules, while approximately 1 µm pores were present on granules of all sizes. The morphology of the pulverized particles was very similar to that of the pulverized Bio-Oss®. The sphene granules derived from crushed sphene foams showed a very similar morphology to that of Bio-Oss® granules for all granule sizes. The surface was rough and large pores in a range of 50-500 µm were present on the large and small particles while smaller pores of about 10-40 µm were present on the pulverized granules as well. Pores with dimension of about 1µm were present in all granule forms. The chemical composition for all sphene granules was characterized by the presence of Ca, Si and Ti.

Conclusion: The presence of pores of large dimensions on the studied granules is required to form blood vessels and induce bone growth around the graft material, while the presence of pores of small dimension is necessary for the penetration of body fluids and ion transportation. The rough surface offers a large surface area for the attachment of osteoblasts. These preliminary results suggest that the novel bioceramic granules could be a valid bone substitute biomaterial and that the pulverized form could have clinical applications.

Maxillary bone defects: new possibilities

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Aim: Tooth Transformer® is an innovative patented system that is able to transform a tooth in autologous material for bone regeneration. In few minutes, an extracted tooth is processed automatically and transformed into grafting material with optimal characteristics. Tooth transformer reduces the crystallinity of hydroxyapatite and, through his exclusive procedure, makes the morphogenetic proteins and growth factors present in the dentin available. The particulate obtained is able to determine an osteo-induction mechanism, capable of stimulating cell adhesion, proliferation and differentiation during bone regeneration. The graft, thus created, is safe because the bacterial load is completely eliminated. It has an absolute biocompatibility and is free from immunological adverse reactions. The high wettability allows great easiness of use and promotes bone regeneration. The purpose of our study is demonstrating that dentin and bone tissue are similar; so, dentin can be considered as bone -like grafting material and as a carrier of osteo-morphogenetic proteins (BMP-2).

Methods: In our study, 6 patients were enrolled (4 men, 2 women), aged between 30 and 55 years. All patients had good general clinical conditions. Bone regeneration and fixture positioning surgery was performed in all patients. Patients were divided into two groups: in the first group (3 patients) a graft (dentin auto-transplantation) was performed with positioning of the slow-absorbing membrane above it; in the second group, however, the cavalry membrane of the same graft was not inserted. A post-operative radiological check was performed in all patients. The patients underwent clinical control at 15 and 30 days. After 5 months, after a Tc control, the implant seats were implanted and the graft site cored.

Results: From the clinical and radiographic examination it was observed that, after 5 months of healing, the bone defects were completely filled with newly formed tissue. Soft tissue healing after graft procedures was uncomplicated. Histological analysis revealed no inflammatory or infectious reactions affecting the tooth graft. The appearance of the regenerated tissue was homogeneous and the grains of the grafted tooth were indistinguishable and were surrounded by new bone formation.

Conclusion: Our results revealed that the dental graft seemed well integrated into the regenerative tissue, without any inflammatory or infectious reaction. In addition, the patient's tooth can be used as an autologous regenerative material, avoiding (where possible) any grafting of heterologous material. In fact, the graft undergoes bone remodeling phenomena, demonstrating excellent integration with the host site. In any case, future controlled studies with long-term follow-up are needed in order to better evaluate the potential of demineralized dentin self-transplants in the field of bone regeneration.

Simplified Apposition Technique (SAT): histologic and radiographic report of a case at 2.5 years follow-up

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Aim: Following tooth extraction, morphological and dimensional changes of the alveolar ridge occur. According to this, the aim of this case report was to scientifically validate a new minimally invasive surgery technique called "Simplified Apposition Technique" (S.A.T), which consists in the use of deproteinized

bovine bone (BO, Bio-Oss, Geistlich Biomaterials), human fibrin glue (HFG, Tisseel, Baxter) and collagen membrane (CM, Bio-Gide compressed, Geistlich Biomaterials) in association with a post-extraction socket, in order to obtain an increase of the horizontal ridge dimension in the atrophic bone crest.

Methods: A 69-years-old man patient was enrolled and written informed consent was obtained. Before the surgery, he was subjected to a Cone Beam Computed Tomography (CBCT) to evaluate the bone width of the analysed site. The radiographic examination was repeated after 11 months and after 2.5 years of follow-up. The patient presented a prosthetic bridge in zone 4.5-4.7 with an atrophic bone crest. The hopeless tooth 4.7 was extracted, using a flapless procedure. Then, a mucoperiosteal flap was raised, making a crestal incision in the edentulous mandibular. According to SAT, the ridge reconstruction and the filling of the socket were performed using BO, HFG, and CM. A modified horizontal mattress and single sutures were used to secure the membrane and the graft material in place. After 10 days, sutures were removed. After 11 months, a flap was raised to place an implant in zone 4.6, and, simultaneously, the bone chips, remaining in the drills, were preserved for the histological evaluation.

Results: The surgical procedures were performed without complications and the follow-up evaluation on day 10 and 1 month showed no signs of inflammation and soft tissue closure, partly obtained by second intention healing, using the association of CM and HFG. CBCT, performed at 11 months, revealed no residual radiolucency and good integration of the graft material. At baseline, the crest width was 3.7 mm, and, after 11 months, it increased, reaching 6.5 mm. The CBCT carried out after 2.5 years showed a maintenance of the reconstructed volumes. At the light microscopy evaluation, the bone chips exhibited various stages of bone formation and maturation, showing a good quality of lamellar compact bone without any inflammatory response. The area regenerated using BO and HFG demonstrated newly formed osseous tissue and very good integration with the pre-existent bone.

Conclusion: The promising histological and surgical findings provide valuable proof that S.A.T could be considered a successful bone regeneration method, minimizing risks of postoperative morbidity and stabilizing the increased horizontal bone over time, as demonstrated by the CBCT at 2.5 years of follow-up. S.A.T allows to obtain an increase of the horizontal ridge dimension of the atrophic bone crest with new hard tissue formation, exploiting the osteoinductive and osteoconductive properties of the used biomaterials. Further studies are ongoing, in order to support the combined use of this technique with different substitutes, always in association with the released factors deriving from post-extraction sockets.

Marsupialization of keratocystic odontogenic tumour: report of 6 cases

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Aim: The keratocystic odontogenic tumour (KOT) is a benign cystic tumour of the maxillary bones characterized by local aggressiveness and a tendency to frequent recurrence. Until recently it was classified among the odontogenic cysts of the jaws, with the name of keratocysts or primordial cysts. It originates from the residues of the epithelial tissue that participates in the formation of the tooth (dental lamina). It appears as a single- or multilocular cystic lesion, with invasive growth, which tends to expand within the bone tissue, inducing its reabsorption, up to surface, deforming its contours. Multiple treatment for the KOT have been proposed: enucleation (Partch II), decompression (Partch I) and decompression following by enucleation. All these treatments are valid depending on the size of the lesion, its location, the entity of cortical destruction, the histological appearance, the proximity to important anatomical structures. The decompression and second stage-enucleation is the most proper treatment in case of medium size lesions and proximity with vital anatomical structures. The present study aims at assessment and histomorphometric analysis of KOT epithelium and fibrous capsule before and after decompression treatment Histological evaluation and immunohistochemical expression of podoplanin, Bcl-2, COX-2, IL1 were analysed by using conventional microscopy. In addition, volume change pattern of decompression was analysed by using TC Dentalscan.

Materials and methods: Six patients who were diagnosed with KOT of the mandible were selected and treated by marsupialization. They underwent an incisional biopsy of the cyst before decompression. Then the connection with the oral cavity was maintained by iodoformic gauze with gentamycin. During the follow up period weekly irrigations through the lesion access were applied. Every time the iodoformic gauze was removed, the cystic cavity was irrigated with physiological solution, hydrogen peroxide, iodopovidone solution, rifamycin and then a new iodoformic gauze with gentamycin was put inside. After some decompression period the patients underwent surgery enucleation. The histomorphometric and immunohistochemical parametrises were measured before starting the decompression treatment (T1) and at time of enucleation (T2). The samples were fixed in 10 percent buffered formalin and treated in haematoxylin eosin. The epithelium and fibrous capsule thickness were measured by Olympus dp-soft software.

Results: The epithelium after the marsupialization epithelium has been shown to be thicker than before the marsupialization treatment. Wilcoxon test was used for the statistical analysis. The volumetric analysis was conducted with Inversthilius 3.1 and Meshlab. Moreover, a volumetric reduction of cystic cavity and a volumetric increase of bone tissue were registered, comparing TC realized at T1 and T2.
Conclusion: As a treatment of KOT, decompression followed by enucleation was more conservative and effective than other procedures. Decompression preserves the important anatomical structures of the jaw and thus decreases complications such as functional and esthetical damage. Although the rate of recurrence is low using this procedure, periodic check-ups are necessary.

Covid-19: preventive strategies for infection control in the dental practice

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Aim: Covid-19 is a respiratory disease caused by a new type of coronavirus named SAR-CoV-2 (Severe Acute Respiratory Syndrome-Coronavirus-2). The virus can spread from person to person with a predominantly respiratory transmission through aerosol and droplets. Dentistry is one of the most exposed professions to the virus contagion due to the inalation of airbone particles and aerosols produced during dental procedures. Infact the practice of dentistry involves the use of rotating dental and surgical instruments that create a visible spray that contains droplets of water, saliva, blood and microrganisms. Preventive strategies should be applied in order to protect the team and the patients from the risk of infection. The aim of this article is to identify and discuss procedures and protocols that allow to control COVID-19 in dental practice.
Methods: The search was performed on PubMed and Google Scholar databases. The keywords used were: "dentistry", "dental practice", "COVID-19", "SARS-CoV-2", "infection". We selected studies analysing the impact of COVID-19 on dentistry.
Results: First of all telephone triage should be performed to investigate current health status and the presence of risk factors for COVID-19 development. The body temperature of all the patient should be registered before entering the dental office. If the patient had a positive history of contact or symptoms the appointment should be delayed for 14 days. Hand hygiene plays an important role in limiting the spread of the virus. Any patient entering the dental clinic had to disinfect hands with alcoholic gel solutions, while dentists should wash their hands before touching a patient, after exposure to body fluids, after touching a patient and after touching contaminated surfaces or equipment. Before starting any dental procedures, mounth rinses with 1% hydrogen peroxide or 0.2% povidone may reduce viral load in oral fluids. Dentists should take strict personal protection measures and the use of an appropriate protective equipment is essential. It includes masks, hair caps, gloves, googgles, shields and waterproof gowns in order to protect mouth, nose, eyes and body. During aerosol-generating procedures on patients assumed to be non-contagious the use of filtering facepiece respirators (FFR) such as N95 or FFP2 is strongly suggested. These respirators are more effective than surgical masks even if their use is discomfortable for operators and cause an increase of facial skin temperature. Furthermore, when performing dental emergency in suspected COVID-19 patients a higher level of respiratory protection such as FFP3 should be considered. The use of a double high-speed aspiration is considered an important means to control aerosols evacuating during dental treatments. However aerosol-generating procedures should be avoid whenever possible. After treatment environmental cleaning and disinfection procedures had to be applied. To remove contaminated air in treatment areas, frequent room ventilation and the use of air purifers with expensive high-efficiency particulate arrestor (HEPA) filters is suggested. Inanimate surfaces shoud be disinfected with sodium hypoclorite 0,1% or 70% isoropyl alcohol and sterilization of all instruments that have been contaminated is reccomended.
Conclusion: In this article the most appropriate procedures were discussed to minimize the risk of infection in dental practice and to prevent the spread of SARS-CoV-2.

Anatomy of the alveolar antral artery as related to maxillary sinus lift procedure: a cone-beam computed tomography study

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Aim: This research focuses on the role played by cone-beam computed tomography evaluating the incidence, frequency and characteristics of the alveolar antral artery (aAA) and ultimately pursuing a reduced risk in

lateral window sinus lift elevation surgery.
Methods: The study examines 100 cone-beam computed tomographies performed between 2012 and 2019 on 100 subjects (200 maxillary sinuses). The subjects presented edentulism from the first premolar to the first molar and were candidates to maxillary sinus lift surgery, 42 (42%) were male and 58 (58%) female. The average age of patients was calculated to be 68.46 to +9.66 years, with an age range from 43 to 88. The software used was PaX-Zenith3D (Vatech, 13, Samsung 1-ro 2-gil, Hwaseong-si, Gyeonggi-do, 445-170, Korea). The observations and measurements of the study were performed examining the following parameters: (i) the presence; (ii) the mesio-distal length; (iii) the cranio-caudal height from the maxillary crest to the first upper molar; (iiii) the calibre at first upper molar level. The data was statistically analyzed by means of SPSS software.
Results: The presence of aAA's intraosseous anastomosis was shown on cone-beam computed tomography in 100 cases out of 100. There were no statistically significant differences in its presence between the right side and the left. The mesio-distal length presented an average value of 24.06 ± 5.66 mm on the right side, and of 23.21 ± 5.43 on the left. The mesio-distal left length is significantly greater than the right length (>1mm). The cranio-caudal distance was measured at 12.25 ± 3.84 on the right, and 13.44 ± 3.91 on the left. 20% of the cases presented a cranio-caudal distance higher than 15mm in the region of the first molar. The calibre averaged 1.07mm. The cranio-caudal female distance was 12.67 mm on the right side and 13.56 on the left. The cranio-caudal male distance was 11.66 mm on the right side and 13.43 on the left. The female mesio-distal length was 23.44 on the right side and 22.49 on the left. The male mesio-distal length was 24.22 on the right side and 24.14 on the left. The female calibre was 1mm on the right and 1.02 on the left while the male data were respectively 1.18 and 1.13 for right and left side. The male caliber difference between right and left was statistically significant (p value<0.05).
Conclusions: As previously reported in the results, the alveolar antral artery was found in 100% of the cases, showing how a knowledge of the maxillary sinus vascularization is essential during the programming surgical phase in order to prevent blood complications during the operations involving this region.

Anatomical variability of the mandibular canal: computed tomography evaluation

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Aim: The purpose of the study is to evaluate the prevalence and the morphological aspects of bifid mandibular canals and to analyze the course and the radiological characteristics of retromolar canals, using computed tomography.
Methods: The tomographic scans of patients who underwent an oral surgery at the Odontostomatology Area of the University of Naples "Federico II" between June 2018 and January 2020 were analyzed. Scans that did not clearly show the entire path of the mandibular canal and those that showed osteolytic and/or osteosclerotic neoformations in the posterior region of the mandible were excluded. The study sample comprised 115 patients (230 evaluation sites). Each CT scan was analyzed using the MPR tool of RadiAnt DICOM Viewer software. The intercepted bifid mandibular canals were classified according to the classification of Naitoh et al. (2009). As regards retromolar canals, sagittal CT-derived images were used to measure three distances, according to the modalities described by von Arx et al. (2011): horizontal distance from retromolar foramen to second molar; height of retromolar canal; width of retromolar canal. Retromolar canals have been classified into 3 categories, according to their course and morphology: vertical, curved, horizontal. Moreover, volumetric reconstructions of the analyzed retromolar canals have been elaborated, using Simplant Pro 18 software.
Results: The study found that 50.4% of patients have at least one bifurcation or trifurcation of the mandibular canal. 33.9% of the 230 analyzed mandibular canals are bifid and only 4.3% are trifid. The anterior canal is the most frequent type of the bifid variations of the mandibular canal, with a prevalence of 12.6%, followed by the retromolar canal (8.3%), the dental canal (6.1%) and the bucco-lingual canal (3.5%). 3,5% of the canals are bifid but it is not possible to classify them according to the adopted classification: in seven sites, an accessory canal branches off from the lower face of the main canal and runs in the front and lower direction; in only one site a Temporal Crest Canal is observed. In relation to the retromolar canals, 63.2% are vertical, 36.8% are curved. The mean distance from retromolar foramen to second molar is 15.7 mm ± 3.8 mm. The mean height of retromolar canal is 13.3 mm ± 2.8 mm. The mean width is 1.05mm ± 0.28mm.
Conclusion: The prevalence data that emerged from the study show that the branches of the mandibular canal represent a common radiological finding. In planning any surgery in the posterior region of the mandible, therefore, it would always be advisable to search for accessory mandibular canals and possibly to analyze them in relation to their position and course. These

assessments can be performed in a much more precise and detailed manner on tomographic scans.

Salivary cytokines for the diagnosis of oral cancer: a review

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Aim: Cytokines are a heterogeneous group of soluble small polypeptides or glycoproteins, with the function of growth promoting, differentiation and activation of cells. Cytokines can have either pro- or anti-inflammatory activity as well as immunosuppressive activity, depending on the microenvironment. It has been demonstrated that at least 20% of malignant tumors exhibits extensive inflammatory infiltrates with high cytokine expression in the tumor microenvironment. The aim of this review of the literature is to highlight the possible correlation between salivary cytokines and presence of oral squamous cell carcinoma (OSCC).
Material and methods: The Medline, Web of Science and Scopus databases were searched, using as entry terms: "Salivary cytokines and oral squamous cell carcinoma", "Salivary interleukins and oral squamous cell carcinoma", "Saliva cytokine and oral squamous cell carcinoma", "Salivary cytokines and oral cancer", "Salivary interleukins and oral cancer". We selected only articles in English, published after 2010 and studies on saliva sample. We excluded case reports, conference proceedings, personal communications and letters to editor. Articles about molecules different from cytokines and reporting diseases different from OSCC were excluded. Articles selected was classified in three subtypes of studies: Studies that analyzed cytokines concentration in OSCC patients and healthy patients; Studies that analyzed cytokines concentration in different OSCC stages; Studies that analyzed cytokines concentration before and after surgery.
Results: Starting from 14318 articles, 26 studies met inclusion and exclusion criteria of the review. Eight articles were in group one (I), 11 in group two (II) and 7 in group three (III). Twenty-one studies (80%) showed statistically significant correlation between altered concentration of some cytokines and oral cancer. It is important to mention that in group II ten articles (90%) had statistically significant results.
Conclusion: Correlation between oral cancer and cytokines is currently an interesting field of research, also because of the high number of articles produce in last 10 years. Moreover, the use of saliva for the analysis seems to be promising, to identify a panel of cytokines useful for diagnosis of OSCC, also in early stages. IL-6 and TNF-aare the salivary molecules most frequently found in association to malignant lesions of the oral cavity. Also, IL-8 seems a promising marker. More studies are necessary to strengthen the relationship between salivary cytokines and OSCC diagnosis, avoiding important confounding factors like presence of oral inflammation and/or coexistence of other systemic diseases.

Effectiveness of ibuprofen and celecoxib on the management of pain and postsurgical inflammatory sequelae following third molar surgery: a randomized, controlled clinical trial

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Aim: To manage postoperative discomfort following the avulsion of the mandibular third molar, many strategies have been developed for minimizing clinical manifestations after surgery through a pharmacological approach. The objective of this study was to compare the efficacy of celecoxib and ibuprofen in reducing postoperative sequelae following the surgical removal of impacted mandibular third molars.
Materials: Ninety-eight patients requiring the surgical removal of a mandibular third molar were randomly assigned to receive a placebo (group 1, 32 patients), ibuprofen (group 2, 33 patients), and celecoxib (group 3, 33 patients). Drugs were administered after tooth extraction twice a day for 5 days. The primary outcome, pain, was evaluated using a visual analogue scale at 30 min, 2 h, 6 h, 12 h, 24 h, 48 h, and 7 and 10 days after surgery. Postoperative pain intensity was measured using a 10-cm visual analogue scale (VAS), which consisted of an interval scale ranging from 0 (absence of pain or discomfort) to 10 (maximum pain or discomfort). The secondary outcomes were the changes in maximum mouth opening and facial contours (mm) between baseline and at 24 h, 72 h, and 5, 7, and 10 days after surgery. The maximum mouth opening was measured in millimeters between the upper and lower central incisors using a calibrated sliding caliper (Therabite Range of Motion Scales), preoperatively (baseline) and at 24 and 72 h and 7 days after surgery.

Results: Compared to the baseline, all treatments demonstrated an improvement in the primary and secondary outcomes. Compared to placebo, treatment with celecoxib and ibuprofen resulted in improvements in the primary outcome. Furthermore, when compared to the other groups, patients in the celecoxib group showed a significant reduction in postoperative pain scores at 6 h ($P < 0.001$), 12 h ($P = 0.011$), and 24 h ($P = 0.041$) after surgery. Measurements of the facial distances, recorded pre- and postoperatively to determine the degree of swelling in the study groups, did not differ between the three groups at any of the observation time points ($P > 0.05$). Moreover, the maximum mouth opening values did not differ significantly between the treatment groups at any of the observation time points ($P > 0.05$).
Conclusions: This study suggests that celecoxib used as postoperative therapy after third molar surgery shows favorable effects in the management of perioperative pain compared to ibuprofen and placebo. Celecoxib was found to be safe and simple to use in the postsurgical management of discomfort following third molar surgery.

Case report: LAM affected patient undergoing allogeneic stem cell transplantation with a huge cystic lesion; a multidisciplinary approach

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Aim: We present a case report of a patient affected by L.A.M. who has been treated in order to eradicate dental infectious foci; the radiological examination highlights a huge cystic lesion in the IV quadrant but there was a very short time before the allogeneic stem cell transplantation. The aim of this study was to evaluate the correctness of our therapeutic choice, according to patient's clinical situation and time available before therapy.
Materials and methods: 49-years-old male affected by L.A.M was referred to the Department of Oral Surgery and Systemic Pathologies, Dental School, University of Turin in April 2016. The patient was waiting for stem cell transplantation [(WBC: 3,9 (109/L), RBC: 3,25(1012/L), PTLS: 47 (109/L)]. He arrives with an orthopantomography in which we can highlight:
a. root residues of 1.5, 1.8, 2.6, 2.7 e 4.6 with variable periapical osteolysis in all sites.
b. periapical bone demineralization and destructive decay of 1.6.
c. destructive decay of 2.4
After oral and radiologic examination extractions of 1.8, 1.7, 1.6, 1.5, 2.4, 2.6, 2.7, 4.6 and 4.8 were planned and a maxillofacial bones TC was required to evaluate the translucency of IV quadrant. The TC highlight a phlogistic periapical osteolysis of 4.3 on the distal side indissociable from the periapicoradicular lesion of 4.4 and 4.5. We also detected spongiosa osteosclerosis near the incisors of the third quadrant progressively more evident going to the fourth quadrant. Considering the short time before transplantation, according to the transplant team, we decided to not extract all the teeth of fourth quadrant but to do endodontic treatment and cystectomy because the only endodontic treatment hadn't permitted us to see the bone healing (6 months required). On 27/04/16 endodontic and conservative treatments of 4.3, 4.4, 4.5 were done in the Conservative and Endodontic department of Dental School, Turin University. On 30/04/16 extractions of 1.8, 1.7, 1.6, 1.5, 2.4, 2.6, 2.7 were done with flap, Spongostan Tissucol and sutures in order to obtain a first intention healing in the first quadrant. Emostasis was good. On 02/05/16 extractions of 4.6, 4.8 and cystectomy were done. From the medical report emerges the presence of fibrous connective tissue chronically inflamed. The patient has done another orthopantomography on 21/06/16 in order to have the transplantation suitability (transplant was done on 08/07/16). The post therapy follow-up was planned every 6 months: in those occasions we had done professional scaling, oral clinical examination and orthopantomography.
Results: The last orthopantomography, done on 10/10/2019, shows us the complete resolution of the lesion in the IV quadrant.
Conclusions: This case report shows an emblematic situation that frequently occurs for the dentist who have to treat patients before transplantation. When the days available for the oral management are less than 21, tooth extractions have to be chosen wisely, taking consideration of patient primary disease and systemic conditions. In this case despite the presence of a huge lesion including 3 elements, the choose of a clinical protocol without teeth extractions permitted to obtain a complete bone healing, even though the contextual immunosuppressive therapy. The most important aspect of our protocol is that we hadn't extract four teeth in a young patient with a good life expectancy.

Split crest technique: case report and 7-year follow-up

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Aim: Alveolar atrophy is the most important problem that has limited the use of endosseous implants since their introduction. When an anterior maxillar tooth is lost, often as a result of trauma or endodontic complications, the labial wall of the alveolar socket resorbs rapidly and the residual ridge actually consists of the previous palatal wall. Therefore, the alveolar ridge is predominantly reduced in the horizontal dimension, and immediate implant placement with routine techniques is not possible because of the discrepancy between the thickness of the ridge and the diameter of the implant. Although many procedures have been proposed to augment the alveolar crest with autogenous bone grafting, such as the ribs and iliac crest, sometimes in conjunction with a barrier membrane, a risk of dehiscence and infections of the mucosa may jeopardize the graft. Furthermore, a two-stage approach to implant placement is generally advocated, lengthening treatment time and increasing cost. In the early 90's Bruschi et al. introduced a split-crest-bone manipulation technique. The purpose of this technique was to create self-space-making defects by splitting the atrophic crests into two parts with a longitudinal greenstick fracture and placing the implant between them, which is also an effective technique for severely thin alveolar bone. Various types of implants have been used within the ridge widening procedure. Because the taper-shaped implants (Winsix, BioSafin, Torque Type implants, Trezzano Rosa, Milan, Italy) are tapped into position similarly to the driving of a wedge, it is considered to be appropriate for this procedure. The present article reports a case of bone splitting (maxillary) and contextual placements of 3 self-taping fixtures.
Methods: A 57 years-old male patient was referred the Dentistry Department of San Raffaele Hospital. The patient didn't referred any systemic diseases so he was classified ASA I. He came to our department to be rehabilitated in the upper-right arch in a fixed way. After local anesthesia, we proceeded to design a total thickness "book-flap" from the element 1.1 to 1.7: reducing deglowing of soft tissue allows the bloody irroration of the bone. To determine the position of the fixtures in the bone, a sterile pencil was used, taking the provisional restoration as guide. The osteotomic incision was achieved by using piezoelectric instrument in the middle part of the crest: we were sure that 1-2 mm of bone was remaining in the buccal side and in the palatal side of the incision. The expansion was ultimate using manual scalpels: we inserted the fixtures when we obtained 2-3 millimiters gap of the splitted bone walls. All the implants reached over 40 N/cm of torque: this is possible by using Torque Type implants (Winsix, BioSafin, Torque Type implants, Trezzano Rosa, Milan, Italy)
Results: After 7-years follow-up the restoration appears in 1st level (OPT) and a 2nd level (CBCT) radiographic examination well-tollerated by the patient and there were no significant bone loss at the neck of the fixtures.
Conclusion: The "split-crest" technique is an easy way to restore the bone volumes lost.

Implant-prosthetic rehabilitation in patients with cleft lip and palate

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Aim: Cleft lip and palate is a congenital malformation affecting the craniofacial structures, caused by a stop of development, between the fourth and tenth week of gestation, which causes a failure to weld the primary facial buttons that contribute to the formation of the upper lip and palate. In patients with cleft lip and palate there is agenesis of the lateral incisor and the bone share present is not sufficient to perform a correct implant-prosthetic rehabilitation.
Materials and methods: The case report presents the clinical case of a patient suffering from left unilateral complete cleft lip with lateral incisor agenesis. The patient at the age of 9 months is subjected to primary cheilonaso alveoloplasty surgery. At 6 years of age, the orthodontic treatment began, which allowed the alignment of both dental arches. At the age of 18, the computed tomographic analysis of the jaw bone showed a bone insufficiency that required horizontal and vertical GBR to allow the insertion of an implant fixture. GBR is performed through block grafting and autologous bone particulate taken from the mandibular body. The graft is fixed through a single osteosynthesis screw.
Results: 6 months after the operation, a computerized tomography is performed which shows a bone increase. We proceed with the insertion of a 3x10 dental implant and healing abutment. By using a temporary resin, the conditioning of soft tissues is promoted. After 3 months, the final prosthetic product is applied. After one year follow up, the patient has a satisfactory result.
Conclusions: In patients with cleft lip and palate, the use of dental implants, after guided bone regeneration (GBR), has become the necessary method capable of guaranteeing long-term predictable and reliable results. Autologous bone was the best grafting material. The block autologous bone graft guaranteed a stimulation of the bone neoformation processes and support for the cells involved in tissue regeneration, ensuring, at the same time, a stability of the cicatricial gingival tissues, avoiding their collapse at the atrophic site.

Eco-assisted biopsy of a benign oral floor lesion

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Aim: Lipomas are benign soft tissue neoplasm of mature adipose tissue it rarely occurs in the oral cavity, preferring sites such as the oral floor, tongue, cheeks and lips. It appears as a roundish mass with a soft-elastic consistency and a yellowish color, its onset is generally slow-growing. This study aims to evaluate the feasibility of intraoral ultrasound as a minimally invasive device to perform an eco-assisted biopsy (EAB).
Methods: A 77-year-old male patient, DDM, referred to Oral Surgery Division of Multidisciplinary Department of Medical-Surgical and Dental Specialties of the University of Campania "Luigi Vanvitelli" presented a neoformation on the right side of the oral floor. On clinical examination, the presence of a neoformation of a yellowish complexion contiguous to the lingual caruncles was evident, on palpation it was mobile and soft elastic in consistency. There was no swelling of the submandibular lymph nodes. The patient reported a slow growth of the lesion up to the objectified dimensions that did not allow him to carry out the normal swallowing and phonation activities.The patient underwent an intraoral ultrasound examination with a portable Esaote TMultrasound machine with a high-frequency hockey stick probe (5-18 MHz) and subsequently underwent surgical excision of the lesion. Following removal, the specimen was sent to pathologic anatomy for examination.
Results: The ultrasound examination showed a very homogeneous solid structure, hyperechoic relative to the surrounding interfaces, 1,572 cm x 1,947 cm in size. The lesion was located above the mylohyoid muscle, for this reason, an intraoral surgical approach was preferred. Moreover, the examination provided relevant information about the position of anatomical structures to be respected and safeguarded during surgery; in fact, the sublingual artery was immediately visible under the base of the lipoma and it was possible to appreciate the gland sublingual with the sublingual caruncles on the right of the same. Histological examination confirmed the clinical diagnosis of lipoma, showing an encapsulated lesion composed of abundant mature adipocytes arranged in lobules.
Conclusions: High-frequency intraoral ultrasonography is an accurate tool in the choice and planning of surgical approach and safeguard of anatomical structures.

Conservative surgical approach of an odontogenic keratocyst: clinical, radiographic and histological evaluation

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Aim: Odontogenic keratocyst (OKC) is an odontogenic cyst representing the third most common cyst of the jaws characterized by a high rate of recurrence. OKC was accepted as a neoplastic lesion in the 2005 WHO classification and it was called keratocystic odontogenic tumor. However, in the 2017 classification of odontogenic tumors, OKC was moved back into the cyst category. Cystectomy, marsupialization, or decompression are the most common treatments proposed for this pathology. This study aims to evaluate clinically, radiographically and through the histological examination the healing of a patient with OKC who underwent surgery with a marsupialization approach.
Methods: An 83-year-old female patient, RF, referred to Oral Surgery Division of Multidisciplinary Department of Medical-Surgical and Dental Specialties of the University of Campania "Luigi Vanvitelli" presented deformation of the right hemi-mandibular region and paresthesia of the right hemi-labium, during intraoral examination it was possible to detect an eggshell crackle on palpation of the anterior edentulous mandible, moreover, the patient reported a growth of the lesion over time that prevented her from using the removable prosthesis. At the OPT it was possible to appreciate a unilocular area that extended from the parasymphyseal region to the right hemi-mandible. The CT scan showed a massive erosion that only partially spared the lower cortex and involvement of the mental foramen.Considering the high risk of fracture and the systemic condition of the patient, marsupialization was performed. To allow re-epithelialization, iodoform gauze was inserted inside the cavity and was then gradually removed in subsequent follow-ups. The patient was instructed to irrigate the pouch with sterile saline after meals. After 60 days two micro-biopsies were performed, the first on the cavity bottom, the second on the edentulous saddle in order to evaluate the epithelial metaplasia. Clinical follow-ups were carried out every 3 months, radiological ones after one year.
Results: One year after surgery, the mucosa appears normochromic and normovolemic, however, a small residual area of the pouch is still present.

Radiographically, it is possible to appreciate a remarkable neoformation of bone tissue in the three dimensions. The comparison of the two micro-biopsies, respectively of the cavity fund and the gingiva, can be superimposed confirming the metaplasia process.
Conclusion: By assessing the complete remission of the cystic lesion, although the lesion has not been enucleated, we believe that in cases, such as those described, the marsupialization approach is a valid therapeutic option.

Piezoelectric devices in third molar and supernumerary teeth extraction: a case report and literature review

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Aim: The purpose of this study is to show a case report of third molar and supernumerary teeth extractions, using piezoelectric devices. Moreover, a literature review was performed in order to evaluate the effective advantages of using piezoelectric handpieces instead of rotatory instruments, to reduce IAN lesions risk.
Methods: The clinical case presented is related to a 20-years-old man. He came to the attention of the Department of Odontostomatologic Surgery of Dental Clinic of Vita-Salute San Raffaele University presenting clinical and radiographic evidences of impacted third molar in all the quadrants and of supernumerary tooth in the 4.8 region. The patient referred painful symptoms in the fourth quadrant. Among the possible surgical treatments, we selected the excision of the completely impacted 4.8 and supernumerary tooth positioned in that area, by using piezoelectric devices and by performing an odontotomy. Under local anesthesia, a mucosal paramarginal incision was performed from 4.6 up to the mandibular ramus, where the supernumerary tooth was placed. The periosteum was dissected from the surrounding mandibular bone, till the exposition of the supernumerary tooth. At first, supernumerary tooth was extracted just employing surgical forceps and elevators, used for more delicate wedging of the periodontal ligament and for easier extraction. Then, a piezoelectric handpiece with osteotomy tip was used to perform an osteotomy around the wisdom tooth and subsequently was done an odontotomy, in order to make it easier to excise all the pieces, saving as much bone as possible. The 4.8 was split up in more parts using piezoelectric devices: at first only the crown was sectioned, after that the roots were divided in two parts. In this way, the tooth was extracted in three parts, avoiding excessive bone removal by jaw branch, in order to make room for the movement of extraction. In this case, as the CBCT shows, the wisdom tooth was really near to the IAN. Therefore, to prevent some hypothetical injuries of the IAN, piezoelectric devices was the elective surgical choice that could guarantee good surgical results with high control. In conclusion, the extraction sockets were revisioned with curettes for granulation tissue removal and the flap was resutured with 3.0 silk suture. The patient was given Amoxicillin + Clavulanic Acid tablet (2 g) and corticosteroids (4 mg).
Results: The MedLine (NCBI PubMed and PMC) database and EBSCO resource were consulted with the following keywords: tooth extraction, impacted third molar, piezoelectric devices. Initially, a total of thirty-two articles were screened and among them, just seven were selected. Articles of which full text is not available, or related to piezoelectric handpieces use in other medical branches or dental procedures were excluded from the study. In all the selected articles the sequelae of using rotatory instruments or piezoelectric devices were analyzed, in order to evaluate advantages and disadvantages of both techniques.
Conclusion: The main advantages of piezosurgery include soft tissues preservation, optimal visibility and improved control of surgical procedures, decreased bleeding, better healing of hard and soft tissues, increased patient comfort, protection of bone and tooth structures. Therefore, using piezoelectric device allows to decrease short-term outcomes such as pain and swelling. This procedure can be successfully used for extraction of impacted teeth.

Treatment of peri-implantitis with Guided Bone Regeneration: a systematic review

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Aim: The aim of this study is to execute a systematic review (SR) of Randomized Controlled Clinical Trial (RCTs) to evaluate the efficacy of regenerative surgical techniques in the treatment of peri-implantitis.
Methods: According to the guidelines defined by the PRISMA statement a systematic literature search was conducted on three online databases (Cochrane Library, PubMed, Embase) updated in December 2017 and supplemented by a paper search.
Results: 220 study were individuated based on inclusion and exclusion criteria. Only RCTs and articles dealing

with treatment of peri – implantitis with procedures of guided bone regeneration were selected. The research allowed to identify 5 RCTs. The 5 articles reported the results of 5 types of regenerative surgical tecniques and materials: autogenous bone graft plus collagen membrane vs bovine – derived xenograft plus collagen membrane; open flap debridement plus amelogenine gel vs open flap debridement; open flap debridement plus titanium granules vs open flap debridement; access flap surgery plus hydroxyapatite vs access flap surgery plus xenologous graft and collagen membrane; xenologous graft plus native collagen membrane vs xenologous graft plus cross-linked collagen membrane. Clinical and radiographic parameters were analyzed and classified in primary and secondary outcomes. Marginal Bone Level (BL), evaluated by endoral radiographs with parallel ray technique, is the primary outcome; the change of the Pocket Depth (PD), Clinical Attachment Level (CAL), Bleeding On Probing (BoP), Probing Suppuration (PuS), Plaque Index (Pi), Full Mouth Plaque Score (FMPS), Full Mouth Bleeding Score (FMBS), Marginal Gingival Recession (ReC) and Implant Loss are the secondary outcomes. For the primary radiographic outcomes a greater bone level gain and percentage of bone filling was observed in BDX treatment (mean bone level gain: 1.1 mm), in EMD treatment (0.09 mm of bone level change) and in PTGs (mean radiografic defect fill: 3.6 mm) compared to the only surgical procedures of OFD (-0.1 mm and 1.0 mm of bone level change). For the secondary outcomes (clinical parameters) BDX group shows better results, while the addition of EMD and PTGs does not bring any clinical benefit compared to the only surgical procedures. The heterogeneity of the treatments involved in this review did not allow the execution of a meta-analysis. Anyway, the individual studies seem to indicate the superiority of regenerative techniques over the only OFD for short observation periods.

Conclusions: The data achieved in this review are unable to give indications on the effectiveness of the different regenerative procedures. Regenerative surgical techniques bring improvements both in clinical and radiological parametres compared to the only surgical treatment, but despite the positive results obtained, we are unable to assert that guided bone regeneration lead to new osseointegration. Therefore are necessary further studies with long follow-up periods and standardized assessment of the outcomes.

Surgical management of four supernumerary teeth: case report

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Aim: The purpose of the following case report is to document the management of four distomolar non syndromic supernumerary teeth, each one in a different sector of the mouth. The development of multiple impacted teeth is a rare condition and often found in association with syndromes or developmental anomalies such as cleidocranial dysplasia or Gardner's syndrome, with an overall prevalence ranging from 0.1% to 3.6%.

Methods: The patient (male, 20 years old, good general health) came to the Dentistry department of San Raffaele hospital to solve his class III malocclusion, in outcome of orthodontic treatments. During the intraoral examination no abnormalities with regard to the size or shape of the patient's tooth crowns or the relationship between his dental age and chronological age were found and all the third molars were impacted. The first (OPT) and second (CBCT) radiographic examination prescribed, however revealed the presence of supernumerary teeth in all the mouth quadrants. After discussing the situation about the most appropriate course of action, in order to optimize orthodontic treatment and reduce the likely negative effects of the supernumerary teeth, the surgical extraction of the supernumerary teeth under local anesthesia were planned.

Results: All the teeth were removed under local anesthesia following the same surgical procedure with few minimal differences regarding the position and the shape of the tooth, realizing a mucoperiostal envelope flap starting from an incision distal to the II molar, preserving the interdental papilla, then after osteotomy and dislocation, the wisdom teeth and the distomolars were removed from their respective sectors. In the case of a multi-rooted tooth, it is often convenient to have the coronotomy proceed to the root separation, as the roots must be extracted following their natural curvature so as not to fracture them. In the present case the sectioning of the tooth was performed using a piezoelectric handpiece. The use of the ultrasounds allows the removal of the dental root without damaging the alveolar walls, process that results especially difficult in the presence of ankylosis. After the surgery the post-extraction alveolus was sutured using a silk thread 3.0 performing an horizontal matress knot which is very useful in closing an extended surface in the sense of its length. A higher contact surface will reduce tension on the tissues, thereby decreasing the risk of necrosis. The results of all the operations were monitored with a strict follow-up lasted 12 months in which a good healing of both hard and soft tissues was evaluated.

Conclusions: Different management options are available for patients with multiple hyperdontia not associated with complex syndrome, because supernumerary teeth tend to adversely affect the adjacent dentition, causing malocclusions and malformations at a rate of 21.6%. According to the patient's needs and condition, surgical option revealed to be the best option. A multidisciplinary approach also represented a focal point in the management of the case as a structured treatment plan drafted by the oral surgeon in cooperation with the orthodontist allowed a more comprehensive view of the clinical condition and a more effective treatment.

Dynamic navigation system for surgical endodontics: a case report

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Aim: Dynamic navigation systems have recently been introduced in dentistry that facilitate and improve the accuracy of implant insertion. The dynamic navigation surgery system integrates the surgical instruments used and the radiological images acquired through CBCT (dental Cone Beam Computed Tomography) examination, using an optical positioning device with two chambers and a dedicated computerized interface that shows the position of the calibrated drill and of a target that guides the patient. The clinical interface shows in real time the three-dimensional position of the drill on the three planes of the space, guides the user in drilling allowing him to maintain the programmed milling axis during the planning of the final position of the implant. Such a system could be used for other surgical procedures, including the access cavity and apicectomy in endodontics. In surgical endodontics, the aim is to prepare a minimally invasive access cavity which, however, should allow enough space to perform the correct apicectomy, retrograde filling and mechanical removal of the lesion. The present clinical case shows the use of the Navident system in surgical endodontics in the preparation of the access cavity and in the apicectomy, with the aim of providing a simpler, faster, more predictable and accurate technique for the treatment of a lesion in an upper lateral incisor.
Methods: A 34-year-old male patient presented himself with a symptomatic right upper incisor, pain during chewing and positive vertical percussion test. The tooth has been endodontically treated orthogonally 1 year earlier. From the CBCT exam held by the patient, a periapical lesion was observed on element 1.2. It was decided to perform a surgical endodontic intervention in dynamic navigation. The dynamic navigation system has been used for the execution of a cavity of access to the minimally invasive lesion, after removal of the periapical lesion and of the third apical root, the root canal system is retrogradely prepared and obturated with a bioceramic material: EndoSequence BC RRM (Brasseler, USA).
Results: Good radiological healing is observed after 6 months after surgery.
Conclusion: The dynamic navigation system has made it possible to perform a precise minimally invasive bone access cavity and removal of the root apex in a microsurgical endodontic intervention. It was possible to precisely orient the drill in the three spatial axes through the screens of the Navident software, reducing the risk of iatrogenic errors, an important factor when you are near noble structures. The clinician had the possibility in real time and at any time of the surgical act, to know the position of his calibrated drill, with respect to the anatomical structures visible from the CBCT sections in the three planes of the space, being able to create a minimally invasive access cavity and a resection root with chamfering control as well as its extension in the apico-coronal, bucco-oral and middle-lateral dimensions.

Treatment of oro-antral communication (OAC) with titanium mesh: a case series

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Aim: Oro-Antral Communication (OAC) can be defined as a pathological condition in which an open connection is created between the oral and the maxillary sinus cavities. It represents a frequently encountered complication in the surgical practice of the latero-posterior region of the maxilla. Although various techniques have been proposed, the successful long-term closure of OAC is still one of the most complex problems to be faced in oral and maxillofacial surgery. The aim of this study is to prove the efficacy of a one-stage surgical procedure, consisting of an otorhinolaryngologic (Functional Endoscopic Sinus Surgery, FESS) and odontoiatric approach (titanium mesh application), for the treatment of OAC associated with odontogenic sinusitis. In particular, we aim to demonstrate that the use of a titanium mesh may guarantee optimal support and stabilization of soft tissues and may promote guided bone regeneration, thus resulting in excellent success rates in the surgical treatment of this type of defect.
Methods: Twenty-two patients affected by OAC underwent a one-stage surgical procedure consisting of a FESS technique associated with the toilet of the

oro-antral fistula and the closure of the OAC by a titanium mesh and a mucoperiosteal vestibular flap. A postoperative antibiotic and cortisone-based therapy was prescribed. Patients were then re-evaluated, with both otorhinolaryngologic and odontoiatric check-ups. The otorhinolaryngologic visit consisted of clinical examination and Fibroscopy. The odontoiatric visit, in the context of which a sample of four patients was examined, consisted of clinical examination, intraoral radiography and Cone Beam Computer Tomography. Bone regeneration with complete closure of the defect was the primary outcome considered.

Results. A 90.9% success rate was recorded, while the remaining 9.1% of cases failed. The two cases of failure were probably referred to the systemic conditions of the patients, that were smokers and with osteoporosis. In 50% of the cases the formation of new bone tissue was confirmed. In 31.8% of cases fibrous tissue with traces of bone tissue and in 9.1% of cases fibrous tissue without traces of bone tissue were observed.

Conclusion: Although further studies are needed, especially RCTs including a more representative sample of patients, this case series proves that a one-stage combined surgical treatment could be an effective long-term and minimally invasive technique in the treatment of OAC. In particular, the titanium mesh, used as a guide in tissue regeneration, ensures the presence of a mechanical scaffold, good tissue stability and rapid healing both at the oral and sinus levels, with the disappearance of all symptoms. Finally, it also allows long-term dental rehabilitation of the area previously affected by the defect.

Summary of the treatment activity (years 2011-2018) in intravenous sedation of non-collaborating patients

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Aim: Providing dental care to patients with disabilities may require modifications to the traditional treatment plan. Special needs patients include individual whit physical limitations, medical complications, developmental problems and cognitive impairments. Oral health care teams should embrace an interdisciplinary approach to care this patient cohort. Therefore, these health care professionals must undergo to specialized training and the medical management should provide a qualified equipment, services and programs. Clinical care of the special need patients should be based on risk assessment, in which the general health status is correlated to the level of collaboration level and to the dental needs. Techniques for behavioural management must be initially used, but in case of failure, sedation is an alternative to the patient who is not to be subjected to general anaesthesia. Monitored anaesthesia care (MAC) has been described as a specific anaesthesia service for diagnostic or therapeutic procedures performed under local anaesthesia along with sedation and analgesia, titrated to a level preserving the spontaneous breathing and airway reflexes. MAC essentially comprises of three basic components: A safe conscious sedation, measures to allay patient's anxiety, and effective pain control. This study reports the activity of the Department of Surgical and Special Odontostomatology of Ancona, during the years 2011-2018.

Methods: Patients records who underwent to the MAC protocol in the period between 2011-2018 were analysed. The health cares were divided in 3 macro-areas (hygiene, conservative and surgery) and the numerical data were processed using calculation software (Microsoft Excel, Microsoft TM).

Result: An average of 111 patients / year underwent to MAC protocol treatment. The duration of each procedures was 28.33 minutes. The 52.2% of performing cares was conservative treatments, the 30.2% were professional hygiene sessions and the 17.6% surgical procedures.

Conclusion: Dental health professionals need to be prepared to accommodate patients with special needs, regardless of the type of disability. Caring these patients requires pre-treatment planning and proper assessment, including scheduling appointments, performing a thorough medical/dental history in consultation with physicians, social workers and caretakers, and appropriate patient communication. Intravenous conscious sedation is certainly a very useful technique in a large number of both diagnostic and surgical services, which can be used in the traditional operating room and in adequately equipped alternative locations. The technique has proven effective in ASA 1-2 patients, finding a considerable degree of satisfaction from patients and family members without neglecting the reduction of stress on the operator. An individualized anaesthetic plan and management and teamwork between the dentist and anaesthesiologist are key points to guarantee safe, successful, and satisfactory anaesthetic procedure.

Non-transfusional hemocomponents: from biology to the clinic - a review

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Aim: Non-Transfusional Hemocomponents are autogenous products prepared by centrifugation of a patient's blood sample. These preparations can be solutions or gels and can be injected. Non-transfusional blood components for surgical use are innovative instruments of regenerative medicine and are widely used in clinical and surgical practices that require tissue regeneration. Different techniques are available for platelet concentrates, therefore there are various products with different biological characteristics and clinical uses. They can be classified into four main categories: pure PRP (P-PRP), leukocyte rich PRP (L-PRP), Pure PRF (P-PRF) and white blood cell-rich PRF (L-PRF). The objective of this study was to review the literature on this topic highlighting their use in regenerative dentistry.
Methods: Literature review on clinical applications. Prevention of hemorrhagic complications after dental extraction: Platelet hemocomponents have been used to prevent post-operative hemorrhagic complications in dental extractions in heart surgery patients treated with artificial mechanical heart valves. For example, PRP gel or PRF placed in the alveolar socket afterextraction without any heparin administration after the suspension of oral anticoagulant drugs allowed for an adequate hemostasis after the dental extraction. Reconstructive and implant surgery: In implant surgery, PRF membranes have been used to cover the head of the implants and thus act as a fibrin bandage between theallograft and the gingival tissue. Moreover, the use of PRF led to a substantial thickening of the keratinized gingival tissue aroundthe implants, playing a significant role in enhancing the stability of the grafted bone surface and in determining the final result of prosthodontic rehabilitation, improving the aesthetic integration. PRF seems to reduce post-operative pain and edemas and to limitinfections. Thus, the control of inflammation seems to be another advantage resulting from the use of PRF during bone grafting. Periodontology: The effect of platelet concentrates in periodontology is controversial. PRP and PRF have been used to induce and accelerate bone regeneration in the treatment of periodontal defects at the distal root of the mandibular second molar after the surgical extraction of amesioangular impacted mandibular third molar. A notable reduction in the probing depth and an improvement in the probing attachment level have been found. Orthopedics: Preclinical studies support the use of PRP for the treatment of tendon injuries and disorders, ligament injuries, and muscle injuries. Moreover, PRP can stimulate chondral anabolism and reduce catabolic processes, and may improve joint homeostasis reducing synovial membrane hyperplasia in osteoarthritis. Plastic Surgery and Dermatology: PRP has been successfully used to improve wound healing when used for skin chronic ulcers. More recently, interest has been increasing in the application of PRP in dermatology, particularly in skin rejuvenating effects. It has also been trialed as a new therapy for androgenetic alopecia.
Conclusions: Studies of blood-derived biomaterials are increasing in efforts to create different therapeutic formulations that can adapt to the needs of various biomedical applications, including orthopedic and maxillofacial surgery, sports medicine, bone reconstruction, tissue engineering, and cosmetic and dental implant surgery. The authors' efforts will be directed toward research and clinical trials underrigid protocols to improve the effects of these products, especially in regenerative procedures.

Central giant cell granuloma of the mandible associated to dental implant: a case report

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Aim: To report a case of a central giant cell granuloma (GCG) of the mandible developed following implant placement and successfully treated through surgical excision.
Methods: An otherwise healthy, caucasian, 56-year old female was referred to the section of Oral Medicine and Oral Surgery of the University of Parma, because of the presence of a radiolucent, well-defined area in the left mandible. The patient reported no history of smoking and alcohol consumption and the anamnesis was negative for systemic disorders. At clinical evaluation, it was noticeable a well-circumscribed, non-tender, painless, swelling, of approximately 2 cm in the lower left premolar area. The orthopantomography showed a radiolucent area in the third quadrant (roots of 3.3 and 3.4), adjacent to the mesial surface of an implant 3.5, which was placed 8 months before. Both teeth had signs of old root canal treatments (most probably silver cones). The patient reported that endodontic treatments were performed at least 10 years before. Differential diagnosis included odontogenic (inflammatory) cyst, odontogenic tumour and fibro-osseous lesions (e.g. giant cell lesion). After the evaluation of an orthopantomography performed one year earlier, odontogenic cyst was excluded because the lesion was not visible before implant placement. A

mucoperiosteal flap with a mid-crestal and two lateral incisions was performed under local anaesthesia. The lesion, which was solid in nature and was made of soft, friable tissue, was removed. An osseous curettage was performed to remove possible small fragments adherent to the bone. The specimen was fixed in formalin and submitted for histopathological evaluation.

Results: The histological examination revealed connective tissue containing many multinucleated giant cells surrounded by ovoid and spindle-shaped mesenchymal cells with multiple interposed blood vessels. A final diagnosis of central GCG, possibly associated to the implant placement, was rendered. Serum test showed normal calcium and phosphorus levels, while overexpression of angiogenic protein basic fibroblast growth factor (bFGF). Complete healing occurred in 2 weeks follow-up and the orthopantomography, performed after 8 months, did not highlighted signs of recurrence.

Conclusion: The etiopathogenesis of central GCG is mostly unknown. Local irritation or reaction to foreign body have been advocated as possible trigger factors. Central GCT associated to a to dental implant is extremely rare. Few reports in the anterior mandible have been reported, so far, and it seems to be more common among young men. Treatment of choice is surgical excision, followed by cavity curettage because of the high potential of recurrence. The present case may lead to hypothesize that the presence of peri-implant particles can induce macrophages recruitment, possibly leading to the development of central GCG.

Oral squamous papillomas: different surgical strategies outcomes of 251 cases

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Aim: Human Papilloma Virus (HPV) are members of the Papillomaviridae virus family which is divided into 39 genera. Uptodate more than 250 different HPV types have been identified and categorized in five different genera: Alpha-; Beta-; Gamma-; Nu- and Mu-papillomaviruses. HPVs with tropism for oro-genital mucosal epithelia belong mainly to Alphapapillomaviruses genotype: the alpha genus are therefore of main clinical importance as this group contains both "so-called" low-risk and high-risk HPVs, responsible for a wide variety of clinical HPV-associated oral lesions. Oral HPV infection is often associated with benign lesion such as squamous cell papillomas and condylomas. Focal epithelial hyperplasia (FEH) is also characterized by multiple HPV-associated lesions, it is a benign familial disorder with autosomal-recessive inheritance. Less frequently, HPV is associated with precancerous and malignant lesions: specific types such as HPV-16 and HPV-18 are strongly involved in the multifactorial process of oropharyngeal squamous cell carcinoma development. The present study aims to analyze and compare epidemiological aspects of 251 HPV benign lesions treated with three different surgical approaches.

Materials and methods: Two hundred fifty-one benign HPV associated lesions (i.e. papillomas or condylomas) were surgically treated at the Center of Oral Medicine, Pathology and Laser Surgery of the Academic Hospital at the University of Parma, between January 1998 and December 2019. After local anesthesia, excisional biopsy was performed either with:

- traditional cold blade 15C;
- molecular quantum resonance (RQM) scalpel;
- Nd:YAG laser (1064 mn, 3.5w, 70Hz).

When needed, suture was placed and removed during follow-up visit after one week. Histopathological examination was conducted after each excisional biopsy to confirm the diagnostic hypothesis. Minimum follow-up time to be included in this study was 6 months. A retrospective epidemiological analysis was conducted regarding: gender, age, site of the lesion, surgical technic and eventual recurrence.

Results: Two hundred fifty-one benign HPV associated lesions were surgically removed in patients mean age of 50 yo, mini. 8 years old max. 85 years old. One hundred forty-three lesions (56,9%) belonged to female patients and 108 (43,1%) to male. Our study showed HPV associated lesions to be localized in almost half of patients (47,9%) on tongue or hard palate, less frequently in cheeks (16,3%) and upper or lower lips (14,4) and in less than 10% of patients on soft palate. Forty-nine lesions (19,5%) were treated with Nd:YAG laser, 32 with RQM (12,7%) and 170 (67,8%) with cold blade scalpel. Recurrence was observed in 8 patients (3%), after a mean time of 14 months. Recurrence occurred in 6 patients treated with traditional surgery (75%), in one patient treated with laser surgery and in one patient treated with RQM scalpel (12,5%), meaning that 3,5% of patients treated with cold blade and 3,1% patients treated with RQM presented with recurrence while only 2% of patients treated with laser surgery had to undergo a second surgery.

Conclusions: Screening and early treatment of HPV-associated lesions is key to prevent oncologic diseases

development. Histopathological examination, possibly with viral genotyping is crucial for definitive diagnosis and predict the level of patient's risk. Hard palate and tongue were highlighted has most commonly involved sites while the complete surgical excision was confirmed to be the gold standard treatment, with low instances of lesions recurrence. Laser surgery was highlighted to be a valid treatment option due to its high selectivity for hemoglobin which allows a good hemostasis and its photobiomodulation action that promotes minimal pain and post surgical complications. Furthermore, high temperature reached by surrounding excised tissue (thermal wave of about 5 mm) lead to deep decontamination of surgical area, resulting as a counteract to HPV spread infection and recurrences.

Maxillo-facial surgery

Traditional versus digital surgical planning in bimaxillary orthognathic surgery

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Aim: The aim of this study was to compare the accuracy of jaws repositioning in bimaxillary orthognathic surgery using traditional surgical planning and digital surgical planning.
Methods: A total of 50 patients who had undergone an orthodontic – surgical treatment with bimaxillary surgery were included in this study. The patients were divided into two groups: n = 25 for the traditional surgical planning group and n = 25 for the digital surgical planning group. All patients of both the groups met the inclusion and exclusion criteria determined prior to start the study. The mean patient's age and the distribution by gender were similar in the two groups. A two – dimensional presurgical visual treatment objectives was prepared for all patients by the maxillo – facial surgeon who performed all the 50 surgeries. In the traditional surgical planning group, the surgical planning and the fabrication of the surgical splints were performed on plaster models mounted in an articulator. In the digital surgical planning group, the planning of surgical displacement was digitally performed with a software and the surgical splints were obtained with CAD/CAM method. For each patient of both groups the outcome of the surgery was compared with those planned, by comparing the cephalometric measurements of the presurgical visual treatment objectives with those obtained in the after surgery's cephalometry, which was done in a lateral teleradiograph performed a few days after surgery.
Results: The statistical analysis showed that the measurements planned on the presurgical visual treatment objectives and those obtained on the after surgery's cephalometry can be considered equivalent in the digital surgical planning group, as well as the surgical movements of the skeletal basis obtained with the surgery compared to those planned. For the traditional surgical planning group, the statistical analysis showed equivalence only for one of the measurements considered for the comparison. By comparing the results of the two group, the digital surgical planning group presented a lower level of error than the traditional surgical planning group.
Conclusions: This study showed that surgical accuracy of jaws repositioning in bimaxillary orthognathic surgery in the studied court was higher for the digital surgical planning group compared to traditional surgical planning group.

Lung adenocarcinoma mandibular osteolytic secondarism: a review of the literature and a case report of mandibular fracture

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Aim: The oral region is an uncommon site for tumor metastasis and is usually evidence of a widespread disease. The jawbones, particularly the mandible, are more frequently affected than the oral soft tissues, and lung is one of the most

common primary sites. The purpose of this report is to discuss published literature about mandibular metastasis from pulmonary tumor and, to present a clinical case of a pathological mandible fracture due to metastatic pulmonary adenocarcinoma.
Methods: We reviewed the English literature up to 2019 by first evaluating the articles concerning metastasis of the jaws, and secondly, by taking in consideration only the articles dealing with jawbones metastatic lung cancer. This decision was made to better investigate the clinical case that occurred to our clinic. In July 2018, a non-smoking 68-year-old male patient, came to our clinic, referred by the geriatric ward, for a specialist evaluation. He complained of pain (VAS: 5) in the right temporomandibular region exacerbated over the past few days, by chewing, and resulting in functional limitation. The patient has been hospitalized with a primary diagnosis of pulmonary adenocarcinoma (T2-T3 N2 Stage IIIA) diagnosed in December 2017 and treated with a completed course of radiotherapy and chemotherapy. High dosage therapy of corticosteroid led to heart and liver complications as well as vertebral collapse. A head CT scan with contrast medium and fine-needle aspiration of the lesion were performed. CT showed a right mandibular condyle fracture associated with a large osteolytic lesion located at the neck of the condyle. The lesion size was approximately 9mm x 6mm x 17mm. The lesion was characterized by irregular margins and cortical involvement both on the medial and lateral sides. The above confirmed the pathological nature of the fracture. Suspicious lymphadenopathy was not observed in the cervical lymph nodes. Fine-needle aspiration of the metastatic lesion confirmed the presence of medium and large sized adenocarcinoma cells.
Results: We took in consideration more than 20 articles concerning jawbones metastasis from pulmonary primary site. In about 30% of cases the oral lesion was the first sign of the malignant disease; in more than 70% of all cases the clinical situation was critical, and patients deceased within 12 months. In the mandible, the molar area is the most frequent metastatic site followed by the premolar area and gonion; condyle localization is rare. The classic symptoms are pain and paresthesia but they may vary according to location. Similar symptoms can be the result of odontogenic infection, trauma, benign odontogenic tumors, systemic disease. Radiographic appearance, although non-specific, raises the suspicion of malignancy with most lesions present as a lytic radiolucent lesion with ill-defined margins.
In our case, it was not possible to proceed with a mandibular resection due to the critical clinical condition of the patient who died in September 2019.
Conclusions: Panoramic radiographic examinations should be indicated in cases of known pulmonary malignancy, in order to evaluate the presence of possible osteolytic lesions of the jaws.
In patients showing symptoms not closely related with the intraoral clinical situation, and with reasonable suspicion, second level imaging studies and other diagnostic manoeuvres should be performed to allow early diagnosis and better prognosis.

Airways outcomes of mandibular distraction osteogenesis vs tongue-lip adhesion and tracheostomy in Pierre Robin sequence: a literature review

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Aim: This study was conducted to determine the effectiveness of Mandibular Distraction Osteogenesis (MDO) in the treatment of airway obstruction in Pierre Robin Sequence. (PRS) In particular, the aim of this study is to evaluate whether MDO can relieve the airway obstruction in PRS patients and its advantages in contrast to the other procedures (tracheostomy and tongue-lip adhesion).
Methods: A clinical review of the current literature was performed to evaluate the efficiency of mandibular distraction osteogenesis in the treatment of the airways problems in PRS newborns. The scientific research was conducted by using Pubmed database. A combination of the following search terms was used: Pierre Robin Sequence AND Airways obstruction AND Mandibular Distraction. Original articles, literature reviews and randomized studies were included. The inclusion criteria were applied to identify studies in children with clinical evidence of PRS, including both syndromic and non-syndromic patients. The exclusion criteria were the following: not English articles, articles not considered relevant.
Results: The research identified a total of 11 articles. PRS is characterized by micrognathia, glossoptosis and upper airway obstuction, associated with U/V-shaped cleft palate. Micrognathia causes upper airway obstruction due to the posterior collapse of the tongue and physical obstruction of the oropharyngeal and hypopharingeal regions. The gold standard of the airways obstruction treatment in these patients is tracheostomy, which immediately relieves the upper airway obstruction. However, the mortality rate is 1-4% and the swallowing dysfunction speech and language developmental problems and late decannulations make tracheostomy an option fraught with serious limitations. The other procedure is tongue-lip adhesion, which consist of the surgical adhesion

between tongue and lip. This kind of treatment has the success range between 57.1% and 84%, however dehiscence rate is 57% which lead to post-operative glossoptosis and airway obstruction that had to be solved by tracheostomy. MDO is a relatively newer procedure that has become very popular for the PRS treatment; its goal is the improvement in breathing and oxygenation by normalizing the upper airway size and shape: the tongue attachments are stretched to the mandible, that positions the tongue anteriorly, relieving the glossoptosis.
Conclusion: The results of the present study confirm that the MDO in the neonates with PRS is an effective treatment option to safely relieve the upper airway obstruction associated with micrognathia and it is a valid alternative of tracheostomy and tongue-lip adhesion. The mandibular advancement could increase the mean airway volume, the anteroposterior dimension of airway in middle of retroglossal area and the retropalatal area, eliminating symptoms of airway obstruction, along with the need of tracheostomy.

How to solve airway and feeding problems in newborns with Pierre Robin sequence: conservative vs surgical management. A literature review

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Aim: This study was conducted to find a method to solve airway and feeding problems in Pierre Robin Sequence (PRS): the aim is to recognize the gravity of signs and symptoms and decide when to use conservative or surgical treatments.
Methods: The scientific research was conducted by using Pubmed database. A combination of the following search terms was used: Pierre Robin Sequence AND Feeding, Airway problems AND Treatment. Original articles, literature reviews and randomized studies were included. The inclusion criteria were applied to identify studies in children with clinical evidence of PRS, including both syndromic and non-syndromic patients. The exclusion criteria were the following: not English articles, articles not considered relevant.
Results: The research identified a total of 9 articles. PRS is characterized by mandibular retrognathia, glossoptosis, often U-shaped cleft palate, resulting in airway obstruction and feeding difficulties, these patients should be evaluated by a multidisciplinary team to assess the airways anatomic findings, delineate the source of obstruction, and address feeding issue. Difficulties in breathing and eating due to the mandibular hypoplasia may cause delayed growth, chronic aspiration, gastroesophageal reflux, defects in speech, Obstructive Sleep Apnea Syndrome (OSAS), otitis media and death.
The diagnosis of PRS should be assessed thought clinical and instrumental analysis. The clinical analysis consists of evaluating the condition of the severity of micrognathia, upper airways and feeding problems. A low dose CT scan is important to evaluate the micrognathia, while the upper airway anomalities should be diagnosed by nasofibrolaryngoscopy, and the lower airway ones should be diagnosed through bronchoscopy. Another objective study that can be carried out is polysomnography, that can document oxygenation, gas exchange and OSAS frequency and duration. Feeding problems are the following: chocking, gagging, regurgitation, distress, impaired intake, insufficient weight gain. The most common instrumental exams are videofluoroscopic and fibreoptic endoscopic studies of swallowing.
After evaluating the new-born condition, it is mandatory to classify the its severity and verify if some other genetic conditions coexist with PRS, such as Stickler Syndrome, Treacher Collins Syndrome, Nager Syndrome and Bilateral Emifacial Microsomia. Therefore, the multidisciplinary team should assess the severity of the PRS case. In mild cases, the parents should have some rules and instructions (prone positioning) to improve the airways space. In severe cases, there are three treatment options: tracheostomy, Mandibular Distraction Osteogenesis (MDO), tongue-lip adhesion and palatoplasty if it is necessary for the U-shaped palate,
Conclusion: It is very important to develop a diagnostic protocol of the cases in order to assess their severity and treat them as mild or severe PRS, thanks to the clinical and instrumental diagnosis at birth –clinical evalutation of symptoms and signs, polysomnography, nasofibrolaryngoscopy, videofluoroscopic and fibreoptic endoscopic studies of swallowing and evaluation of associated syndromes.

Upon the surgical management of pathological fractures of the jaws associated with hidden cysts. Two case reports

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Aim: Pathological fractures of the splanchnocranium are quite rare. They occur when a weakening of the bone is generated by unrecognized bone diseases (or surgical practices) and in that cases the fracture rhyme results in proximity to the lesion. This paper has the aim to describe different surgical management of two maxillary bone's fractures related

to cysts, in order to promote a new surgical approach.
Methods: Examining CT scan of our first patient, a 54-year-old woman with a history of accidental trauma, not only a zygomatic - maxillary complex (ZMC) fracture was found, but also an intrasinusal cystic lesion that (22.5 x 28.8 mm) had been expanded massively the anterior and lateral walls of sinus. At first, alterations in cutaneous sensitivity or damage to eyesight were excluded; later antibiotic therapy was set and up to 4 days a surgical session in GA was planned. On surgical time we recornized that the right buccal cortex of the maxilla was deformed by the lesion. After isolation of the right infraorbital nerve, the maxillary fracture was reduced, fixing it with a microplate and titanium screws. Necrotic elements 15 and 16 were extracted (the apexes were included in the lesion) and the cyst was easily enucleated using the bone gap created by the fracture's rhyme. Then the anterior maxillary wall was replaced and, in order to overcome bone fragility, a large titanium plate was fixed. The procedure ended with reduction and fixation of other fractures and intraoral and cutaneous sutures.
Afterwards to our observation, a 21-year-old boy with a traumatic mandibular fracture hesitated after a scuffle. The physical examination excluded paresthesias, but showed altered occlusion and mandibular excursions. Looking at orthopantomography and CT, we discovered two fractures of the mandible: one left paramedian and another nearby element 38. Moreover, as occasional finding, we detected a cystic lesion. After 6 days, we were in surgical session in GA. A full thickness flap from 33 to 43 was set and a traditional approach was chosen by opening a vestibular bone trap helped by piezoelectric instrument. Within the endosseous cavity only blood and minimal residues of soft tissue were found. Finally the bone trap was repositioned, the fractures were reduced using miniplates and fixing screws and the flap was repositioned and sutured. Ended the surgical time, a intermaxillary fixation has been applied and maintained for 15 days.
Results: Histological examination of the first case gave a diagnosis of odontogenic cyst . At 13 days after surgical session the facial symmetry and the physiological eye's mobility was restored; the surgical wound was on way of consolidation. On the other hand the histological examination of the fragments found within the bone deficiency that caused the mandibular fracture confirmed a diagnosis of SBC. Within 21 days good stability of the applied titanium plates, optimal healing of hard and soft tissues and physiological mandibular movements were seen.
Conclusion: Using the same surgical time to enucleate cyst and reduce a pathological fracture has the rationale to improve postoperative morbidity and prognosis. Therefore, if the more traditional approach has its undoubted value, the opportunity to access the cystic lesions from using the gap caused by the fracture line, how we decided to approach our first case, should be, in our opinion, taken into serious consideration in similar clinical and surgical situations.

Modifications at surgery to enhance the prosthetic prognosis in the patient with mandibular defect: a review of the literature

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Aim: The prosthetic treatment is a viable option for restoring the esthetic-functional state that was altered by the surgical resection which caused a mandibular defect. Unfortunately, not all mandibulectomy procedures are often made taking into account the prognosis of subsequent prosthetic rehabilitation. The present review was aimed to assess the surgical procedures to improve the prosthetic prognosis in patients with mandibular defect.
Methods: An extensive search of the literature was performed, on the databases of PubMed/Medline, Scopus, Embase, Google Scholar, Dynamed and Grey Literature, in addition to congress proceedings and books, written in English or Italian. Literature search was performed using combinations of the following keywords: ("prosthesis" or "prosthetic") AND "prognosis" AND "mandibulectomy"; ("prosthesis" or "prosthetic") AND "prognosis" AND ("defect" OR "reconstruction" or "resection") and ("mandibular" or "mandible"). Studies were deemed suitable for this review if they met the following criteria for inclusion: 1) studies providing useful indications about the surgical procedures to improve the prosthetic prognosis in patients with mandibular defect; 2) in vivo studies and 3) studies published in Italian or English language. Studies fulfilling at least one of the following exclusion criteria were excluded from the review: 1) in vitro studies and 2) studies published in languages other than English or Italian.
Results: After the databases search, the selection process yielded 43 papers, while after the manual search, 7 books and 3 congress proceedings were included. With this literature search, the authors identified the surgical modifications to improve the prosthetic prognosis in patients with mandibular defects. These included: the need for a sufficiently large oral orifice, the intraseptal bony cut and the

direction of the mandibular resection lines, the importance of tooth preservation, the usefulness of skin grafting and vestibuloplasty, the management of patients under radiotherapy, and the possible removal of the coronoid process. Free flaps, implant rehabilitation, and new digital technologies were also extensively examined.

Conclusion: To enhance the prosthetic prognosis, the surgeons must preserve the tongue mobility and as many teeth as possible. Also, the surgery that affects the lips should try to maintain or restore mobility and sensation, contour, intercommisure distance, and labial vestibules; skin graft and vestibuloplasty could be needed, while intraseptal bony cuts and specific directions of the resection lines are strictly recommended. Moreover, also the use of fibula graft, osseointegrated implants, and digital technologies can improve the prosthetic prognosis.

Orthodontic-surgical treatment of severe Class II dento-facial decrepancy in a patient presenting Treacher Collins syndrome morpho-genetic traits

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Aim: Treacher Collins syndrome (TCS), also known as Facial-Mandibular dysostosis, is a cranio-facial malformation resulting from a genetic disorder and presenting with typical structural and functional impairment of more than one system within the cranio-facial district. This syndrome is characterized by deformities of the ears, eyes, cheekbones, and chin. Diagnosis is generally based on symptoms and X-rays, then confirmed by genetic testing. TCS is usually autosomal dominant but more than half of all cases presents a new mutation. The involved genes may include TCOF1, POLR1C or POLR1D. Some individuals are so mildly affected that they remain undiagnosed, while others have moderate to severe facial involvement and life-threatening airway impairment. TCS is often suspected from clinical signs and OMENS classification is used to determinate its grade. The name of the classification is an acronym that indicates five different dysmorphic features: Orbit size and position; Mandible hypoplasia; Ear deformity; Nerve involvement and Soft-tissue deficiency. Different techniques are used to confirm the diagnosis of TCS, in particular the cephalometric analisys which shows in affected patients hypoplasia of the facial bones (malar bone, mandible, and mastoid). The aim of this case report is to describe the orthodontic-surgical management of severe Class II with both mandible retrognathia and maxillary prognathia in a TCS patient.

Methods: The present case report describes the orthodontic-surgical treatment of a young adult patient (a girl of 24 years old) with a chromosomal disorder (5q31.3-33.3 on TCOF1 gene). She came to our observation, in San Michele Hospital, seeking orthognathic correction of TCS dysmorphic manifestations. She had a convex profile with labial incompetence, a skeletal Class II malocclusion, with a 10 mm OVJ due to mandible underdevelopment and hypoplasia of chin and mandible angles. She also had hypoplasia of zygomatic frontal process, lateral pterygoid plates, paranasal sinuses and mandible condyles. The treatment purpose was to improve the skeletal and soft tissue profile, to correct the dysmorphic manifestations and to normalize OVJ and OVB values. In order to improve the facial aesthetic, the surgical treatment with orthodontic presurgical dentaldecompensation was the chosen. The treatment plan consisted in bonding the upper and lower dental arches and performing the Straight-Wire sequences of archwires: it was applied archwire 0.014 inch Ni-Ti followed by a 0.014 x 0.025 inch Ni-Ti, archwire 0.019 x 0.025 inch Ni-Ti and 0.019 x 0.025 inch S.S. To achieve the best facial and skeletal results, modified extended Le Fort I osteotomy including the malar zygomatic processes was performed. A combined segmented osteotomy with 5 mm segmentectomy including the area corresponding to 1.4 and 2.4 (previously extracted) was performed to obtain premaxilla retrusion onto posterior maxillary segment. The entire maxillary complex was then impacted 4 mm vertically making the new OVJ 4 mm and the new FH^NA angle 87,5°. Since moving 4 mm forward the mandible would not have achieved significant improvements, for a better facial aesthetic, a 3 mm total maxilla advancement was performed making the new OVJ 7 mm and new FH^NA angle 91°. Bilateral Sagittal Split Osteotomy (B.S.S.O.) with 6 mm advancement and maxillae and mandible Rigid Internal fixation (R.I.F.) were performed to normalize the OVJ value. Finally, Medpor/Porex Angle Prothesis was placed, and extended genioplasty with 7 mm advancement was performed. In the following year after surgery, the orthodontic treatment continued to achieve interarch coordination and the fixed appliance was removed. Retention was provided by upper Hawley biteplate and lower 3-3 bonded lingual retainer.

Results: There was a good improvement of facial aesthetic both in frontal and in lateral view. Normalization of overjet and overbite, Class I molar and canine and coincidence of upper and lower midline were achieved.

Conclusion: In the next evaluations of the patient final

records, the major goals set at the beginning of the treatment were successfully achieved, providing the patient with adequate masticatory function and pleasant facial aesthetics.

IGG4-Related orbit mass: a diagnostic challenge

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Aim: The aim of the present study was to report a case of an orbital mass IgG4-related. IgG4-related disease (IgG4-RD) is a newly described systemic autoimmune disease, characterized by infiltration of IgG4+ plasma cells accompanied by tissue fibrosis of multiple organs throughout the body and swelling or tumor-like, nodular or proliferative lesions. It was initially described as affecting the pancreas, but commonly involves the head and neck region as well.
Case report: A 75-year-old female in good health came to our hospital on October 2019 complaining intermittent diplopia since August 2019. Clinical examination revealed the presence of a left orbital subcutaneous neoformation. Subsequent CT with contrast medium showed a neoformation of soft tissue the left eyelid which erodes the medial wall of the left orbit and the nasal process of the frontal bone. The chest radiography excluded pleuroparenchymal lesions. Blood exam highlighted an iron deficiency anemia framework. The clinical suspects were of a lymphoma, Mikulicz disease or Kuttner tumour. In local anesthesia an incisional biopsy of the mass was performed. The histopathological examination was not conclusive,: inflammatory process with the presence of histiocytes, lymphocytes, granulocytes and plasma cells, (CD68+, CKS 100-, SMA-) which cause necrosis of the muscle structure. Serum immunoglobulin levels, including IgG4, were required and a second biopsy was performed in general anesthesia. Serum level of IgG4 were higher >135mg/dL and pathological examination pointed out the presence of an intense intense lymphocytic infiltrate mainly plasma cell, with histiocytes and granulocytes. Immunohistochemistry highlighted the positivity of CD138 (negative: CD3, CD20) and ratio of IgG4/IgG positive cell> 50%. These results allowed a definitive diagnosis of ophthalmic IgG4-related disease as proposed by Umehara et al.(2017): Imaging studies show enlargement of the lacrimal gland, trigeminal nerve, or extraocular muscle as well as masses, enlargement, or hypertrophic lesion in various ophthalmic tissues. Histopathologic examination shows marked lymphocyte and plasmacyte infiltration, and sometimes fibrosis. A germinal centre is frequently observed. IgG4 þ plasmacytes are found and satisfy the following criteria: ratio of IgG4 þ cells to IgG þ cells of 40% or above, or more than 50 IgG4 þ cells per high-power field (400). Blood test shows elevated serum IgG4 (>135 mg/dl). Diagnosis is classified as 'definitive' when (1), (2) and (3) are satisfied; 'probable' when (1) and (2) are satisfied; and 'possible' when (1) and (3) are satisfied. Screening of the neck, chest, abdomen and pelvis with computed tomography did not reveal any other organ involvement. The patient underwent rheumatologic examination, and subsequent oral Prednisolone and Azathioprine treatment with resolution of the proptosis. There was also improvement of the eye pain. A CT was performed after 1 month and a reduction of the mass was highlighted.
Conclusion: In the head and neck region, IgG4 disease has been described to cause enlargement of the extraocular muscles, pituitary stalk, retrobulbar soft tissues, salivary glands, lacrimal glands, and cranial nerve branches. IgG4-RD commonly involves the maxillary and mandibular branches of the trigeminal nerve, with preferential involvement of the infraorbital nerves. The common differential diagnosis on radiology includes lymphoma, granulomatosis with polyangiitis, Sarcoidosis and Grave's orbitopathy. The degree of fibrosis in the affected organ is a major determinant of treatment response. Prognostically, orbital IgG4-RD usually shows dramatic response with steroids but relapses are common and hence long term low dose steroid or combination with immunosuppressant may be necessary.

Conservative

Roughness surface analisis with different finishing sistems

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Aim: Several studies analyzed the incidence of iatrogenic damages to adjacent teeth caused by treatments involving interproximal areas. Results show a high incidence of iatrogenic damages (73-89%) which are increasing with operative field distalization and adjacent teeth proximity. It is important to find ways to prevent these damages, which once created are not easily to treat. A possible solution is to use specific instruments when involving interproximal areas. Lussi A. and Gygax M. have already observed a reduction to 31% of adjacent damaged inter-proximal surfaces when using diamond burs with working head. Although, before to confirm these tools as a gold standard, it is necessary to clarify whether there are differences in comparison with traditional tools.

Methods: 19 extracted molars are selected, disinfected, cleaned, included in a gypsum base leaving CEJ exposed and stored in physiological solution at 3 ° C until treatment. Cavities are prepared in the mesial and / or distal site, involving healthy dental tissue for a total of 30 preparations. The cavities are made with rotating instruments under continuous irrigation, specifically using 835kr diamond bur (Komet). Each cavity is 3 mm deep from the main sulcus bottom and ends before reaching the CEJ, while its horizontal dimension runs from the crest of the buccal cusp to the crest of the vestibular cusp. Cavity walls are prepared perpendicularly to the bottom with a slightly rounded transition angle. Afterwards, the cavities are randomly divided into 5 groups (A-E) to use different systems. A: diamond cutter, coarse-grained, working only at the tip 10839. B: diamond cutter, coarse grain, cylindrical 835 Kr. C: cylindrical diamond cutter, fine grain, 8835 Kr. D: diamond cutter, fine grain, working only at the tip 11839. E: ultrasonic finishing system. Groups A-D are used on the same turbine, at the same speed, under continuous irrigation. Group E is used at low power. Analysis are carried out using a surface roughness tester (Alicona InfiniteFocus) and the personnel is not informed regarding sample processing to proceed double blinded.

Results: A descriptive analysis is produced by calculating Ra (roughness parameter) mean and standard deviation for each formed group. T-student test is used as well to proceed with a comparative analysis and results are processed using the Excel function = Distrib.T.2T to measure the P-value. It is visible how coarse-grained systems return a rougher surface than fine-grained systems (P-AC = 0.0018; AD = 0.0013; BC = 0.0333; BD = 0 , 0208). Comparing A&B and C&D there are no statistically significant differences (P -AB = 0.1224, P-CD = 0.7467), however is seen a slightly lower average for group D. Group C demonstrates a significantly lower variance, thus a higher result predictability. Ultrasonic systems gave significant results when compared to groups B (P-value = 0.0318), C (P-value = 0.0016), D (P-value = 0.0012) and statistically insignificant results when compared to group A (P-value = 0.15876).

Conclusions: Drills working at the tip do not show statistically significant differences compared to others with the same grain, however the first are demonstrating a lower predictability. Nevertheless, as those drills are able to significantly reduce the prevalence of iatrogenic damage, these systems can be considered the gold standard for working interproximal areas. This statement is reinforced by the fact that the present study was conducted on extracted dental elements. Indeed, we expect a lower predictability in clinical use of A&C tools compared to the results of this study. Ultrasonic systems seemed to return unacceptable results for clinical use, nevertheless further evidences are needed.

Survival of dental restorations performed under general anesthesia in special needs patients. Preliminary report of 15-years experience

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Aim: Assess survival of dental fillings performed under general anesthesia (GA) in a cohort of special needs patients(SNP) over a 15-years period.
Methods: Uncooperative SNP requiring dental treatments under multiple GA in our institution during 2018 were selected. Data regarding dental treatments performed in these patients from 2002 until 2017 were retrieved from hospital records. Presence and clinical functionality of restored teeth were assessed in subsequent follow-up visits or dental treatment under GA during a 15-years timespan. Restorations were considered successful since they incurred in an event (replacement, tooth loss, endodontic treatment) during follow-up. Mean annual failure rate (MAFR) of dental restorations was calculated.
Results: Preliminary data regarding survival of dental restoration performed in SNP during 2018 are presented here. Seventyseven SNP underwent dental treatments during 2018, 45 of them were excluded since only one procedure under GA was performed. Final analysis included data from 32 patients who underwent 109 multiple interventions under GA since 2002. Dental treatments performed were: 307 dental restorations, 218 tooth extractions, 109 scaling and root planing procedures. Since 75 dental restorations were performed during the last procedure under GA, survival of only 232 dental restorations was assessed. MAFR of dental restorations was 1,84%. MAFR varied during time. Maximum MAFR was observed two years from the first intervention (9,09%) whereas diminished during time (min 0,14 % 10-years from first intervention).
Conclusions: Failure of dental restorations performed under GA in this preliminary report resemble previous findings regarding routine conservative treatment in the general population. Interpretation of wide range of AFR observed during time is difficult. Several tooth and patient's variables should be considered: filling materials, tooth type, number of surfaces, associated disabilities, ambient, lifestyle, care-giver, etc.. Dental interventions under GA need to find a solution to several dento-periodontal problems in very limited time (generally 120 minutes). Complete elimination of dental foci is mandatory to avoid necessity of subsequent repeated interventions under GA that's why tooth extraction is a common treatment modality in this setting. Surgical treatment needs certainly represents the strongest indications for GA intervention. However also optimal dental evaluation is frequently performed during GA interventions since in office follow-up visits could be irregular and inaccurate because of the uncooperativeness of these patients. Our preliminary findings support tooth restoration as a reliable dental treatment modality in SNP treated under GA in accordance with the available literature.

Polishing methods of composites affect surface characteristics and human gingival fibroblasts adhesion

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Aim: Non-carious cervical lesions(NCCL)associated with gingival recessions are common defects and their treatment represent an intriguingly challenge for clinicians due to both restorative and surgical aspects. Sometimes, a surgical-restorative approach is needed to restore the correct anatomy and the adequate thickness of gingival tissues. Dental composites are the gold standard restorative materials for the treatment of NCCLs, most probably due to the fact their esthetic rendering is easy to be obtained and because they allow clinicians to obtain a long-lasting surgical procedure. It is known that gingival fibroblasts better adhere on surfaces presenting micro-structured topography, if compared to polished counterparts, supporting the idea that the surface processing technique and manufacturing have a great impact on the soft tissue cells response. Therefore, it is essential to understand the relationship between composites and connective tissue, especially due to the important role that it holds during the early stage of wound healing. In these regards, the main objective of this study was to understand the influence of different surface polishing techniques on composite materials micro-topography and consequent soft tissue cells behavior, in order to ameliorate surgical clinical outcomes.
Methods: Model discs of composite materials have been prepared using G-Aenial Anterior A2(GC,

Italy) with the final dimension of 3mm in height and 10mm in diameter, and subsequently polished with different techniques: one-step diamond rubber (DR), abrasive discs (AD) and tungsten carbide burr (TCB). Not-polished smooth samples (SM) were used as control. Samples were physically characterized through the measurement of the wettability(contact angle) and the microscopical analysis of their surface micro-topography (SEM). Afterward, the biological response in terms of cellular proliferation of Human Gingival Fibroblasts(HGF-1) has been assessed with a chemiluminescent assay CellTiterGLO.

Results: Our data underlined that the finishing systems caused alterations to the contact angle, in particular, AD and TCB samples were much more hydrophilic than DR and SM. From SEM images, it appears clear that samples finished with AD and DR showed a groove-pattern that is evidently lacking in the control and TCB samples. The grooves determined by AD tend to be slightly curved, while the ones determined by the DR seem more straights and parallel; from a measurement of their height we showed that DR grooves were significantly deeper than the others (p=0,009). Cell proliferation assay allowed us to assert that in all the polished groups there was a greater cellular proliferation if compared to the smooth surfaces. Moreover, the surface presenting the higher proliferation was the DR, supporting the hypothesis that an irregular and groove pattern at the cell-biomaterial interface could ameliorate fibroblasts proliferation on composite materials.

Conclusion: Taken together, our data demonstrate that surface micro-topography of composite material can heavily influence the biological response of fibroblasts. These modifications were evident in contact angle and SEM analysis, which confirmed that different polishing procedures determine alteration in both, surface wettability and micro-topography, leading to a different cellular behavior in terms of proliferation. In particular composites polisher with AD and DR seem to ameliorate fibroblastic response, auspicial leading to clinically relevant results in soft tissues restoration.

Comparison between the antifungal action of ozonized gel and chlorhexidine in oral candidiasis therapy

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Aim: of study: ozone therapy has a wide range of applications in almost every field of dentistry. Its properties include antimicrobial, immunostimulant, analgesic and antihypoxic actions. Various studies have evaluated the use of ozone for many dental therapies however there are few data available in literature for what concerns its fungicide capacity. The purpose of this study is to evaluate the antifungal action of a new ozonized gel against different species of Candida. Ozonated gels are antiseptics obtained from the chemical reaction between ozone and unsaturated fat acids of vegetable oils.

Methods: Ozonized gel, composed of bio ozonized olive oil and synthetic amorphous silica gel with peroxide index 20 mEq O2/Kg (GeliO3, Bioemmei Srl, Vicenza, Italy). Chlorhexidine digluconate (Plak gel®0,2%, Polifarma Benessere s.r.l., Roma, Italy). Candidastrains; four species were selected as main culprits of oral candidiasis: C. albicans, C. parapislosis, C. glabrata, C. tropicalis. A chromogen medium for selective yeast isolation has been used to evaluate the growth of micro-organisms. (Chromid®). The evaluation of antifungal activity was performed by setting the inocula of the strains studied in sterile distilled water; the suspension was prepared by diluting the Candida colonies in distilled water to have a turbidity of 0,5 MacFarland. Agar plates were rubbed with a buffer immersed in the prepared suspension. Subsequently two wells were built in each agar plate, one of which was filled with 150 µL of ozonized gel and the other with 150 µL of chlorhexidine. The plates were then incubated for 48 hours at 37°C. The results were read after 48 hours, due to the different growth times of the Candidastrains. The efficacy of ozonized gel and chlorhexidine were evaluated by measuring the diameter of the inhibition halos formed around the wells. The experiment was repeated three times for each strain.

Result: GeliO3and Plak gel®have both shown to have antifungal activity on all the Candidaspecies considered. The diameters of the inhibition of mycotic growth were obtained from the arithmetic mean of the diameters measured in the different tests, who have shown values between 15 and 19 mm for GeliO3, and between 16 and 17 mm for Plak gel®. All Candida species were found to be equally sensitive to Plak gel®while C. glabrataand C. albicanswere more sensitive to GeliO3 than the other two fungal strains.

Conclusion: GeliO3 can be considered a valid product in the treatment of oral candidiasis, for the germicidal activity of ozone and for the hydrophobicity of the gel, which allows it not to dissolve in the saliva once applied.This characteristic would also allow to penetrate more easily into the hydrophobic matrix of the biofilm formed by Candida. Finally, another advantage is the absence of cytotoxicity unlike most oral antiseptics. Although, further studies are needed to confirm the GeliO3 effective clinical efficacy on oral candidiasis.

The use of bulk fill resin based composite in the sealing of cavity with margins in radicular cementum

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Aim: The radicular cementum represent a challenge for the adhesive techniques due to its high organic matrix content and the irregular surface that could lead to microleakage. The bulk fill resin based composite is characterized by a dimensionally small polymerization shrinkage that could lead to a better marginal sealing in cavity preparations. The PICO framework was used as follows: in cavity preparation with margins in dental cementum of human extracted teeth, do bulk fill resin base composites provide a better marginal sealing than non bulk fill resin based composites?
Methods: The eligibility criteria were established as follows: in vitro study on extracted human teeth to have a better standardization of the cavity, date of publication up to the 1 years ago (2019) due to the introduction on the market of the first bulk fill composite, explicit description of the cementum margins in the cavity preparation, study of comparison between a bulk fill and a non bulk fill resin based composite, study published in english. Our research was carried out on 04/21/2020. Five electronic databases were searched PubMed, SCOPUS, Google scholar, Semantic scholar, opengrey.eu. Two authors independently evaluated the abstract and titles for eligibility criteria. Two authors independently extracted the data and assessed the risk of bias in single studies.
Results: After the initial screening of 400 abstract and titles: the full text of the articles, that could met the eligibility criteria, were obtained. 36 full text articles were evaluated; 11 articles were finally eligible for the review. Eight studies show statistically differences, but non-significant, in the marginal sealing between bulk fill and non bulk fill resin based composite ($p>0.05$). One study shows statistically significant differences: SonicFill and Grandio show better marginal sealing than GrandioSo and SDR and the latter two to have better marginal sealing than Filtek Supreme ($p<0.05$. One study shows statistically significant less marginal gap of SDR than Filtek Bulk Fill ($p=0.0015$) and Filtek Supreme ($p<0.0001$). One study shows SDR to have a significantly higher microleakage than the other materials tested ($p<0.05$).
Conclusions: Based on our current literature review there are not enough data to establish if bulk fill resin base composite provide a better or a worse marginal sealing at cementum margins. Further protocols, maybe shared between different research groups, and long term follow up are needed to better understand the advantages and the disadvantages of these new materials.

Aesthetic evaluations of different luting cements by using different staining and curing protocols: a spectrophotometric analysis

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Aim: Today's minimal invasive dentistry is the most conservative way to preserve the dental tissues. For this reason, adhesive procedures and materials became detrimental in order to perform the best conservative treatment, in both direct and indirect restorations. In indirect restoration, the luting agents play a crucial role in term of adhesion and aesthetics, mainly in the anterior area. This study aims to evaluate the translucency of two light-cure and two dual-cure luting cements upon exposure to different staining agents.
Methods: The following luting cements were tested: light-cure Nexus Third Generation, shade Yellow, (NX3L) and dual-cure Nexus Third Generation, shade Yellow (NX3D); dual cured RelyX Ultimate, shade A3, (RXU) and light cure RelyX Veneers, shade A3 (RXL). For each tested material, thirty samples were made and divided in the following two groups: Group P1, the samples were cured for 40 sec; Group P2, the samples were initially cured for 5 sec, and, after a 20 sec pause, were cured for additional 40 sec. Moreover, once polymerized, the samples of each group were divided in 5 groups ($n=3$), according to the type of the chosen staining agent. Indeed, all samples were evaluated upon exposure to the following different drinks and agents: distilled water (control group), Coca-Cola, red wine, coffee and chlorhexidine. Samples were evaluated immediately, after 24 hours and after 7 days from the immersion in the staining agents. Color analyses were performed with a spectrophotometer (Spectroshade DeguDent), using CIELAB color space relative to CIE standard illuminant D55. The translucency was calculated by the color difference of the tested materials on white and black background. Data were analyzed by two-way analysis of variance (ANOVA)and Tukey's HSD test ($p=0.05$).
Results: Depending on the staining agent and the protocol used, the tested materials showed different translucency after 1 week. However, NX3F, RXU and RXL, had higher translucency value than NX3D ($p<0.05$), with both curing protocols.
Conclusion: The difference in translucency between

the tooth and the indirect restoration which has to be cemented can cause an aesthetic failure. Indeed, the choice of the appropriate luting agent will be necessary: a luting cement with high translucency value can blend in the restoration with the surrounding color, while a luting cement with low translucency can lead to an overall not well-integrated, opaque result. The understanding of the characteristics of the luting material and the knowledge of the influence that various agents can cause on its staining is fundamental to make the indirect restoration more predictable in terms of color stability and translucency.

Conservative treatment in patient with autism spectrum disorder: case report

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Aim: Autism is a behavioral syndrome caused by a biologically determined developmental disorder, which manifests itself with some specific behavioral and cognitive sensorial characteristics. Generally those with a autistic spectrum disorder presents: impairments in both verbal and non-verbal communication; difficulties in social communication and interaction; narrow interests and stereotyped activities. Autistic patients may also present intellectual disabilities of various stage of severity. Today, is widely accepted the belief that autism is the result of dysfunctions of both neurobiological maturation and development of the central nervous system; often with an undefined etiology. Although the average age of diagnosis may varies between 3 and 4 years old, most children are believed to manifest the clinical features within the 20th month of life. The new definition "Autism spectrum disorders" refers to a dimensional concept of pathology, which means that along a continuum of dimensions we find autistic symptoms that may vary in intensity and frequency. According to the diagnostic manual and statistic of mental disorders, DSM 5, there are 3 levels of severity: level 1, in which there is a minor and / or partial impairment of the linguistic and cognitive area, and the communication deficits require medical support; level 2, in which verbal and non-verbal communication are deficient and there is a need for significant clinical support; level 3, where there is a serious impaired functioning, which requires very significant support.
Methods: The following article is a case report of a patient, with diagnosis of autistic syndrome, with a non verbal mental retardation, epilepsy, Kawasaki syndrome, hypertension, anemia and both environmental and pharmacological allergic diatheses. The patient was treated for dental care at our Odontostomatology department of Cardarelli's Hospital of Naples. The 20 y.o. male patient was carried to the hospital by his parents who wanted him to be evaluated for dental care treatments. The mental impairment was really serious. During clinical consultation a lot of cavities where detected. The clinical evaluation was confirmed by an orthopanoramic view.
Results: In 2018 the patient underwent numerous surgical and non surgical dental care treatments of the compromised teeth. Follows up where scheduled until december 2019. Nowadays the patients is still being evaluated for future developments.
Discussion: Patients with a diagnosis of autism spectrum disorder are more prone to cavities and periodontal problems due to their disease, which makes the dental treatment difficult to manage. A really careful evaluation of the ability of collaboration of the affected patients, can help us obtain, in a good number of cases, a good compliance to dental care, and this can lead to an improvement of these patient's quality of life. The necessity of an operating room is only required in those cases characterized by an absolute lack of compliance.

Tooth whitening: state of the art

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Aim: dental discoloration can be treated with different methods. The chosen therapy depends on the tooth's characteristics, the cause of dyschromia and the patient's request. The aim is to analyze various treatments and their applicability and to examine technological advances regarding dental bleaching.
Methods: for this research, search terms such as "Tooth Whitening", "Dental Bleaching", Hydrogen Peroxide", "Carbamide Peroxide" and "Power Bleaching Technique" were used on various databases, including PubMed and Cochrane Library. Articles published from 2010 onwards were sought to analyze the most recent improvements and older articles were included to examine the history and evolution in tooth whitening.
Results: research has shown that the substances we currently use have not undergone substantial changes in the past 50 years. In fact, as bleaching agents, we still use hydrogen peroxide, carbamide peroxide, sodium perborate and chlorine dioxide. Bleaching techniques have stayed the same as well. Home bleaching known as Nightguard bleaching, was introduced by Heymann and Haywood in 1989. Other tooth whitening methods

rely on external and internal in-office bleaching. Additives and support mechanisms are responsible for a better, more predictable, and safer treatment. The introduction of spectrophotometers, for example, has been able to make our treatment more precise. We are able to set a base color and evaluate the progress during the therapy, treating only the sites that need it. Home bleaching has improved thanks to precise individualized retainers that guarantee the substance stay on the tooth, avoid gum contact and are not ingested, both improving the treatment's outcome and reducing possible complications. Better additives made it possible to have more efficient, standardized products, to ensure predictable results and lower complications, such as soft tissue burns or root resorption. This aspect is particularly important for internal bleaching that used to cause tooth loss due to resorption and was therefore often avoided as treatment.

Conclusion: Tooth whitening is one of the most requested therapies in dentistry due to a better life quality and higher esthetic demands. In fact, demographics of people requiring this kind of treatment has changed a lot, including a variety of social groups such as older people. Often this treatment is done by dental hygienists, but it is extremely important for dentists to be aware of the different possibilities and their applicability, as it is a dentist's job to supervise the treatment.

Is resin infiltration the best treatment for white spot lesions resolution? A systematic review

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Aim: this systematic review aimed to assess whether resin infiltration is the best method in resolving white spot lesions (WSLs) compared to remineralization or microabrasion techniques.

Methods: A comprehensive search was carried out on electronic databases, including: Ovid MEDLINE, PubMed and Web of Science. The following terms were searched individually and combined together: "White Spot", "Resin Infiltration", "Remineralization" and "Microabrasion". Only studies published between January 2013 and April 2020 were considered. The exclusion criteria applied to the studies were: studies involving patients with dental disease, studies that use infiltration technique only, case reports, case series, review, meta-analysis, papers without available full text. The methodological quality and risk of biases of included papers were assessed using CONSORT criteria for non-randomized comparative studies and Cochrane Collaboration for randomized clinical trials (RCT).

Results: From a total of 324 articles, 18 remained in the qualitative synthesis. Twelve in vitro experimental studies and six RCT studies were selected. In vivo studies show that the resin infiltration technique determines a significantly statistical variation in the color of the White Spot lesions when compared to similar lesions treated with fluoride varnish or microabrasion technique. One Author shows that resin infiltration technique demonstrated a significantly better outcome than a resin-modified glass ionomer remineralizing agent , but the WSLs regress after 3 and/or 6 months. All in vitro studies show a better clinical outcome when aesthetical results of resin infiltration technique are compared to: fluoride based products, micro-abrasion, and remineralizing agents. One author stated that both resin infiltration and microabrasion techniques were not capable to restore the tooth color. Furthermore, other Authors evaluate various clinical parameters, individually or combined, as clinical outcome such as: superficial roughness alteration, microhardness alterations, ability to stop the WSL progression, treatment penetration depth. Resin infiltration technique shows the best enamel penetration capability compared to fluoride varnish and the best potential to inhibit the progression of the lesion. Contradictive results regarding the microhardness of the enamel: this systematic review show that the surface microhardness of the enamel increases after several treatments of the WSLs with the resin infiltration technique, while this remains unchanged after the topical application of the sealants. Behrouzi P. Et Al show how topical application of fluoride, in the form of a cream with a concentration of fluoride between 900 and 1450 ppm, significantly increases the microhardness of the enamel; this effect was not visible using the resin infiltration technique. All studies selected show how resin infiltration technique were more sensitive to pigmentation when compared to any other technique analyzed.

Conclusion: White spot lesions are the first clinical manifestation of dental demineralization and constitute an aesthetic blemish poorly accepted by patients. Among the various therapeutic possibilities, invasive and non-invasive, the resin infiltration technique demonstrated mainly minimally invasive and well accepted by patients of all ages. The evidence for clinical recommendation of this technique is not strong, thus, further RCT studies with long-term follow-up should be conducted. among all the techniques analyzed, resin infiltration is a promising technique for the aesthetic resolution of white spot lesions and can help the clinician to rehabilitate the patient in a minimally invasive way.

Evaluation of micro-hardness and depth of cure of new resin-based bulk-fill composites

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Aim: The purpose of this in vitro study was to evaluate Vickers hardness number (VHN) and hardness ratio of four bulk-fill composites (BFCs) as indexes of an adequate depth of cure of these materials.
Methods: Four composite resins (Voco, Cuxhaven, Germany) were selected for the present study: VisCalor Bulk, Admira® Fusion x-tra, x-tra fil and GrandioSO x-tra. Thirty samples were prepared for each material by inserting the respective BFC into a stainless steel mold (Ø 7 mm, h 4 mm) placed on a dark opaque paper background with a polyester matrix strip interposed. This arrangement was chosen to obtain a smooth surface under the composite but also to avoid light reflection from the bottom, thus minimizing the artificial hardening of this area; each mold was slightly overfilled and a second polyester matrix strip was placed on the top to avoid the oxygen to interfere with the polymerization of the most superficial layer of the composite. Due to its termoviscous behaviour, VisCalor Bulk was preheated before the application with a preheating device (Caps Warmer, Voco, Cuxhaven, Germany) at 68 °C for 15 minutes, in accordance with the operating instructions. In order to extrude the excess composite resin and to obtain a flat surface, a glass slide was pressed against the upper polyester film and removed before curing. Each sample was light-cured with a LED unit (Celalux 2, Voco, Cuxhaven, Germany) and then removed from the mold. Exclusively one light polymerization mode was used (standard mode) with output irradiance of 1000 mW/cm2 for 20 seconds. In order to simulate the physiological oral conditions, the samples were stored for 48 hours in complete darkness, at 37°C and 100% humidity, before proceeding with the assessment of the VHN. The VHN of the upper and lower surface of each sample was determined with a micro-hardness tester (durometer Isoscan HV2, LTF Spa, Antegnate, Bergamo, Italy) equipped with a Vickers diamond indenter to apply a 200g load with a 15 s dwell time. After the procedure described, the thirty samples of each material underwent a different storage: 10 samples were stored for 1 day into a soft drink (Coca-Cola, Coca-Cola Company, Milano, Italy), 10 samples were stored for 10 day in the same soft drink, whereas the 10 remaining were kept in water as controls. At the end of the acid storage, the subgroups underwent a hardness testing performed as previously described, but, in this case, considering only the upper surface of the samples which represents the portion of the material directly exposed to an erosive action in the oral cavity.
Results: A significant reduction in VHN was showed for all the groups when comparing external versus internal side, however hardness ratio was greater than 0.80 resulting in an adequate polymerization; regarding the acid storage, all the groups showed a significant decrease of VHN if compared with the controls, both after 1 day and after 7 days.
Conclusions: Despite the limitations of this in vitro study, all the tested resin-based bulk-fill composites have showed an adequate depth of cure. As expected, micro-hardness values appeared significantly decreased both after 1-day acid storage and after 7-day acid storage.

Resin infiltration for dental fluorosis: two-hundred teeth with one-year medium follow-up

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Aim: Fluorosis is a dental problem which causes white or yellowish non-cavited lesions afflicting both function and aesthetics. The latest research showed the feasibility to treat these lesions in a non-invasive way both to prevent tooth decay and to satisfy the patient's aesthetic requirements. The main purpose of the study was to evaluate whether "resin infiltration" is a valid non-invasive method for the treatment of fluorosis in terms of chromatic stability over time and lesions' diameter reduction. The secondary purpose was to evaluate dental sensitivity, pain, duration of chair-treatment and patients satisfaction over time.
Methods: 200 teeth with moderate or severe fluorosis were treated by using resin infiltration (ICON®, DMG, Hamburg - Germany). Standardized photos were taken at the first appointment and then every 3-months to measure the diameter of the lesions by means of a digital software. Fluorosis index and number of needed etching cycles were also assessed. Sensitive teeth degree was evaluated by the operator (Shiff Air Index ranged between 0 to 3) after chair-treatment and then every 3 months with a medium follow-up of 1 year. Dental sensitivity was evaluated by a standardized questionnaire administered to patients which reported sensitivity during the 12, 24, 48 and 72 hours following treatment on a scale from 0 to 10 (VAS Scale). Patient's aesthetic satisfaction, perception of duration of procedures and pain during the chair-treatment were assessed scoring from 0 to 10 (0 greatly satisfied, 10 not satisfied). Correlation between etching cycles and sensitive teeth at 72 hours, pain during treatment, lesion dimension at t0, lesion dimension at t1, fluorosis index at t0, fluorosis index at t1 was assessed by using Pearson Coefficient, significance was set at P≤0.05.

Results: All of 200 lesions treated had an immediate improvement. No variation of color or dimension was reported during the follow-up. Some cases of sensitive teeth were reported, however all disappeared after 72 hours from the treatment. Satisfaction of color change was confirmed even if all lesions did not disappear completely. Absence of pain and perception of duration were evaluated positively by the patients. There seems to be a relationship between the number of etching cycles and lesions dimensions and fluorosis index.
Conclusion: Improvement of fluorosis lesions and patient's satisfaction seem to demonstrate the effectiveness of resin infiltration technique. This could be considered an important alternative to perform non-invasive and preventive dentistry.

Influence of restorative technique on the fracture resistance of molar teeth restored with composite overlays after receiving cervical margin relocation

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Aim: To evaluate the resistance to load of maxillary molars restored with composite overlays manufactured with a traditional indirect technique, a chairside semi-direct technique, and a CAD/CAM technique after receiving cervical margin relocation (CMR).
Methods: Sample size was calculated on the basis of the results obtained in preliminary experimental studies ($\alpha=0.05$; $\beta=0.20$; $\delta=500.0$; $\sigma=300.0$). Thirty sound maxillary molars of comparable size were selected from a pool of freshly extracted teeth and received a standardized preparation for a full-coverage overlay with a 2mm proximal box below the cemento-enamel junction (CEJ). All the boxes were restored with a composite resin CMR 1mm above the CEJ. The prepared teeth were randomly divided into three experimental groups of 10 elements each: traditional indirect technique with polyvinyl siloxane impression and stratification on a stone model; chairside semi-direct technique with alginate impression and stratification on a silicon model; CAD/CAM technique with digital impression and milling with the Cerec 3 system. The same brand of resin-based composites (Voco) was used for the study. Moreover, a custom-designed phantom model was used for the CAD/CAM impression procedures. The cementation protocol involving sandblasting, self-etch adhesive procedures with selective enamel etching, and dual- cure resin cement was the same for all groups. The restored teeth underwent thermomechanical aging (1,250,000 cycles, 1Hz, 5-55°C) and then were axially loaded to fracture by using a universal testing machine with a round-head stainless steel stylus. The type of fracture was analyzed. A one-way analysis of variance and Scheffè post-hoc test ($p<0.05$) were used to compare the maximum load to fracture among the groups.
Results: The specimens showed no detectable defects on the occlusal surface after the thermomechanical aging. The maximum load values exceeded the threshold of the masticatory forces (~ 800 N) in all the tested groups. The greatest resistance values were found in the CAD/CAM technique group (1807,60± 511,61 N); the traditional indirect technique (1699,18± 399,56 N) and the chairside semi-direct technique (1386,28± 434,95 N) showed a trend towards lower resistance values without any statistical difference. A fracture below the cemento-enamel junction was the most frequent type of failure.
Conclusion: Under the limitations of this study, all the tested restorative techniques showed a good performance in terms of load resistance. The composite CAD/CAM overlay seems to offer the greater resistance in comparison to the considered indirect and semi-direct techniques. The CMR does not reduce the fracture resistance under the threshold of the masticatory forces.

Endodontics

Effects of simultaneous liquid or gel sodium hypochlorite irrigation on cyclic fatigue of two single-file nickel titanium systems at room and body temperature

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Aim: To evaluate the effects of simultaneous liquid or gel sodium hypochlorite (NaOCl) irrigation on cyclic fatigue of F6 SkyTaper (F6ST; Komet Dental, Gebr. Brasseler, Lemgo, Germany) and OneCurve (OC; Micro Méga, Besançon, France) single files at room (20 °C±1°C) and body (37°C±1°C) temperature.
Methods: One hundred and eighty new 25/.06 F6ST and OC files were randomly allocated into 6 groups (n = 15) for each brand. Groups 1 and 4 included new files that were not exposed to NaOCl at 20°C and 37°C, respectively. Groups 2 and 5 included instruments activated with liquid NaOCl at 20°C and 37°C, respectively. Groups 3 and 6 consisted of instruments tested with NaOCl gel at 20°C and 37°C, respectively. A customized static cyclic fatigue testing device was used. The device allowed the standardized instrument insertion thanks to a fixed block and the possibility to test the files at different inclinations. For this study, all instruments were tested at the standard position which corresponds to a 0° inclination. In addition, a simulated 16-mm-long ceramic artificial was employed (60° angle and 5-mm radius of curvature) by reproducing the instrument's size and taper. The simultaneous irrigation was ensured by a cover formed by the superimposition of two Plexiglas slides in which a channel and a small circular hole were built inside to permit the irrigation flow and outflow trough aspiration system, respectively. A thermostat associated to the customized device allowed the temperature adjustment in the artificial canal. Fifteen instruments of each system were activated in continuous rotation (300 rpm) following the manufacturer's instructions and torque fixed at the maximum value provided. For control groups (without NaOCl), the friction of the file on the artificial canal walls was reduced by a special high-flow synthetic oil (Super Oil; Singer Co Ltd, Elizabeth, NJ) designed for lubrication of mechanical parts while experimental protocols (for liquid and gel solutions) included a continuous and constant injection of irrigant for 10 seconds every 30 seconds of rotation of the instruments. For each instrument, the time to fracture in seconds (TtF) from the start of the test until the moment breakage was detected visually and/or audibly was recorded with a chronometer to an accuracy of 0.1 second and the length of the fractured file tip was measured by using a digital microcaliper (Mitutoyo Italiana srl, Lainate, Italy). The surface of fractured instruments was studied by field-emission scanning electron microscopy (SEM). The means and standard deviations of TtF were calculated and statistically analyzed (P<0.05, Two-way ANOVA, Tukey Test).
Results: TtF of all tested instruments decreased at body temperature (P<0.05). At 20°C, NaOCl enhanced TtF of F6ST and OC (P<0.05). Instruments irrigated with NaOCl liquid had higher TtF in comparison with gel for F6ST (P<0.05); no difference was observed between the two formulations for OC. At 37 °C, both NaOCl formulations had no significant influence on TtF for F6ST while improved cyclic fatigue resistance of OC (P<0.05). Independently from the temperature

and irrigant use, OC reported significant higher TtF than F6ST ($P<0.05$). The length of the fractured file fragments was not statistically different among the tested instruments (5.1 mm) ($P>0.05$). Moreover, SEM analysis of the fractured surfaces showed the typical features of cyclic fatigue failure for both instruments.
Conclusion: Within the limitations of the present in vitro study, NaOCl (liquid or gel) improved cyclic fatigue resistance of OC, independently from the temperature, while for F6ST the negative impact of higher temperature reduced the irrigant benefits.

Analysis of C-shaped anatomical configuration in mandibular premolars and molars: prevalence, differences, correlation and bilateral symmetry. A cone-beam computed tomography study in vivo

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Aim: The aim of this in vivo cone-beam computed tomographic (CBCT) study was to analyze the prevalence, correlations and differences of C-shaped canal morphology in mandibular premolars and molars, within the Asian population.
Methods: A total of 221 subjects (49% males, 51% females), with a mean age of 29 ± 1.20 years, coming from the middle East, were included in this study. Among 1768 screened teeth, 1523 were valid for analysis. Previously treated root canal, calcification or resorption, and distorted CBCT images have been excluded. 810 mandibular premolars (411 first premolars, 399 second premolars) and 713 molars (307 first molars, 406 second molars) were evaluated using CBCT scans, using the following parameters: FOV 170x120 mm, 90 kV, 5-8 milliA,17.5 s exposure time and 0.25 mm voxel size. Axial sections were acquired at coronal, middle, and apical levels to explore C-shaped canals types. A premolar tooth is considered to have a C-shaped canal when two anatomical features are found: an external radicular groove and a C1 or C2 configuration, present at any position of the root canal system (Fan et al. C-shaped classification). For a molar to have a C-shaped canal, three anatomical features are instead needed: fused roots, a longitudinal groove, and one cross-section of the canal showing C1, C2 and C3 or only C4 configuration types present in all axial sections. Furthermore, the study investigated also the prevalence, correlations, differences of C-shaped configuration types between premolars and molars, differences between genders and location in the mandibular, bilateral simmetry between right and left side of the same individuals and the external grooves on roots. The same endodontist examined the CBCT images twice, with a 4-week interval between the two analyses.
Results: The prevalence in premolars was of 1,4% (72,7% first premolars, 27,3% second premolars) and of 4,8% in molars (100% in second molars and none in first molars). The presence of C-shaped configuration in premolars, molars and between the two groups in the same individual has no correlation. Different C-shaped canals were found in both premolars and molars. Axial sections at coronal levels showed the prevalence of C4 in premolars and C1 in molars, whereas middle and apical sections proved the prevalence of C2 in premolars and C3 in molars. The whole prevalence was of C2-shaped canals in premolars, and of C3-shaped canals in molars. External longitudinal grooves were frequently localized on the mesiolingual surface (7 cases, 63,6%) in premolars and on the lingual side (20 cases, 58,8%) in the second molars.
Conclusions: The prevalence of C-shaped canals in mandibular premolars was relatively low, whereas it was more relevant in second molars. No C-shaped canals correlation was found between premolars and molars and amongst the two groups for the same patient. Significant differences relevant to the presence or absence of C-shaped configuration were not found in relation to gender and sides. No significant data emerged in support of the bilateral symmetry in the same patients. Despite CBCT gives a higher dose of radiation than traditional x rays, it permits to adopt a more predictable root canal treatment in case of difficult and uncommon canal system anatomy such as C-Shaped canals, giving to clinicians the possibility to exactly preview root canal system, so that they can plan endodontic therapy, adopting specific techniques or using certain instruments in order to reduce complication.

MicroCT study of the shaping ability of Procodile and Reziflow reciprocating instruments

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Aim: Micro-computed tomography (μCT) is an accurate qualitative method to evaluate the shaping ability of

endodontic rotary files. The introduction of nickel-titanium (NiTi) instruments has improved root canal treatments in terms of predictability, accuracy, respect of original anatomy and reduction of procedural errors. Manufactures have constantly sought to improve the mechanical characteristics of endodontic instrument in particular different new thermos-treated alloy and file design have been introduced. Recently Komet launched in the market Procodile, a new reciprocating instrument with a distinguishable green coating on surface and an innovative tapered core that gives more flexibility and shaping efficiency. The aim of this study is to evaluate the shaping ability of new Procodile in comparison with R6 Reziflow, a reciprocating NiTi file from which Procodile derives, using a micro-computed tomography (µCT) and digital software.

Methods: Fourteen first mandibular human molar teeth have been selected for this study. The teeth were first scanned using a Scanco uCT50 micro CT scanner (Scanco, Brüttisellen, Switzerland) using X-ray settings of 90kVp, 155uA and a 0.5 mm aluminium filter. The scans were scaled at reconstruction using the CT manufacturer program and then analysed using Parallax Microview software (Parallax Innovations Inc., Ilderton, ON Canada). Access cavities were completed using a 522 DiPi round diamond burs and Endo-Z burs (Dentsply Maillefer) under surgical microscope at 10X. The teeth were at random divided into two groups for a total of 7 samples (14 canals) per group. After confirming patency with a 10 K file, mechanical glide path was completed with a size 15.03 taper Path glider at 300 rpm. Only the mesial root canals were shaped with the tested instruments, Procodile and R6 Reziflow both size 25 0.06 taper used in reciprocating motion following manufacturer instructions. All specimens were then subjected to an additional micro CT to evaluate changes in canal morphology (centering ability, C) and respect of anatomical apex (canal transportation, T) using a mathematical model. All collected data were analysed using a Shapiro-Wilk test and further statistical analysis was conducted using the t-test or the Kolmogorov-Smirnov test. A software STATA V11 was used for this purpose (STATA Corp., Texas, USA).

Results: Few differences were detected by means of centering ability and canal transportation between the tested groups. Procodile showed to be more conservative in the coronal third of the root canal compared to Reziflow ($P<0.05$) thus with less canal transportation. A more centered root canal preparation was noticed in the Reziflow group ($P<0.05$).

Conclusion: Procodile and R6 Reziflow are reciprocating files composed of the same NiTi alloy. The two files showed few differences in the root canal preparation. Procodile had a better performance in terms of transportation in the coronal third of the root canal while Reziflow produced a more centered preparation in the apical third.

The influence of brushing movement on geometrical shaping outcomes: a micro-CT study

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Aim: The purpose of this ex vivo study with micro computed tomography (Micro-CT) was to compare the maintenance of original root canal anatomy after instrumentation using WaveOne Gold reciprocating files with or without brushing motion. Micro Computed tomography is a modern higly accurate method proporsed in literature to asses shaping capability or endodontic anatomy throug the three dimensional analyss of the root canala volumes: it is widely documented as a non destructive, non invasive, repeatable and reliable method and it represents nowadays one the best ec vivo and in vitro methods in the endodontics research field.

Methods: Sixty extracted human mandibular first molars with independent mesial canals were selected. The specimens were fixed in a custom made support and a low resoluzionte preliminary micro-CT scans were performed to obtain and overall outline of the root canal anatom and to ensure inclusion criteria were met .Canal scouting with #10 K-file and glide path with ProGlider were performed at working lenght. Samples were randomized into two groups (n=30 per group): WaveOne Gold Primary (25,0.7) single files were used to shape the mesio-lingual canals without (NB group) or with (B group) an intentional brushing motion. Canals were irrigated with 10% EDTA and 5% NaOCl. Specimens were scanned with micro–computed tomography before and after shaping in order to match and compare the volumes for post-treatment analysis (SkyScan Bruker micro-CT, 100 kV, 100 µA, 16 µm resolution, Al + Cu filter). The images obtained were reconstructed and analyzed using NRecon and CTAn. The increases in volume and area of the root canal surface were measured. The centroid shift and the thickness of dentine removed towards the inside of the root canal curvature were measured at the furcation and at 1.5mm and 3mm from the apex. The same measurements were performed at the point of the maximum curvature of the canal. Results were analyzed by one one-way ANOVA and post-hoc Student-Newmann-Keuls test ($P < 0.05$).

Results: No significant shaping aberrations were observed in either group. The original canal anatomy was maintained to a greater extent when no brushing motion was used ($P < 0.05$), especially in the coronal third of the root canals.

Conclusion: Within the limits of this study, when using WaveOne Gold reciprocating single-file system, a no-

brushing technique resulted in a better preservation of the canal anatomy than using brushing, reducing the risk of stripping.

Clinical use of ultrasonics and operating microscope in endodontics

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Aim: Endodontic treatment is often difficult or tricky due to the complexity of root canal system. The purpose of this study is to estimate how the introduction of new technologies can help the dentist during the realization both of primary endodontic therapies and of retreatments caused by previous failures. Especially, different possibilities of treatment are allowed by the combined utilization of ultrasonics and operating microscope, which can guarantee benefits in visibility, precision and predictability of endodontic procedures.
Methods: Ultrasonic devices were proposed for the first time in 1957 for root canal shaping and cleansing. Nowadays the piezoelectric systems are preferred to the magnetostrictive ones and widely used because of their higher frequency, linear movement of tips and low generation of heat. However, the real evolution has concerned tips, which have been produced in different shapes, diameters, materials and conicities specific for endodontic use. Furthermore, the restricted dimensions and the poor brightness of the mouth have leaded to the commercialization of magnification systems. Introduced in 1981, the operating microscope presents various advantages than galilean and prismatic optical systems: higher magnification values (20-30x), better lighting, less visual effort, possibility of documentation and absence of weight on head, nose and ears. The operating microscope found in endodontics its ideal field of application. This research shows some clinical cases performed with the combination of ultrasonics and operating microscope, focusing on the benefits related to their use.
Results: An interesting synergic use is the removal of silver cones from root canal system: these tools let to obtain a more detailed vision and a greater precision, resulting in a more conservative retrieval. In the same way, the extraction of root canal obturators with plastic carrier coated with gutta-percha (as ThermafilTM) is favoured by the combination of ultrasonic tips and operating microscope. Furthermore, their utilization is fundamental for retreatments of teeth with glass fiber posts, which have a dentin-like color: the high magnification allows to distinguish between dentin and post, leaving the ultrasonic tip free to disrupt the post matrix without an excessive damage of dental structure. Besides, clinical cases demonstrate a higher probability of recovering broken instruments in root canals; once localized with the help of operating microscope, ultrasonics make easier to mobilize and displace them in a coronal direction in order to extract them.
Conclusion: Certainly, the introduction of ultrasonics and operating microscope represents an important addition to the specialistic tools. Although the learning curve is steep and prices are still high, their utilization (even in combination) lets to obtain indisputable advantages for the dentist. The result is an improvement of therapeutic possibilities and an increase of predictability about treatments considered impracticable in the past.

Endodontic treatment with CBCT and 3D printed model of a molar with complex anatomy: case report

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Aim: case report of an endodontic treatment of a molar with complex anatomy using an approach based on the pre-operative analysis of the real tooth morphology aided with a three-dimensionally printed model based on Cone Beam Computed Tomography (CBCT) data.
Method: after local anesthesia and rubber dam isolation, access opening and root canal scouting was performed with a K-file #10. Afterwards, shaping was completed with Proglider and ProTaper Next (Dentsply Sirona) systems. The disinfection, and the obturation were performed under operative microscope. Sodium hypochlorite 5% and EDTA 10% were used. Due to the difficult of the access, the narrow endodontic space and the curvature of the canals, we decided to use a carried base obturation system.
Results: major issues were the research of the canal and the scouting due to the really narrow endodontic space. The use of microscope was significant for these steps especially for the coaxial illumination system. Another challenge was the proper irrigation of the wide-open canals in the palatal portion of the tooth, jointed with an isthmus, that forced to extend the disinfection time assisted with sonic activation. Intermediate x-rays were difficult due to the distal position of the tooth comparable with a wisdom tooth.
Conclusion: the correct preparation of the operative sequences studying the three-dimensional anatomy of the tooth is a primary step for the treatment of complex case like dental anomalies. Knowing the number, the position and the orientation of the root canals and the

dimension and position of the roots is highly important to have a minimal invasive treatment. Printing a real model of the element allows to better understand the complex anatomies and to prepare a correct approach. The use of the reconstruction software may be a valuable adjunct for the tridimensional evaluation of the CBCT images in order to better visualize some anatomical structures. Therefore, in this case the 3D model helps us to find hidden canals thanks to the irregular surface of the apical portion of the mesial rooth, that were impossible to find only in the CBCT reconstructions. The limit of this case is the quality of the CBCT images own by the patient.

Torque range: a new parameter to evaluate clinical safety and efficiency of nickel-titanium rotary instruments during root canal treatment

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Aim: Aim of the present study is to compare two different files by evaluating "torque range", which represents the difference between torque at failure and operative torque, relating the in vivo and in vitro behavior of the files.
Methods: 20 ProTaper Next X1 (PTN X1) (Dentsply Maillefer; Ballaigues, Switzerland) and 20 EdgeFile X7 (Edge Endo; Albuquerque, New Mexico, United States) 17.04 were randomly divided in two equal groups. An in vitro evaluation was performed for 10 instruments that underwent torque to failure (TtF) test. The 3mm tip of the file was stopped by a firm block of a mixed autopolymerizing resin, which was held still with the help of a vise. The instruments were rotated at 300 rpm and torque was set at 5.5 Ncm. The remnant instruments underwent an in vivo test to evaluate the operative torque during preparation of a root canal of 20 single-root mandibular premolars. All the canals taken in exam presented a curvature smaller than 30°, divided in two groups of 10 each. A manual glide path was performed with #15 K-file to the working length. The instruments were rotated clockwise at 300 rpm with 2 Ncm maximum torque by an endodontic torque recording motor (Kavo, Biberach, Germany). Data were statistically analyzed using Statistical Package for the Social Sciences (IBM-SPSS, version 23, Shanghai, China) software and one-way ANOVA with significance level set at 5%. Ultimately torque range (Ncm) was obtained by subtracting the results of torque at failure and mean operative torque of each files.
Results: The two instruments did not show significant different values for torque at failure (P<0,05). Regarding the operative torque test, none of torque values exceeded the established torque limit. Edgefile X7 achieved lower average and maximum torque values than PTN files. Moreover, Edgefile X7 required significantly less time to reach the working length (p <0.05) and showed a wider torque range than PTN. No file showed flute deformation or intra-canal failure during instrumentation.
Conclusion: The static torsional resistance test, torque at failure, represents the torque at which the 3mm tip fracture occurs. On the other hand, the operative torque represents a dynamic evaluation of the real time torque needed to shape a root canal. The torque range, including both the torque at failure and the operative torque, is obtained by subtracting these two different parameters in order to estimate a relationship between in vitro studies and in vivo behavior of rotary files. The results showed that the Edgefiles X7, despite similar dimensions, exihibited a wider torque range compared to the PTN X1. Due to this fact Edgefile X7 should have a safer range of clinical use. The torsional resistance of the two tested files is less influenced by manufacturing processes and design, but it could be mainly influenced by the size and mass of the metal of the files. The torque range could be considered as an accurate and valid parameter for the evaluation of the clinical safety of Nickel Titanium rotary instrument. Higher the value, greater the clinical safety will be. Within the limit of the present study, this new parameter, provides more information than individual tests, showing a correlation between the torsional resistance of the instruments and the stress to which they are subjected during the instrumentation.

Dental pulp regeneration innovative protocol: report of clinical cases

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Aim: The purpose of this study was to evaluate a novel clarithromycin-containing triple antibiotic mixture (3-MIXC) vehicled by hyaluronic acid (HA) and to report ten pulp regeneration clinical cases using this antibiotic paste.
Methods: Ten patients undergone anterior teeth trauma were recruited at the University of Turin, Dental School – Department of Endodontics. The recruiting criteria were permanent anterior teeth with immature root and open apexes which presented dental pulp necrosis. The protocol consisted in two appointments for the

regeneration treatment. In the first appointment, a mini-invasive opening of the pulp chamber was achieved and the clearance of necrotic pulp and disinfection was obtained with NaClO (2,5%). 3-MIXC was positioned following the previously published protocol of the University of Turin. Three weeks later, the second appointment consisted in removing the antibiotic paste using EDTA (17%). Bleeding stimulation was promoted and MTA sealing at the cement enamel junction (CEJ) with composite restoration was fulfilled. Follow-ups were scheduled at 1 month, 3 months, 6 months, 1 year and a following annual recall.

Results: The efficacy of the novel 3-MIXC was previously tested ex-vivo through confocal laser scanner microscopy (CLSM) viability staining to quantitatively analyze the mean depth of the antibacterial effect and the proportions of dead and live bacteria inside the dentinal tubules. The clinical and radiographic treatment outcomes were observed with a minimum follow-up of 6 months and a maximum of 3 years. This in-vivo study evidenced no symptoms or clinical and radiographic signs of pathology for each case. Moreover, no tooth discoloration was observed for all the patients.

Conclusions: Alternative antibiotic mixtures are already applied in pulp regeneration protocols, although tooth discoloration can occur in more than 40% of the cases as a side effect. 3-MIXC demonstrated an ex- vivo efficacy depth of action similar to the Trimix antibiotic paste but without dentinal discoloration as side effect in both ex vivo and in vivo studies. Neither post-operative pain and tooth discoloration were observed for all the cases treated with 3-MIXC. This antibiotic paste may be an effective alternative for the disinfection during the endodontic regenerative procedures and the management of necrotic immature permanent teeth.

Influence of sealer placement technique and powder/liquid mixing ratio on the quality of single-cone root canal filling: a micro-CT analysis

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Aim: To assess the influence of two different placement techniques and powder/liquid mixing ratio of a bioceramic sealer on the quality of root canal filling by single-cone using a micro-CT analysis.

Methods: Thirty-two single-rooted elements with a mesio-distal diameter of 5,00±0,50 mm, a buccal-lingual diameter of 6,50 ±0,50 mm and a root length of 14,50±0,50 mm measured at CEJ level were selected to be included in the study. After creating the coronal access cavity, root canals were scouted with manual files and the working length was acquired. Root canals were shaped with R40 Reciproc Blue and irrigated with NaOCl 5% and EDTA 17% solutions. Prepared samples were randomly assigned into four experimental groups (n=8), according to the sealer placement technique and the powder/liquid mixing ratio: G1, the sealer (BioRoot RCS, Septodont) was mixed in a 1:5 ratio, as suggested by the manufacturer, and carried into the root canal by a dedicated gutta-percha cone up to the working length; G2, sealer placement as group G1, but using 1:6 mixing ratio; G3, the sealer was mixed in a 1:5 ratio and carried into the root canal by a syringe with a cannula (Apexcal, Ivoclar) up to its complete filling, then a dedicated gutta-percha cone was inserted into the canal; G4, sealer placement as group G3, but using 1:6 mixing ratio. All the samples were submitted to micro-CT analysis. Micro-CT scans were acquired after shaping procedures (t0) and after canals obturation (t1) and then compared to evaluate the presence of voids in the gutta-percha, sealer and dentin interfaces. The normality of the distribution and the equality of variance of the microtomographic datasets were tested with a Shapiro-Wilk and Levene test, respectively; the significance of the differences between groups in terms of the formation of voids was ascertained with the Kruskal-Wallis test. The results were considered statistically significant for a $p\text{-value} < 0.05$.

Results: Minimal void volumes were observed among groups. G1 performed the best result: total void volumes were 0,253±0,175% of the entire canal space. The other experimental groups follow in order of increasing volume: G3 (0,260±0,254%), G2 (0,532±0,528%), G4 (0,840±0,705%), but no statistically significant difference was observed. All groups showed a similar distribution of voids: in the apical and middle third of the root canal the presence of voids was minimal while the greatest void volumes were detected in the coronal third, due to the canal anatomy and the larger amount of sealer. In this canal portion voids were mainly distributed within the sealer. Concerning the sealer viscosity, the more fluid formulation (1:6) showed an increase of void volumes, although without statistical significance. Likewise, no statistically relevant influence was registered regarding the sealer placement technique.

Conclusion: All the examined techniques should be considered effective for the clinician. Under the conditions of the present study, the 1:5 powder/liquid mixing ratio should be preferred when associated with both the sealer placement techniques, according to the clinical situation and the operator preferences.

When using the low viscosity formulation, the clinician should insert the sealer slowly and in a controlled way, in order to minimize the formation of voids.

A micro-computed tomographic analysis of obturation and retreatability quality of an epoxy resin based sealer

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Aim: To evaluate the voids percentage of a matched-taper single cone and epoxy resin-based sealer (MM-Seal, Micromega, Besançon, France) root fillings and its retreatability using rotary instrumentation and supplementary irrigation techniques.
Methods: Single-rooted mandibular premolars (n=72) were prepared using Hyflex EDM nickel-titanium rotary instruments (Coltene, Coltene/Whaledent AG, Altstatten, Switzerland) up to 40.04. Each canal was trial fitted with a 40.04 gutta-percha point with tug-back at the working length. The MM-Seal was used as root canal sealer and prepared according to the manufacturer's instructions. All canals were filled with a matched-taper single-cone technique to maintain experimental consistency among the groups. The specimens were scanned with micro-CT scanner (Skyscan1172, Brunker microCT, Antwerp. Belgium) at 80 kV and 100 µA with an isotropic resolution of 11 µm, before and after root canal obturation. Volumetric measurements were performed using the software Amira 5.3 (Mercury Computer System Chelmsford, MA, USA) to calculate the percentage of voids in the whole root canal, root canal thirds and the last millimeter from the apex. The voids volume was calculated for each section by subtracting the filling material volume from the post-instrumentation root canal volume. In addition, root fillings were removed using rotary instruments and the teeth were randomly allocated to one of the groups for supplementary irrigation techniques (n=24): group A, syringe irrigation; group B, Tornado Brush (Tornado France, M.I.B, Suresnes, France) and group C, ultrasonically activated irrigation (P5Newtron; Satelec Acteon, Mérignac, France). Specimens were re-scanned with micro-CT to evaluate the volume of remnant root filling material. The data relative to voids and retreatment techniques were not normally distributed, consequently they were analyzed by Kruskal-Wallis test (P<0.05). Differences in retreatment time were analyzed using one-way ANOVA with the Tukey's test (P<0.05).
Results: No significant difference was observed between the baseline (after instrumentation) and final (gutta-percha+sealer) root canal volumes (mm3) for whole canal and each anatomical third (total baseline volume) (P>0.05). There was no significant difference in the percentage of voids between the different root-thirds (P>0.05). Regarding the retreatment techniques, there was no significant difference between the supplementary irrigation groups in the remnants of MM-Seal for the whole root canal and each anatomical part (P>0.05). In all the groups, the coronal region exhibited more remaining material than other anatomical thirds (P<0.05). For retreatment time, no significant difference was reported among the three different retreatment techniques (P>0.05).
Conclusion: Within the limitations of this in vitro study, root canals filled with a matched-taper single cone and MM-Seal showed a low percentage of voids. All root canals obturated with tapered single cone and MM-Seal sealer had residual filling material, with no significant differences among the anatomical parts examined. Regarding MM-Seal retreatability, additional retreatment techniques used did not improve MM-Seal removal in comparison with syringe irrigation.

Micro-CT evaluation of two rotary systems for canal shaping in mandibular first molar mesial canals

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Aim: To evaluate the shaping ability and the maintenance of the original root canal anatomy of a modified ProTaper Next technique (PTNm) and the TruNatomy (TN) rotary system using micro-computed tomography (Micro-CT).
Methods: twenty mesiobuccal and mesiolingual canals of permanent first mandibular molars extracted for periodontal reasons were randomly assigned into 2 groups (n = 10): (A) modified ProTaper Next technique and (B) TruNatomy system. The specimens were randomly selected, and the inclusion criteria were the following: a primary root canal curvature comprised between 20° and 40°, a mean radius between 4 and 8 degrees and the absence of root canal calcifications. The modified ProTaper Next technique, encoded by Professor Elio Berutti in 2014, consists in the following instrumentation sequence: ProGlider and ProTaper Next X1 at the working length (WL) and apical finishing with a K-file NiTiFlex #25. The TruNatomy system is constituted by: Orifice Modifier, Glider and Prime at WL. The shaping instruments were changed every canal. The irrigation was achieved with 5% NaOCl and 10% EDTA

solutions. The samples were scanned using micro-CT (SkyScan 1172®: ©Bruker microCT, Kontich, Belgium) at 100 kV and 100 µA with isotropic voxel size of 14.99 µm. Matched volumes, before and after shaping, were evaluated and the following bidimensional and three-dimensional parameters were analysed: the volume of the removed dentin, the difference of canal surface, the centroid shift, the minimum and maximum diameters, the cross-sectional areas and the canal geometry variations through the geometrical parameters ratio of diameter ratios (RDR) and ratio of cross-sectional areas (RA). The measurements were assessed at 2 mm from the working length and in centre of the root canal coronal and medium third. During the study, a secondary aim was obtained: it would be possible to get a standardized and feasible digital workflow to process the shaping outcomes from micro-CT analysis. The data were analysed statistically using one-way analysis of variance (ANOVA) with the level of significance set at $\alpha = 0.05$.

Results: the PTNm group showed a higher volume of removed dentin (1.40 ± 0.80 vs 0.91 ± 0.44 mm3; p = 0.102) and a less centroid shift at apical level (0.083 ± 0.045 vs 0.146 ± 0.27 mm; p = 0.471) while the TN sequence demonstrated a better centring ability at coronal level (0.070 ± 0.046 vs 0.155 ± 0.14 mm; p = 0.085). The only significant difference between the two groups is represented by the RA at coronal level (1.82 ± 0.71 vs 1.30 ± 0.21; p =0.037).

Conclusion: despite the RA parameter at coronal level, there were no significant differences among the tested groups. Therefore, both shaping techniques demonstrated their ability to maintain the original root canal anatomy.

Root-end resection without retrograde preparation: a micro-CT study

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Aim: the gold standard in endodontic surgery is characterized by meticulous retrograde procedures that could be not performable in all teeth due to multiple clinical difficulties. The possibility to perform the only apical resection, when feasible, without further retrograde steps might represent a substantial clinical advantage. The present study analyzes the filling quality achieved with standard retrograde technique in comparison with alternative techniques with or without retrograde procedures.

Methods: the sample size was determined using with the following parameters: $\alpha=0.05$; $\beta=0.20$; $\delta=3.0$; $\sigma=1.5$. Twenty-four single-rooted teeth were selected from a pool of freshly extracted teeth, discarding those with aberrant anatomy. Selected teeth of comparable size were decoronated to obtain 12 mm long roots. The canals were scouted with manual files and the working length acquired. After mechanical glide path establishment, canal shaping was performed with HyFlex EDM rotary files up to size 40.04 taper (500 rpm; 2.5 Ncm). The roots were analyzed with a computed microtomography scanner to identify the possible presence of dentine microcracks. Afterwards, the roots were randomly assigned to two groups: twelve canals were filled with the single cone technique (SCT) with dedicated cones and BioRoot RCS bioceramic sealer; twelve canals were filled with MTA cement (ProRoot MTA) for 6mm in the apical portion with the aid of the MAP System; the empty canal portion was backfilled with thermoplasticized gutta-percha (Obtura III Max System). After 24 h, the roots were apically resected with a carbide bur 3 mm from the apex. At this point, the two groups were randomly subdivided into two further groups of six elements each: G1, SCT and bioceramic sealer without retrograde procedures (n=6); G2, SCT and bioceramic sealer with standard retrograde ultrasonic preparation and MTA filling (n=6); G3, orthograde MTA placement without retrograde filling (n=6); G4, orthograde MTA placement and standard retrograde ultrasonic preparation and MTA filling (n=6). Lastly, the formation of internal and external voids was quantified by means of a second computed microtomographic analysis. The normality of the distribution and the equality of variance of the microtomographic datasets were tested with a Shapiro- Wilk and a Levene test, respectively; then, the volumes measured in the groups were statistically compared with the Kruskal-Wallis test and with the Mann-Withney test with Bonferroni's correction couple comparison.

Results: All groups showed minimal voids volumes formation. In the groups characterized by standard retrograde procedures, the mean voids volumes were 1.16±0.40 % (G4) and 1.87±1.49 % (G2) of the entire canal space, in the groups with the only root-end resection 0.82±0.58 % (G1) and 1.08 ± 0.50% (G3). The difference between the groups was not statistically significant. Analyzing the volume within the apical 3 mm of the canal after root resection (G1=0.06 ± 0.10%; G2=0.76 ± 0.81%; G3=2.06 ± 1.92%; G4=1.53 ± 1.79%) the difference between G1 and the other groups was statistically significant ($p < 0.05$).

Conclusion: When suitable, filling the canal with the single cone technique and bioceramic sealer or orthograde MTA placement combined with simple root-end resection appears to provide an efficient seal of the endodontic space. These technique could represent a good alternative to the retrograde preparation and filling.

Evaluation of the canal sealing quality with warm vertical guttapercha condensation, guttapercha carrier-based and guttapercha point with bioceramic sealer: a micro-CT study

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Aim: To compare the quality of the tridimensional (3D) filling and the presence of radiographic translucencies after root canal obturation with three different techniques: warm vertical condensation, carrier-based and single cone with bioceramic sealer.
Methods: Thirty intact single-rooted human teeth with closed apex, freshly extracted due to periodontal disease, were recruited for this study and stored in a NaCl 0.9% W/V solution. After performing a minimally invasive endodontic access, the canal was scouted with a #10 k-file (Dentsply Maillefer, Ballaigues, Switzerland). Working length (WL) was assessed with a microscope (OPMI Pro Ergo®, Carl Zeiss, Oberkochen, Germany) when the instrument's tip became just visible at the apex. Glide path was performed with ProGlider (PG) (Dentsply Maillefer, Ballaigues, Switzerland) and shaping with ProTaper Next (PTN) (Dentsply Maillefer, Ballaigues, Switzerland) X1, X2 and X3, up to WL. The irrigation between every instrument was performed with 5% NaOCl (Niclor 5; Ogna, Muggiò, Italy) alternated with 10% EDTA (Tubuliclean; Ogna) by using a 5 mL syringe and 30-gauge side-vented needle. The specimens were randomly divided into three groups (N=10) for the final 3D filling step: Buchanan's continuous wave of condensation (Group 1, G1), Thermafil® (Group 2, G2) or TotalFill® BC Points™ combined with TotalFill® BC Sealer (Group 3, G3). Micro-CT scans were performed after the obturation step: test tubes were fixed on the customized support for high resolution scans (100 kV, 100 µA) (SkyScan 1172®: ©Bruker microCT, Kontich, Belgium), with an isotropic resolution of 12.53 µm/pixel, in a 3 hours timeframe approximately for each specimen. The slices were 3D reconstructed with the NRecon (©2012 Bruker) software using standardized parameters for the whole study. Afterwards, the filled area and the associated radiographic translucencies were computer-isolated using Materialise Mimics MedicalTM 20.0 (Materialise NV) and their volumes were calculated with Geomagic Qualify 12.0 (©2010 Geomagic). The statistical analysis was performed using one-way ANOVA and the post-hoc Student-Newmann-Keuls (P<0,05).
Results: The mean percentage of translucency areas in the warm vertical condensation group (G1) was 1,23%, whereas in the carrier-based group (G2) was 4,22% and in the single cone with bioceramic sealer group (G3) was 10,44%. The differences between the groups were statistically significant (P=0,029).
Conclusion: In the present study micro-CT scans were used to compare the quality of the 3D filling and the presence of radiographic translucencies of three different root canal obturation techniques: warm vertical condensation, carrier-based technique and single cone with bioceramic sealer. The same parameters among the different group were analyzed: obturation volume, pores volume and pores rate. No obturation technique showed a completely filled canal system, even though we may affirm that all the obturation techniques provided an adequate 3D root canal filling. However, the null hypothesis of a superimposable 3D filling quality between groups was refused. The single cone technique with bioceramic sealer represented a viable clinical alternative, although it seemed more operator-dependent than the others.

Clinical and radiographic evaluation of the efficacy of endodontic treatments performed by undergraduates: a two years follow up study

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Aim: The aim of the study was to assess the success, defined as absence of signs and symptoms of endodontic disease, of primary root canal treatments performed by undergraduate students, over a period of 2 years.
Methods: 100 patients, with a diagnosis of irreversible pulpitis, symptomatic or asymptomatic, or pulp necrosis, with or without apical periodontitis, were enrolled in the study. The presence of signs and symptoms (pain, spontaneous or induced, swelling, presence of sinus-tract, probing depth) were recorded. Specifically, the presence and the size of periapical radiolucencies was assessed using a periapical radiograph and the PeriApical Index (PAI), which gives scores from 1 (absence of lesion) to 5 (large lesion). ImageJ software was employed to record the width of the lesion in its widest point and its area. Root canal treatment was then carried out. Canal scouting was performed with a #10 K-file and a glide-path was achieved with #12 to #17 stainless-steel K-files and #20 NiTiFlex K-file. Root canals were then shaped either with manual (ProTaper Universal) or rotary instrumentation (ProTaper Next). Irrigation was conducted alternating 5% NaOCl and 10% EDTA. Electronic working length was measured three times during the treatment, during the canal scouting with a #10 k file, at the end of glide path, with a #17 k-file and during the shaping, respectively after S2 Protaper Universal and X1 Protaper next. Canals were sealed with warm vertical condensation or with a carrier-based technique and sealer (Pulp Canal

Sealer, Kerr). The number of appointments needed was recorded. A temporary restoration was provided using glass-ionomer cement or composite. Patients were then scheduled for a post endodontic restoration. After two years from the root canal filling, a follow-up visit was booked and clinical and radiographic data were re-assessed. Statistical analysis was carried out using T-student and chi-square tests (P<0.05).
Results: The overall 2-years success rate was 94.7%. The average length and area of the endodontic lesions was, respectively, 4,416 mm and 15.483 mm2 at baseline, while it reduced to 0,77 mm and 2.05 mm2 after 2 years. In the 75% of the cases the lesion was not detectable anymore. The persistence of a periapical lesion was identified 25% of the cases recorded at baseline. In all of these cases the radiolucency was reduced and, thus, considered as healing. All of the cases with no lesion at baseline had no lesion at the follow-up. There was no statistically significant correlation between number of appointments, canal obturation techniques and shaping instruments and healing of the lesions (respectively, P=0.815, P=0.222 and P=0.156).
Conclusion: With the limitation of this study, related to the small size of the sample, it can stated that the success rate of the endodontic therapy is beyond 90% even when performed by undergraduate students.

Effects of temperature and angle of file access on cyclic fatigue resistance of two single-file nickel-titanium rotary instruments

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Aim: To evaluate the influence of surrounding temperature and angle of file access on cyclic fatigue resistance of two single file nickel-titanium systems.
Methods: Two single file systems [F6 SkyTaper (F6ST), Komet, Brasseler GmbH & Co., Lemgo, Germany and One Curve (OC), Micro-Mega, Besançon, France] were used. 120 new files of 25-mm length were evaluated at two insertion angles (0° and 20°) at room (20°C±1°C) and body (35°C±1°C) temperatures in a 16-mm stainless steel artificial canal with a 60°curvature and 5-mm radius, using a customized testing device. It maintained the 6:1 reduction electric handpiece (Sirona Dental Systems GmbH, Bensheim, Germany) in a fixed 3- dimensional position thanks to a fixed block. In addition, a mobile support on rails ensured the insertion/withdrawal of the file. The different inclination of file access was permitted by the platform containing the artificial canal, which maintained the entrance of the instrument perpendicular to the canal. Therefore, cyclic fatigue resistance was tested with a different inclination (20°) of files with respect to the standard position (0°). A thermostat connected to the customized device guaranteed the temperature adjustment in the artificial canal at room or body temperature. All instruments were activated at the preset temperature using the handpiece powered by a torque-controlled motor (Silver Reciproc, VDW) in continuous rotation at a constant speed of 300 rpm (revolutions per minute) and the maximum torque (4.1 Ncm) following the manufacturer's instructions. The friction of the file on the artificial canal walls was reduced by a special high-flow synthetic oil (Super Oil; Singer Co Ltd, Elizabeth, NJ) designed for lubrication of mechanical parts. Each file was rotated until fracture occurred and the time to fracture in seconds (TtF) was recorded with a chronometer to an accuracy of 0.1 second. The length of the fractured tip of the instruments was measured using a digital caliper (Digimatic; Mitutoyo Co, Kawasaki, Japan). Data were analyzed statistically using 2-way ANOVA and the Bonferroni multiple comparison post hoc test (P<0.05).
Results: All instruments exhibited lower TtF at body temperature (P<0.05). An inclined access of 20° did not significantly influence the TtF of tested instruments, independently from the surrounding temperature. OC exhibited higher TtF of F6ST at 20°C with an angle of file access of 20°(P<0.05). The mean length of the fractured fragments was not significantly different for all instruments tested (5± 0.1 mm) (P>0.05).
Conclusion: F6ST and OC showed a significant reduction of cyclic fatigue resistance at body temperature. An inclined insertion of instrument did not affect the cyclic fatigue resistance of tested instruments at both tested temperatures. In addition, no significant difference was observed between F6ST and OC, except at 20°C and a file inclination of 20° with OC performed better than F6ST.

Assessment of the resistance to cyclic fatigue of rotating instruments in continuous rotation produced with modern ni-ti alloys

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Aim: The aim of present study was to compare cyclic fatigue resistance of three modern Ni-Ti instruments used with a movement of continuous rotation. In recent years, nickel-titanium has established itself in endodontics as the greatest innovation in the field of root canal system instrumentation. The success of this

techniques that use this alloy compared to the methods that provided for the use of traditional manual tools is mainly due to the mechanical characteristics of the Ni-Ti alloy, superior to those offered by steel, but also to the innovations brought by the production processes in the field of drawing (geometry, geometry of sections, orientation and number of the blades, variable taper) of the instruments, in particular as regards size and taper. Only by exploiting the superelasticity of nickel-titanium has it been possible the realization of larger instruments capable of maintaining characteristics of flexibility and resistance suitable for rotating instruments. To create these tools, it was necessary, at the beginning of the 90 years, to design and build special computerized equipment capable of working the nickel-titanium wire in order to give it increasingly complex and performing designs. Through these innovative devices it was possible to create sections and coils with complex morphologies and likewise to introduce the concept of augmented taper. The advantage of having tools with increased taper and continuous rotation, which ensures superior cutting efficiency and optimal use of the alloy's superelasticity, consists in being able to prepare the root canal in shorter times and through simpler procedures, with a fewer number of tools.
Methods: For this study three groups of continuous rotation rotating instruments (HyFlex EDM, Twisted File Adaptive, Revo S SU) were used, each group included twenty unused files. The various groups were subjected to cyclic fatigue tests through an artificial metal device specially created. A statistical analysis was carried out with Kruskal-Wallis test and Mann-Whitney test.
Results: Statistically significant differences were found between the various groups. HyFlex EDM instruments showed fracture strength slightly higher than twisted files and significantly higher than Revo S Su.
Conclusions: A number of studies have stated that fatigue is the predominant mechanism in material failure. Different types of rotary files exhibit differences in resistance to fatigue failure due to differences in various determinants. This study has shown how modern Ni-Ti alloys increase the resistance of rotating instruments to cyclic fatigue. HyFlex EDM and Twisted files showed the best features.

A comprehensive in vitro comparison of mechanical properties of two rotary endodontic instruments

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Aim: The aim of the present study was to compare two different nickel–titanium (NiTi) rotary files, F-One Blue and F2 Protaper Gold (PTG), evaluating their properties such as cyclic fatigue resistance, torsional resistance, and bending properties.
Methods: Sixty F-One Blue (25.06) and 60 PTGF2 have been randomly divided into 3 groups of 20 instruments each. Each group was tested in a different way, in order to analyze three different properties: cyclic fatigue resistance, torsional resistance, and flexibility. Cyclic fatigue resistance was evaluated by inserting the instruments for 16 mm in a stainless-steel artificial canal with a 90° angle and 5 mm of curvature with recommended speed and torque. Time to fracture was recorded using a chronometer (1/100 seconds). The number of cycles to fracture (NCF) was then calculated. Fragments were collected, and their lengths were measured. Torsional resistance was evaluated on the apical 3 mm of each of the files to calculate torque to fracture (TtF) using an endodontic motor (KaVo, Biberach, Germany), which automatically recorded the torque values every 1/10 s. All instruments were rotated at the same speed (300 rpm) and torque value (5.5 Ncm). Flexibility was evaluated using a calibrated load cell supported by a computer program. All the collected data were statistically analyzed (t-test) with a significance level set at 5%.
Results: A significant difference in terms of cyclic fatigue resistance, torsional resistance, and flexibility between F-One Blue and F2 PTG was found ($p < 0.05$). The mean value of NCF was 604.16 (SD ± 23.32) for F-One Blue and 300.5 (SD 19.92) for F2 PTG. The mean value of TtF was 1.41 Ncm (SD ± 0.01) and 1.39 Ncm (SD ± 0.01) for F2 PTG. The mean value of bending test was 29 gcm (SD ± 1.15) for F-One Blue and 50 gcm (SD ± 2.30) for F2 PTG.
Conclusion: F-One Blue better resists to flexural and torsional stresses and seemed to be more flexible. Since F-One Blue mechanical tested performances were better than the F2 PTG ones, these instruments should be considered a very promising instrument, due to its innovative flat side design and heat treatment, that could improve endodontic clinical practice.

In vitro evaluation of the degree of dissolution of pulp tissue through different root canal irrigation protocols

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Aim: The aim of this study is to evaluate in vitro, using artificial lateral canals, the rate of dissolution of the pulp

tissue through different protocols of canal irrigation. Introduction. The goal of root canal treatment consists in the complete removal of all the damaged tissues, bacteria and their toxins, from the complex radicular system. The endodontic space should not be considered in a single dimension, the main canal, but it must be considered as a complex of structures and ramifications on three dimensions. The irrigation of the root canal is an essential procedure in the endodontic treatment for the abstraction of the smear layer. Currently, the alternate utilization of sodium hypochlorite and EDTA irrigants is recommended to abstract both the inorganic and organic components of the smear layer. The action mechanism of sodium hypoclorite is well-known and well-known are its antibacterial action characteristics and dissolution of vital and necrotic organic tissues, although its action is reduced on vital tissues.
Methods: 100 artificial canals provided with lateral canals have been used. Each lateral canal was filled with pulp tissue and calibrated to 0.002 mg. All canals were irrigated using 5 different protocols. 5 groups have been used for the experiment: Group A, distilled water (control); Group B, preheated NaOCl; Group C, NaOCl heated inside the canal; Group D, NaOCl ultrasonically activated; Group E, NaOCl heated inside the canal with ultrasonic activation. All samples were weighed through professional microbalance in three different phases: before insertion of the pulp tissue into the lateral canal, after insertion of the pulp tissue and, finally, after different protocols of irrigation. A statistical analysis with Kruskal-Wallis test and Mann-Whitney test was performed.
Results: The partial dissolution of the pulp tissue inside the artificial lateral canal occurs only using the protocol with NaOCl heated inside the canal with ultrasonic activation. Other irrigation protocols are not able to dissolve the pulp tissue.
Conclusions: The main objective of endodontic therapy is the removal of damaged tissues and bacteria. Modern literature highlights that is impossible to remove all the pulp tissue and bacteria from the whole endodontic space. So, to achieve excellence and get positive results in the short and long term, it is necessary to use techniques and technologies that may increase the degree of root canal detersion.

Quality of canal walls cleanliness and dentinal tubules penetration of heated sodium hypochlorite (NaOCL) ultrasonically activated in root canals conservatively shaped: an in vitro study

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Aim: To investigate the effect of ultrasonic activation of intracanal heated sodium hypochlorite (NaOCl) on its dentinal tubular penetration and root canal cleanliness using a histological method in vitro. Conventional irrigation with syringe and needle is not able to allow optimal penetration of the irrigant into the dentinal tubules. In the last decade, endodontic research has focused on irrigants activation strategies, including techniques as sonic, ultrasonic, laser, and mechanical agitation leading to unsatisfactory results. Recent studies have shown that the intracanal heating of NaOCl has resulted in significantly less debris on the walls of the root canals compared to irrigation with preheated NaOCl. However, it is not known if ultrasonic activation in combination with intracanal heating will result in better debridement of root canals, compared to ultrasonic activation alone.
Methods: 44 lower premolars extracted a few days earlier were selected. The teeth were decoronated at the cemento enamel junction to obtain roots of standardized length (18 mm). The canals were shaped with 10 / 0.05 and 20 / 0.05 rotating instruments (Hyflex EDM, Coltene). Irrigation was performed with 3% NaOCl using a 30G needle. A total of 5 ml of NaOCl was used for each tooth and renewed every minute. The canals were then irrigated with sterile saline, followed by irrigation with 3 mL of 17% EDTA for 1 minute to remove the smear layer. All canals received a final irrigation of 3 ml of sterile saline solution. In experiment 1, the premolars were randomly assigned to three groups: group A, ultrasonic activation; group B, ultrasonic activation of heated NaOCl; group C, irrigation with syringe and needle. The penetration of fluorescence-labeled NaOCl was studied by means of an optical microscope. In experiment 2, the premolars were randomly assigned to group B or C for histological analysis of the pulp tissue residue and debris. The data were analyzed statistically using the Kruskal-Wallis and Mann Whitney tests (P = 0.05).
Results: Group B showed significantly greater penetration of the irrigant into the dentinal tubules than groups A and C. Group C showed minimal penetration of irrigant into the tubules. When heated NaOCl was activated by ultrasound (group B) it penetrated down to 0.66 microns into the dentinal tubules, 20% more than the ultrasonic activation alone. Intracanal heating of irrigation with ultrasonic activation produced significantly cleaner canals than syringe and needle irrigation.
Conclusions: Used together, ultrasonic activation and intracanal heating of sodium hypochlorite significantly increase its penetration into the dentinal tubules compared to ultrasonic activation or irrigation of the syringe alone. They also significantly improve the debridement of the root canals compared to irrigation with the syringe alone.

Postoperative pain and quality of life after emergency endodontic treatment: a randomized clinical trial

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Aim: The aim of the study was to compare postoperative pain and quality of life after three different emergency endodontic treatments: pulpotomy, manual partial pulpectomy and mechanical partial pulpectomy. The null hypothesis was that were no differences among the treatments.
Methods: Eighty-six patients with clinical and radiographical diagnosis of symptomatic irreversible pulpitis with or without symptomatic apical periodontitis affecting both mono and multi-rooted teeth were selected. After local anesthesia, rubber dam isolation and access opening the patients were randomly allocated to the following treatment groups:
1. Pulpotomy (manual debridement of the pulp chamber and location of the root canals orifices)
2. Manual partial pulpectomy (debridement of the main root canal in multi-rooted teeth) performed with manual k-files from #10 to #20 NiTiFlex up to working length
3. Mechanical partial pulpectomy, performed with PathFiles (size #13, #16, #19) up to working length, after a manual canal scouting with #10 k-file.

For each group, irrigation was performed with 5% NaOCl. At the end of the session, a temporary restoration was placed with glass-ionomeric sealer after drying the pulp space and positioning a sterile cotton pellet. Then patients received a Likert-like postoperative pain self-assessment questionnaire to fill in for the following 7 days. Postoperative pain, difficulty in eating and difficulty in sleeping were recorded. Patients assigned a score for each indicator, ranging from 0 to 10. The parameters were also evaluated at baseline, before starting the treatment. Statistical analysis was carried out using the one-way ANOVA, Kolmogorov-Smirnov and Kruskal-Wallis tests to evaluate the trend of variables over time and to perform comparison between groups. Statistical significance was set at $P<0.05$.
Results: No differences among the group were found at the baseline, confirming their homogeneity. Postoperative curves didn't show statistically significant differences among groups ($P>0.05$). Generally, a more favorable trend was observed for the groups that underwent partial pulpectomy, either with manual or rotary instruments. In the group 2 difficulty in sleeping was slightly positive in the first post-operative day, without statistically significant differences (day 1 $P=0.086$). Regarding eating difficulties, no differences were registered between groups ($P>0.05$), even if partial pulpectomy with rotary instruments showed a more favorable trend.
Conclusion: Within the limitation of the study, partial pulpectomy may be a reliable approach in case of emergency endodontic treatment of symptomatic irreversible pulpitis with or without apical periodontitis. It may allow sufficient hemostasis and root canal system debridement, justifying reduction of pain and better quality of life perception.

Prevalence of the genus Propionibacterium in persistent lesions: systematic review

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Aim: Propionibacterium are anaerobic/aero tolerant rod gram positive bacteria and numerous studies are associated with primary and secondary endodontic infections. The data in the literature on the prevalence of propionibacterium are conflicting and there are studies that report conflicting data on the prevalence in primary and secondary endodontic infections. This review aims to clarify the prevalence of bacteria of the genus Propionibacterium in endodontic lesions.
Methods: The present systematic review work was performed on the basis of the Prisma protocol. a search was carried out on the PubMed and Scopus databases with the use of keywords. The research produced 410 records which, after the elimination of the overlaps and the application of the inclusion and exclusion criteria, led to a number of 36 included articles divided by the 3 outcomes. The first Outcome concerns prevalence of bacteria of the genus Propionibacterium in primary and secondary endodontic lesions, secondary outcome difference in the prevalence of bacteria of the genus Propionibacterium between primary endodontic infections and secondary endodontic infections and Tertiary outcome, difference in the prevalence of Propionibacterium Acnes compared to Propionibacterium propionicum, in endodontic endodontic infections. The Newcastle–Ottawa scale for case–control studies was used to assess the risk of bias in the included studies in primary, secondary and tertiary outcome .The cumulative meta-analysis for the first outcome was performed using the software, Open Meta-Analyst version 10, the quantitative analysis for secondary and tertiary outcome was performed with the Rev Manager software 5.3. The extracted data included the magazine (author, data, and journal), the bacterium species of the genus

propiponibacterium investigated (genus, species, and number of dental elements with the presence of the bacterium), the number of samples examined, type of sample (necrotic or vital tooth, endodontic canal, tooth in pulpitis or apical periodontitis, tooth previously treated endodontically, tooth with failure subject to extraction or endodontic surgery), the number of samples per pathology with the presence of propionibacterium, the bacterium identification method (PCR or Culture).

Results: For the first outcome, prevalence of bacteria of the genus Propionibacterium in primary and secondary endodontic lesions, the heterogeneity is very high with I2 equal to 92.78%

Conclusion: For this reason, a random effects model was used. The cumulative meta-analysis presents an Overvall (I2=92.78%, P value < 0.001) 0.202 (0.169, 0.279) with a ratio between events and samples examined equal to 322\1658. For the secondary outcome, difference in the prevalence of bacteria of the genus Propionibacterium between primary endodontic infections and secondary endodontic infections, the comparison showed absence of heterogeneity among the studies, with an I2 equal to 0%. For this reason, for the second outcome, a fixed effects model was applied. For the second outcome, the forest plot is in favor of the subject group Primary endodontic infection in a statistically significant way.

Gnathology

Evaluation of pain variation and disk recaption in patients with disk displacement with reduction treated with mandibular bite

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Aim: Disk displacement with reduction (DDwR) is characterized by an altered anatomic disk-condyle relationship at rest. During mouth opening, the disk repositions over the condyle producing a typical noise known as 'opening click', that can be registered and analyzed by means of sonographic examination. DDwR conventional therapy is represented by bite prescription, which aims to establish a correct disk-condyle relationship, by the distraction of the temporomandibular joint and the relaxation of masticatory muscles. The aim of this study is to evaluate how articular noise and pain are modified in patients with DDwR treated with a bite.
Methods: A sample of 24 patients with the diagnosis of DDwR was visited at the Gnatology Department of the Dental School of Turin and treated with the mandibular bite. At each appointment patients were asked to fill a VAS scale in order to understand how much pain they were experiencing at that particular moment. Furthermore, bilateral sonographic examination of the temporomandibular joints was carried out, both wearing the mandibular bite and without it. This protocol was repeated at different timepoints: T0: delivery of the mandibular bite; T1: one month after T0; T2: three months after T1; T3: six months after T2. Noise measurements were made in a quiet room with K7 evaluation system (Myotronics-Normed, Inc., USA), instructing the patient to open the mouth at maximum opening and to close at maximum intercuspidation, following a metronome on the computer display. The presence of articular clicks (identified with a short duration, high intensity and low frequency peak) was investigated from graphics obtained. Frequency and amplitude values of articular click obtained both with the mandibular bite and without it at T1, T2, and T3 were compared with the baseline. Statistically significant differences (p. value < 0.05) were obtained for frequency in 1 of 24 patient with bite and 1 of 24 without bite, and for amplitude in 1 of 24 with bite and 8 of 24 without bite. VAS value decreased with a statistically significant difference for every patient compared to the baseline.
Conclusion: According to the data available in the literature, the mandibular bite didn't lead to the resolution of the disk displacement with reduction, neither to the disappearance of the articular click within this sample of patients. Nevertheless, thanks to the action on muscle relaxation and joint distraction, all patients obtained a statistically significant reduction of pain, registered with the VAS scale, in the subsequent months compared to the baseline.

Use of Frankel II in the conservative treatment of condylar fractures in pediatric age: a case report

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Aim: Condylar fractures represent the 75% of the mandibular fractures among children. Proffit et al. reported that in 15-20 % of the children who suffered a condylar fracture, there was a reduction in growth after the injury. This growth impairment may relate to the amount of trauma to the soft tissues and the resultant scarring in the area. The use of functional appliances aims to guide the mandible to an advanced and load-free position, so that condylar remodeling and jaw growth can be encouraged. The aim of this study is to describe the treatment of a 6-years-old female patient affected by bicondylar fracture with Fränkel II (FR2) appliance.
Methods: The 6-years-old female patient was urgently visited in October 2019 in the Orthodontics' division of Fondazione Policlinico Agostino Gemelli IRCCS, Università Cattolica del Sacro Cuore, Roma. At radiographic examination, the patient showed bicondylar neck fracture at the level of sigmoid notch, with a slight to moderate displacement of the condylar head with respect to the articular fossa (Lindahl classification, 1977). A mandibular body fracture, in the region of the symphysis, was also detected. At intraoral inspection, the patient presented a deviation of the lower incisal midline to the left. At extraoral evaluation, the patient showed a laceration localized to soft tissues of the chin associated to a minimum deviation of the same to the left from the facial midline. The clinicians performed a conservative treatment with Fränkel II (FR2) appliance with 1.5 mm of mandibular advancement.
Results: At the first evaluation the maximum mouth opening was 20 mm. After three months of therapy, the maximum mouth opening was 35 mm, the deviation of the lower midline was improved and there was not pain on trigger points during manual palpation. Moreover, the TC showed a complete ossification of temporo-mandibular joints on both sides.
Conclusion: The present study shows that Fränkel II may represent a useful appliance for the conservative treatment of condylar fracture in pediatric age. It differs from other functional appliances by protruding the mandible, ideally without contacting any mandibular teeth and by causing an increase of the jaw growth through the action of the lateral pterygoid. It pronounced vertical development of the mandibular molars. Fränkel II device induces a modification of the immature postural pattern of the muscle of mastication and an anterior functional shift of the mandible. This bodily translation leads to a modification of the postural pattern of the muscles of mastication. Moreover, Fränkel II is considered an exercise device, as its mode of action is based on the medical orthopedic principles that consider exercise of muscles training as important factors in the normal development of skeletal tissues. An early stimulation and control of muscle activity with functionalizing equipment integrated by physiotherapy sessions represent a key point in the non-surgical treatment. The aim is to achieve early mobilization of the joint tissues and surrounding areas, increasing the mobility of the articular disc and reducing its mechanical load, so as to ensure the restoration of good joint function. Clinical experience tells us that, with these measures, the joint surfaces are remodeled and, in the child, the possibilities of obtaining both anatomical and functional healing of the joint are real.

Prospective longitudinal study for the evaluation of Cerezen as a treatment for painful temporo-mandibular disorders

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Aim: Temporomandibular disorders (TMD) are a set of conditions concerning the temporomandibular joints (TMJ), the masticatory muscles or both, and involve musculoskeletal pain, disturbances in the mandibular movement patterns, and/or impairment in functional movement. Initial therapy for TMD usually includes behavioural counselling, physical therapy and an intraoral stabilization splint. An innovative, non-invasive, and reversible device, Cerezen®, has recently been introduced to treat temporomandibular muscle and joint disorders. It is a plastic device placed into the outer third of the ear canals. Unlike a splint, it has no effect on speech and it is not visible. The aim of our research was to evaluate the effects of Cerezen® on pain and Pressure Pain Threshold (PPT) of masticatory muscles in patients with diagnosis of TMD pain.
Methods: Ten subjects with TMD pain diagnosed according the Diagnostic Criteria for TMD (DC/TMD) and with pain intensity higher than 30 mm on a VAS scale were included in the study (mean ± SD age = 30 ± 10.47; 8 females, 2 males). Among these patients 7 reported myalgia, 2 reported both myalgia and arthralgia and 1 reported myalgia and headache attributable to TMD. All the patients received the Cerezen® device and counselling. Assessments included the Characteristic Pain Intensity (CPI) calculated from the Graded Chronic Pain Scale (GCPS), and PPTs at baseline (T0), after one month (T1), three months (T2) and six months (T3) from the first use of the device. PPT was measured in kilopascals through a digital

algometer (Sense Box, Somedic AB, Hörby, Sweden), in the following sites: right anterior temporalis (TdxM), left anterior temporalis (TsxM), right masseter (MdxM), left masseter (MsxM) and right thenar which was selected as a control site (TenM). The Shapiro-Wilk test was used to evaluate if there was a normal distribution of the data. The difference among the longitudinal timepoints for each PPT was analysed using ANOVA for repeated measurements. Statistical significance was accepted at $P < 0.05$.

Results: All the PPTs analysed showed a statistically significant increase during the timepoints (TdxM, P< 0.001; TsxM, P< 0.001; MdxM, P=0.0001; MsxM, P=0.0001; TenM, P=0.0015). In particular, a statistically significant increase between T3 and T0 was found for all the PPTs (TdxM, 103.7±16.1, P< 0.001; TsxM, 98.2±15.6, P< 0.001; MdxM, 88.9±15.6, P< 0.001; MsxM, 74.6±13.7, P< 0.001; TenM, 161.7±36.7, P=0.001). The CPI was significantly decreased between T3 and T0 (-27.5±5.91 P< 0.001). Five out of 10 patients presented absence of pain after six months from the beginning of the therapy based on the use of Cerezen® and on counselling; moreover, an increase in the pain free opening of at least 5 mm (mean ± SD: 5.8±8.2 mm) was clinically detected in 8 patients.

Conclusion: Cerezen® seems to be an effective device for control of the TMD pain. Indeed, the PPTs and the pain free opening increased, and pain reduced. Further studies based on larger samples are needed to confirm benefits obtained from this device, comparing Cerezen® to intraoral splints, or to a control group.

Ehlers-Danlos syndrome: screening and preventive strategies of temporomandibular disorders in pediatric patients

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Aim: Ehlers-Danlos syndrome (EDS) is an hereditary systemic pathology, affecting the connective tissue, characterized by hypermobility of joints, hyperextensible skin and musculoskeletal, visceral, pelvic and neurologic dysfunctions. At present, late diagnosis on adult subjects has decreased, due to a deeper knowledge of this disease, which enabled early identification of EDS in pediatric population. This study aimed at assessing, as for temporomandibular joints hypermobility is concerned, an early screening and new preventive strategies to be adopted to improve joint functionality and mandibular proprioception, preventing articular pain and dysfunctions.

Methods: Ten subjects affected by EDS (average age 9 ± 1 years, 7 females and 3 males) were recruited at the Department of Oral and Maxillo-facial Sciences, Sapienza, University of Rome, between January 2018 and January 2020. After the initial specialistic pediatric dental examination, patients were visited by a medical staff of experts of gnathology, according to the Diagnostic Criteria for temporomandibular disorders (DC/TMD). Also a psychometric assessment – PedsQL 4.0- was performed. Among the preventive strategies, the proprioception exercises and the use of a new occlusal device – Ri.Pa.Ra. - for mandibular functionality were reported.

Result: At the moment of the diagnosis, all the patients reported mandibular subluxation and episodes of luxation, 4 patients with mild joint pain. 3 patients reported myalgia of mild intensity in correspondence of lateral pterygoids. Headache and neck pain of moderate/severe intensity were reported. Mandibular movements incoordination was noticed and the mouth opening (in mm) was always > 50mm. Psychological distress was moderate, in particular the aspects relating to social relationships and fatigue. After one year of proprioception exercises and the use of Ri.Pa.Ra splint, the patients were re-evaluated. All patients acquired a greater awareness of their mandibular movements, avoiding the ones beyond the normal joint excursion, by a rehabilitation of tongue position. Patients which referred joint and or muscle pain reported no symptom. Headache and neck pain improved. Monitoring of these patients is not concluded. They will be re-evaluated with an annual follow-up.

Conclusion: The role of prevention has a fundamental connotation for the EDS management, which might be complex because of the young age of patients. However, pediatric approach succeeded in stimulating collaboration and active partecipation in performing mandibular proprioception exercises with the aid of the occlusal appliance Ri.Pa.Ra. Successful outcome was achieved, however long-term follow-ups are recommended because of the instability of EDS clinical condition.

Severe temporomandibular joint osteoarthritis: is it possible to avoid surgery with a multidisciplinary approach? A case report

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Aim: Osteoarthritis is an inflammatory disorders of TMJ and associated structures, characterized by joint pain generated by jaw movement and function or

parafunction, or replicated by the provocation tests of the TMJ. Furthermore it is characterized by joint hypomobility that should interfere with daily function and activities. According to the evidence that recommend mobilizations and exercises to promote tissues adaptation and the healing process, the aim of the study is to verify in a patient elective for surgery, if the surgery can be prevented by the use of Manual Therapy (MT) combined with Therapeutic Exercise (ET) for the management of pain and disability.
Methods: A patient of 76-years-old with diagnosis of severe osteoarthritis of the temporomandibular joint was subjected to a conservative treatment to prevent plastic surgery. He reported pain and noises at rest and during opening/closing movement, associated with referred pain in the sub-occipital region, in the temporal region, numbness of the right side of the face and a limitation of health-related quality of life. After a dental and maxillofacial evaluation the patient was subjected to five sessions of Manual Therapy, Therapeutic Exercise and Education. Each session lasted approximately 30 minutes and was held twice a week by a Physiotherapist. Primary outcome used to measure pain at rest and during movement was the Numeric Pain Rating Scale (NPRS). Secondary outcome used to measure the health-related quality of life was the 36-Item Short Form Health Survey (SF-36). Furthermore we measured Active Range Of Motion (AROM) as functional measure. The follow up was assessed 1 week after the last treatment, in which the patient was subjected to a clinical control assessment by the same assessors.
Result: Measures at the baseline demonstrated low level of joint mobility and social participation, followed by a severe and referred pain during movement and function (6.0 score on the NPRS). The Physical Health Index (IHP) appeared better than the Mental Health Index (IHM) but both values were below the average. At 1 week follow-up the pain decreased to score 1.0 on the NPRS with the increase of AROM and active participation, followed by an increase of health-related quality of life on SF-36 in role-physical (RP), role-emotional (RE) and bodily pain (BP). Based on these results, the 1 week follow-up clinical assessment attested to continue the treatment with further periodic assessments.
Conclusion: In case of severe osteoarthritis of TMJ, a multidisciplinary approach involving physiotherapist, dentist and maxillofacial surgeon seems to be helpful to delay or avoid surgery, in particular the use of Manual Therapy combined with Therapeutic Exercise and patient Education. It's a valid conservative treatment approach for its reproducibility. There are still few follow up to certify the results, therefore we need more follow up to verify the long term effects of the conservative treatment and its durability over the short term.

Upper or lower occlusal splint for myofascial pain? A randomized controlled trial on patients with muscle-related temporomandibular disorders

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Aim: Myofascial pain is one of the most common causes of temporomandibular disorders (TMD), affecting the 85% of general population in their lifetime with an overall prevalence of approximately 46%. Mandibular occlusal splints and upper Michigan occlusal splints are two of the occlusal stabilization splint (SS) approaches most commonly used in the treatment of TMDs. However, although these treatments have already been extensively described in literature, there are no data regarding a comparison between the effects of these two approaches in terms of reduction of pain in muscle-related TMD patients. Therefore, this study aimed to assess the effectiveness of upper Michigan occlusal splint compared to mandibular occlusal splint in terms of pain, range of motion (ROM), muscle activity in patients affected by muscle-related temporomandibular disorders.
Methods: In this randomized controlled trial, patients consecutively referring to the Gnathology Unit, Dental School, University of Turin, were recruited from November 2017 to April 2019. Inclusion criteria were: a) diagnosis of myofascial pain, according to the DC/TMD;1 b) visual analogue scale (VAS) ≥ 4; c) pain lasting from at least three months on at least one masseter muscle. They were randomly allocated into two groups: 20 in Group 1 (Michigan occlusal splint), and 20 in Group 2 (mandibular occlusal splint). Primary outcome of this study was the VAS measurement; secondary outcomes were ROM of mandible movements and activity of the main masticatory muscles (superficial masseter and anterior temporalis), assessed by surface electromyography (sEMG). All patients were assessed at the baseline (T0), after 1 (T1), 3 (T2), and 6 months (T3).
Results: Forty patients (13 male and 27 female; mean

aged 47.2±12.8 years) were enrolled. There were no significant differences after the treatment at all the endpoints (T1, T2, and T3) in terms of pain, assessed by visual analogue scale (VAS). However, there was a trend in decreasing pain in both groups, particularly after using Michigan occlusal splint for 6 months (T3-T0) (VAS: 5.1±2.5 vs 3.9±1.6; NS). There were no differences between groups in terms of ROM, except for right lateral mandibular at T2 ($p<0.05$) and left lateral mandibular at T3 ($p<0.05$). We reported no significant differences in all the assessed sEMG parameters.
Conclusion: Taken all together, the findings of the present randomized controlled trial suggested that SS, independently from being built on the upper or lower arch, did not have any significant effect in decreasing myofascial pain over a 6-month period in patients affected by muscle-related TMD. Future prospective studies with longer follow-up evaluations should be performed to have more data on the effects of SS in these patients. Furthermore, it is mandatory to consider that the treatment of muscle-related TMDs should be multifactorial including also pharmacological, psychological and physical interventions.

Micronized palmitoylethanolamide reduces joint pain and glial cell activation

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Aim: Joint inflammation is believed to be a chief cause of pain in patients with TMD, through the release of pro-inflammatory cytokines that induce peripheral sensitization of nerve terminals followed by microglial stimulation. In this study we assessed the properties of m-PEA on glial cell activation following induction of TMJ inflammation and trigeminal hypersensitivity.
Methods: The study was conducted using Sprague–Dawley male rats . Rats were randomly divided into the following groups: Sham group Rats received an equal volume of saline into the left TMJ capsule using the same technique. Sham + mPEA group Rats received m-PEA administered intraperitoneally at a dose of 10 mg/kg; CIA group Rats were subjected to TMJ inflammation by administering 50 µl of CFA oil/saline (1:1) emulsion into the left TMJ capsule; CIA + mPEA group Rats were subjected to TMJ as described above and were treated by ip administration of m-PEA at a dose of 10 mg/kg 1 h post-CFA. m-PEA was provided by Epitech Group SpA. m-PEA was resuspended in 5% Pluronic F-68 to preserve particle size distribution of the lipidic molecule. m-PEA was administered ip at a dose of 10 mg/kg 1 h post-CFA or saline. Sham and CFA animals received the vehicle used for m-PEA. Evans blue dye was injected into the tail vein 10 min before perfusion. The left TMJ was dissected out, cut into small blocks and incubated overnight at room temperature in a 7:3 (v/v) mixture of acetone and 35.2 mM sodium sulfate on a shaking table. Samples were then centrifuged, the supernatant collected and dye absorbance determined spectrophotometrically at 620 nm.Twenty-four and 72 h after CFA injection, rats were killed and both brain and TG were excised and fixed in 10% (w/v) formaldehyde in phosphate-buffered saline. After deparaffinization and rehydration the detection of glial fibrillary acidic protein and neuron-specific nuclear protein, of the number and of the activation of macrophages phenotype (Iba1 and ED1) were carried out in ophthalmic (V1), maxillary (V2) and mandibular (V3) TG divisions after boiling in 0.1 M citrate buffer for one minute. Quantitative analysis of immunopositive cells in the TG was carried out by using the Image-J software. All values are expressed as mean ± standard error of the mean (SEM) of n observations. For in vivo studies "n" represents the number of animals used. The results were analyzed by one-way ANOVA followed by a Bonferroni post hoc test for multiple comparisons. A p value less than 0.05 was considered significant.
Results: CFA-injected animals showed TMJ edema and ipsilateral mechanical allodynia accompanied by a robust growth in GFAP protein-positive satellite glial cells and activation of resident macrophages in the TG. Moreover, m-PEA administration significantly reduced the degree of TMJ damage and pain, macrophage activation in TG and up-regulation of Iba1.
Conclusion: Results demonstrate that CFA-induced TMJ inflammation and pain were reduced by m-PEA administration, by the reduction in edema and mechanical allodynia after TMJ induction. These effects were associated with a reduced density of GFAP-positive cells in the ophthalmic, maxillary and mandibular divisions of the TG, and reduced macrophage activation in terms of ED1 fluorescence intensity and number of ED1+ cells. The findings reported here confirm the important contribution of non-neuronal cells in TMJ inflammation and pain and the possible application of m-PEA as an innovative therapeutic agent to decrease inflammation thereby reducing trigeminal hypersensitivity.

Frequency of awake bruxism behaviors in a sample of healthy young individuals: a multiple-week observational study

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Aim: Awake bruxism (AB) is an oral condition that is gaining increasing attention in several medical fields however it has some uncertainties concerning the epidemiology, also due to the different diagnostic strategies that have been adopted to address it in the research setting. Recently, some experts were invited to take part in an International Consensus Meeting suggested that an ecological momentary assessment (EMA), which enables real-time reporting of the condition under study, can implement knowledge on the topic. In particular, since bruxism has to be considered a jaw-muscle behavior in otherwise healthy individuals, it is recommendable that it is measured in its continuum or on-time occurrence of behavior. The aim of this study was to assess the frequency of awake bruxism in its continuum over time in 3 sessions, each one 2 months after a previous one, with a smartphone application and test it for potential Ecological momentary intervention (EMI) effects in a population of Italian young adults.
Methods: Seventy-seven (77) healthy young adults (mean age 24.0 ± 0.8 years) used a dedicated smartphone application (BruxApp®) to record real time report on five specific oral conditions (relaxed jaw muscles, tooth contact, teeth clenching, teeth grinding, mandible bracing) that are related with the spectrum of AB activities. Participants should have been in good general health and the exclusion criteria were the presence of temporomandibular disorders (TMD) pain, as screened with the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) guidelines, and/or any documented neurological, psychiatric, sleep or systemic (e.g., rheumatologic, hormonal) diseases. Data were recorded over a 7-day period for three times, with a 2-months interval between the three observation periods to monitor AB behaviors over time and test for potential EMI effects.
Results: The average frequency of relaxed jaw muscles, as a percentage of answers, was 72.7%, 77.7% and 80.2% at the end of the first, second and third session respectively. "Teeth contact" and "Mandibular bracing" have been the most reported conditions with a mean prevalence of 23,1% and 7,2% respectively while the frequency of "dental bracing" and "teeth grinding" was less than 3%; in detail 2,6% for "dental bracing" and 0,3% for "teeth grinding".
Conclusions: This investigation provided data on the frequency of AB behaviors in its continuum and introduced its potential biofeedback effect. On one hand the data will serve as a templates for future comparisons to get deeper into the study of natural fluctuations of AB behaviors on the other hand could be compared to populations with risk/associated factors and possible clinical consequences.

Effects of Cerezen device on the psychosocial domain in patients with temporomandibular pain

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Aim: Psychosocial factors play an important role in the development and progression of Temporomandibular Disorders (TMDs) and in the chronicity of pain. Thy also negatively affect therapeutic efficacy, especially in the long term. TMD pain is usually managed with conservative and non-invasive treatments as counseling and behavioral approach, physical therapy and intraoral stabilization splint. A new innovative and non-invasive device, Cerezen, has recently been introduced to treat TMDs. It is a plastic intra-auricular device that patients should wear 23 hours during the day. It presents few contraindications and, unlike an intraoral splint, it does not influence speech.The aim of the study is to evaluate the effects of Cerezen on psychosocial domain and on TMD pain intensity in patients with TMD pain.
Methods: Cerezen device was evaluated in a prospective, 6-months clinical study including 10 adult patients of both sexes (mean ± SD age= 30 ± 10.47; 8 females, 2 males) with TMD diagnoses of myofascial pain (according to Diagnostic Criteria for TMDs) and intensity of pain > 30 on a VAS scale going from 1 to 100. All the patients received the Cerezen device and counselling. Patients completed the questionnaires of the DC/TMD Axis II and the Oral Health Impact Profile 22+1 (OHIP 22 + 1) at T0, one (T1), three (T2) and six (T3) months of use of the device. In particular, pain assessment was conducted through the Characteristic Pain Intensity Scale (CPI) and Interference Score, obtained from the Graded Chronic Pain Scale (GCPS); Jaw functional limitation scale Score (JFLS) was used to detect jaw function; depressed mood was assessed through the Patient Health Questionnaire 9 Score (PHQ-9); somatic symptoms and anxiety level were evaluated trough the Patient Health Questionnaire 15 Score (PHQ-15) and the Generalized Anxiety Disorder Scale Score (GAD-7); oral parafunctional behaviours were quantified through the Oral Behavior Checklist Score (OBC); finally, the Oral Health Impact Profile 22+1 Score (OHIP 22 + 1) was used to assess the quality of oral health. The difference among the longitudinal timepoints for each variable was analyzed using ANOVA for repeated measurements with a statistical significance accepted at $P < 0.05$

Results: All the variables analysed (CPI, Interference, JFLSglobal, PHQ-9, PHQ-15, GAD-7, OBC, and OHIP 22+1 score) showed a statistical significant reduction during the different timepoints ($P < 0.05$). In fact, they showed a statistically significant decrease between T0 and T3 (CPI, -27.5 ± 5.9; P<0.001; Interference Score, -26.3 ± 6.2, P= 0.001; JFLS, -1.3 ± 0.3, P< 0.001; PHQ-9, -4.8 ± 1.04, P<0.001; PHQ-15, -4.6 ± 1.3, P=0.009; GAD-7, -4.6 ± 1.4, P=0.015; OBC, -15.7 ± 3, P< 0.001; OHIP 22+1, -.0.64 ± 0.12, P<0.001).
Conclusion: Cerezen device seems to be able to improve psychosocial aspects in patients with TMD pain. Moreover it promotes a reduction of pain intensity and its interference on daily activities and a reduction of comorbidities and parafunctional activities. Finally, it improves depressed mood, anxiety and quality of oral life. Anyway, further studies, based on larger samples, are needed to confirm benefits of Cerezen on psychological domain, comparing the device to other conservative treatments (i.e. occlusal splint).

MRI as a diagnostic instrument to evaluate the resolution of the anterior disc displacement with reduction after orthodontic and orthognathic treatment in a skeletal II Class patient: a case report

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Aim: ADD is an abnormal relationship between the articular disc and mandibular condyle in the mandibular fossa; it can have a reduction, that is the recapture of the disc by the condyle during the opening and the closure of the mouth and it's the reason of the clicking, which in some cases can determine pain. The ADD with reduction is partially attributed to abnormal biomechanical forces applied to the mandibular condyle, which alter the shape and function of the articular tissues, and also to some occlusal abnormalities. The aim of our poster is to analyze the changes of the TMJ and the related tissues before and after a combined orthodontic and orthognathic treatment in a II skeletal class with ADD with reduction, using the Magnetic Resonance Imaging (MRI) focus on the disc position, the condylar translation and the secondary bone changes.
Methods: A patient who underwent to a combine orthodontic and orthognathic treatment with a history of Temporomandibular Disorders was evaluated with MRI 8 months before and 18 months after the maxillofacial surgery. The exam was executed with TSE technique T2- weighted for a simultaneous imaging of both the TMJs, that were imaged in coronal and sagittal planes; before the images were taken with the close mouth and then a device was used to obtain the maximal opening of the mouth. We considered the condylar translation restricted if the condylar was unable to translate until the articular eminence, while it is considered normal if the condylar head translated just beyond the posterior slope of the articular eminence and excessive if the condylar head translated beyond the articular eminence.
Results: In the beginning MRI, the right side presents a reduced thickness of the disc cartilage, compatible with an inflammation of the structure, an irregular upper edge of the condyle, a complete and symmetrical articular movement, a condylar light lateralization and a mild medial dislocation of the disc cartilage; the left side presents a reduced thickness of the disc cartilage and an anterior disc dislocation with recapture in maximal opening. In the second MRI, in the both sides there is a regular relationship between the condyle and the mandibular fossa, the disc has a physiological shape with no sign of inflammation and there isn't any sign of ADD, but the left disc continues to present a reduced thickness of the cartilage, even if it is less than previous MRI.
Conclusion: The combined orthodontic and orthognathic treatment can play an important role in the improvement of the health of the TMJ, especially in II skeletal class with posteriorized mandible, but we suggest to find out if this treatment would produce the same results in other skeletal malocclusions

Correlation between OSAS and sleep bruxism: is there a causative link? A literature review

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Aim: This study was conducted to assess if OSAS (Obstructive Sleep Apnoea Syndrome) and Sleep Bruxism (SB) are related: the aim is to recognize if there is any cause-effect association between them.
Methods: The scientific research was conducted by using Pubmed database. A combination of the following search terms was used: OSAS AND Sleep Bruxism. Original articles, literature reviews and randomized studies were included. The inclusion criteria were applied to identify studies in adult with clinical evidence of OSAS and SB. The exclusion criteria were the following: not English articles, articles not considered relevant.
Result: The research identified a total of 7 articles. Obstructive sleep apnea syndrome (OSAS) is a repiratory disorder wich occurs during sleep: it is characterized by prolonged partial obstruction of

the upper airway space (hypoventilation) and/or by intermittent complete obstruction (apnoea). The major risks problems are: craniofacial malformations, micrognathia, retrognathia, obesity, neuromuscolar diseases, which can lead to cardiovascular alteration and pulmonary hypertension. The main symptoms are: snoring, respiratory effort and intense body movement during sleep. Bruxism is a repetive jaw-muscles activity, characterized by teeth cleching or grinding and/or mandible bracing of thrusting. It has two circadian manifestations: awake and sleep-bruxism. SB is a sleep-related motor disorder characterized by involuntary phasic (rhytmic) or tonic (sustained) motor activity in the masticatory muscles during sleep; it can be associated with orofacial pain, muscle tenderness and pain, sleep disorders, headaches, sleep apnoea, tooth weat, failure of dental restorations, complications in impalnt and teeth supported rehabilitation. It has a mutifactorial etiology: psycho-social factors (stress, anxiety), malocclusion, temporomandibular disorders, sleep diturbances, parafuncional habits. In literature, it is reported that the frequency of apneic episodes and bruxism positively correlates in OSAS: SB events frequently occur during micro-arousal events consequent on apnoea-hypopnoea. In fact, studies show that 35% of tooth grinders present snoring and 16,7% present OSAS and close to 30% of OSAS patients complain of bruxism. Mechanisms of SB genesis described in the literature suggest that most SB-rhythmic masticatory muscle activity episodes are observed in relation to sleep micro-arousals associated with brain and cardiac activity. In addition, other Authors reported that SB is a common phenomenon in a group of mild OSAS patients probably being secondary to it in the majority of cases. Only a minority of SB events were not secondary to OSAS. It appears that OSAS is often accompanied by SB. Obstructive apnoea events result in oxygen desaturation and lead to arousal reactions, which are often followed by secondary SB events. Other studies show that muscle contraction in the respiratory-related orofacial muscles (e.g. tongue) often occur after apnoea and hypopnea events during sleep in patients with OSAS, moreover masseter muscle is activated in association with apnea episodes. Masseter muscles are activated more frequently after respiratory events during NREM sleep than during REM sleep, due to the presence of active inhibition during the latter sleep state. However, in literature there is not evidence cause-effect association between OSAS and SB.

Conclusion: There is not a causative link between OSAS and SB, however they share common pathophysiologic pathways and clinical features, in fact there is a relationship between OSAS and SB, suggesting that OSAS patients are at high risks of SB and conversely bruxers should be also screened for OSAS.

Temporomandibular disorders in idiopathic inflammatory myopathies (IIMS) patients. Observational study

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Aim: Inflammatory idiopathic myopathies (IIM) refer to a rare heterogeneous group of acquired muscle diseases, due to still unknown causes and characterized by an inflammatory process affecting the skeletal musculature with an increase of muscle enzymes (e.g. creatine kinase) and extra-muscular organs. Numerous autoantibodies are associated with the disease, many of which linked to different clinical phenotypes. The IIMs can be sub-grouped into dermatomyositis (DM), polymyositis (PM) and inclusion body myositis (IBM). The most accredited studies indicate an incidence of 11 new cases per million inhabitants per year, while the prevalence is 14 out of 100,000 inhabitants While PM generally affects individuals aged >18 years and IBM >50 years, DM affects all ages and , the IIMs prefer the female sex, with a female to male ratio of about 2:1. The most accredited etiopathogenesis is the intervention of an exogenous factors (infectious agents such as Coxsackie, Echovirus, Influenzavirus A and B, hepatitis B and C viruses, Herpes, rubella, Epstein-Barr Virus, retrovirus and non-infectious agents such as D-penicillamine, L-tryptophan and hypocholesterolomizing agents, interleukin-2, growth hormone, silicone or collagen surgical prostheses and exposure to dust of silica polyvinyl chloride or organic solvents) capable of triggering an immune and/or autoimmune reaction (humoral and/or cellular) with a genetically predisposed subject (carrier of the HLA-DRB1 and DRA1 antigens) leading to a muscle damage. It has recently been shown that PM, DM and IBM are associated with distinct HLA antigens, suggesting different pathogenetic mechanisms in the various subgroups of myositis. The clinical picture of PM and IBM is dominated by muscular and extra-muscular manifestations. DM presents proximal symmetrical muscle weakness and cutaneous rashes. Sometimes, patients with DM may present rash without muscle weakness and vice versa. In addition, gastrointestinal, pulmonary, renal, articular, and other connective tissue diseases have been described, such as rheumatoid arthritis, systemic sclerosis, or rarely Sjögren's syndrome. Temporomandibular disorders (TMD) are a generic

term referred to clinical conditions involving the jaw muscles and temporomandibular joint. The aim was to assess oral and temporomandibular symptoms and signs in IIM patients.
Methods: The study group included 40 patients (28 women and 12 men), 18 of whom affected by dermatomyositis (DM), 19 by polymyositis (PM) and 3 by inclusion body myositis (IBM). A group of 40 patients served as control group (CG). Signs and symptoms of TMD were evaluated according to standardized Diagnostic Criteria for Temporomandibular Disorder. Comparison of the categorical data was carried out using Chi-squared test ($\chi 2$) or Fisher's exact test, while comparison of continuous datawas performed usingthe unpaired Student's T test. Values with $p<0.05$ were considered statistically significant. Statistical analyses were performed using Prism (GraphPad software, version 6.0, San Diego, California).
Results: Arthralgia was complained by 16.7% of IIM patients versus 18.5% of CG ($\chi^2=0.06$, $p>0.05$). TMJ sounds were overlapping in the two groups: (i) click=11.1% both in IIM patients and CG ($\chi^2=0$, $p>0.05$); (ii) crepitation in 11.1% of IIM and 9.3% of controls ($\chi 2=0.1$, $p>0.05$). No significant difference was detected about deflection (9.3%, $\chi^2=1.3$, $p>0.05$). Endfeel was significantly increased in IIM group for a higher presence of muscular contracture.
Conclusion: IIM patients were more frequently affected by TMD than CG, with increase in orofacial pain and an altered chewing function.

Temporomandibular joint disc displacement treatment: a 2-year clinical and magnetic resonance imaging follow-up

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Aim: The objective was to describe three clinical cases of temporomandibular joint (TMJ) anterior disc displacement with reduction and intermittent locking treated with anterior repositioning splint (ARS) with a 2-year follow-up through clinical and magnetic resonance imaging (MRI) evaluations.
Methods: The patients were recruited at the Orthodontic Program of the University of Campania Luigi Vanvitelli, Naples, Italy. The patients were subjected to functional examination, including maximum opening, left and right laterotrusive movement to reveal range of motion in each direction, and palpation of posterior and lateral aspects of the joint. TMJ MRI scans of the mouth opening and maximum intercuspation were obtained by means of a 1.5 Tesla super-conductive MR system. To design the ARS, the clinician guided the patient's mandible forward until disc reduction and the click disappeared. The appliance was worn full time for about 6 days a week for an average of 9 weeks when the clinical signs and symptoms almost have disappeared, then was worn only at night. The ARS was gradually converted to a nonrepositioning design. Clinical records and MRI were obtained at a 2-year follow-up to compare the condyle/disc position and morphology. Below the detailed description. Case 1 reported pain and sounds during movement, final clicking (22mm), restricted opening (26mm) with soft end-feel, laterotrusive movement (left 10mm, right 4mm) suggesting left condyle impairment. MRI confirmed an anteriorized left disc position. ARS therapy and transcutaneous electrical nerve stimulation was prescribed to resolve muscular contraction. Case 2 reported jaw pain and sounds limited opening (21mm) with hard end-feel. No clicking was observed during left condyle movement and normal translation on the other side. The diagnosis was disc displacement with intermittent locking. The closed lock was reduced via jaw manipulation to can obtain MRI scans that confirmed an anteriorized left disc. Case 3 reported mandibular pain and sounds, limited opening (22mm), hard end-feel and deflection. No clicking in the right TMJ was found, left TMJ normal translation and right laterotrusive was compromised (3mm). MRI scans were obtained after jaw manipulation and confirmed anteriorized right disc.
Result: In Case 1, post-treatment MRI showed a corrected disc position on the right side, whereas remained anteriorized on the left, and thickened tissue in the retrodiscal zone. In Case 2, the follow-up images showed the discs still anteriorized, but increased thickness on retrodiscal zone. In Case the MRI after 2 years showed retrodiscal fibrous modification. Thus, in the three patients after 2 years pain and sound were reduced and mouth opening was normalized without any deviations and deflections. MRI showed partial disc capture and thickening of the retrodiscal tissue including extra fibrous tissue, resulting in a pseudodisc.
Conclusion: Management of disc displacement becomes necessary when pain or dysfunction are present. Treatment using a disc repositioning device can stimulate tissue fibrosis and the formation of a pseudodisc. MRI is the gold standard for diagnosis and follow-up of disc displacement. Further studies with a wider sample are needed to monitor over time the disc-condyle relationship.

Variations in athletic performances with occlusal splint: a randomized clinical trial

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Aim: Clinical experience and scientific research hypothesized symptomatic connections between the elements constituting the postural chain, [Manfredini et al, 2012] particularly between the cranial-mandibular structures and the cervical-thoracic-lumbar spine with occasional associations to the sacred girdle, the pelvic girdle, hip joints, knees and toes. The maintenance of good postural balance between all these segments allows the human body to maintain a feasible and ergonomic energy efficiency.[D'Ermes et al, 2012] This postural balance facilitates the dynamic functions which is particularly important in the presence of structured subjects and qualitatively active persons such as high-level competitive athletes.[Hrysomallis et al, 2011]. The aim of this research is to demonstrate a possible correlation between dental occlusion and sport performances in track and field athletes.
Methods: 16 track and field athletes were enrolled for the study and were randomly divided in three groups: Untreated control group, Placebo group (with a lower plaque without occlusal coverage) and Treated group (with occlusal splint). Changes in sprint and jump performance were assessed on a weekly basis for 5 consecutive weeks. All participants performed the countermovement jump (CMJ), the drop jump (DJ), the 10m and 30m sprint tests.
Result: Mean differences between Control group and Placebo group and between Control group and Treated group showed no statistically significant results. However it was possible to observe a clinical improvement of measurements obtained, especially for CMJ, 10m and 30m sprint tests. Regarding DJ test no variation neither statistical neither clinical was observed.
Conclusion: According to the statistical analysis, the correlation between the professional athletic performance and the use of occlusal spint is not significative. However, athletes with occlusal splint showed better results compared to athletes without occlusal splint in vertical jump (CMJ) and sprint performance.

Clinical correlation between bruxism and enamel wear

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Aim: Dental wear is one of the biggest problems in patients nowadays, especially for patients who are suffering from bruxism. Dental wear prevention is crucial if problems such as sensitivity and poor structural strength are to be avoided. The aim of this in vitro study was to evaluate the possible connection between dental abrasion and bruxism, showing how the tooth surfaces changes over time in patients with teeth in healthy conditions. The null hypothesis is the absence of enamel wear in healthy teeth in vivo in bruxist patients.
Methods: A group of ten young bruxist women and men was selected. The diagnosis of the group was made with Bruxoff Technology for a total of three nights. At first, the machine needs to be set and adapted to the individual patient recording of three maximum contractions that will be taken as a reference point.
The system is based on the joint analysis of the EMG of the masseter muscles and the ECG for the heart rhythm, by means of special electrodes, that allowed us to identify bruxist patients by calculating the bruxism index, which shows the number of episodes per hour of sleep, with the software Bruxmeter. The criteria of inclusion were: physiological occlusion, healthy teeth, absence of systemic disorders and absence of orthodontic therapy in the active phase. Each participant, once informed of the content and nature of the study, was enrolled. Intraoral scans of the dental arches were performed with Cerec Omnicam (Dentsply Sirona USA) in order to record an individual initial condition (t=0). The patients were then recalled after one year to undergo a new oral scan (t=1). The obtained STL files were processed and superimposed with the use of Geomagic Qualify to divide the analysis of the complete arch into anterior and posterior sectors. The degree of wear was then calculated between the initial scan and the one-year

interval scan using Geomagic Control X. The data were statistically analyzed with a one-way anova test with established significance for p less than 0.05.
Result: The average wear expressed in Micron was 15.18 for the upper arch and 12.25 for the lower arch, in particular for the front sector of 26.7 and 16.2 respectively, while for the rear sector the average wear was 13.87 and 10.64. The obtained values were greater than those reported in the literature of physiological occlusal wear, especially anterior sectors suffered more than posterior in both arches. 3D volumetric maps showed the areas of enamel that were most affected by wear.
Conclusion: The initial null hypothesis has been rejected due to the obtained results, since enamel wear occurred in selected patients. The anterior teeth, due to the eccentric mandibular movement of bruxist patients, showed the greatest enamel wear. Furthers studies are necessary to confirm the results.

Mandibular asymmetry and TMD: a retrospective study

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Aim: The aim of this study is to assess the effectiveness of orthodontic or orthognatic therapy to treat asymmetry and to evaluate if a reduction of the asymmetry could reduce temporo-mandibular disorders (TMD).
Methods: We analyzed 24 patients: 21 female and 3 male with average age of 26.5 (±14). Minimum age was 11 y.o. and maximum was 51 y.o. All patients had TMD before orthodontic/orthognatic treatment. The examination has been done according to DC/TMD guidelines. This analysis has been done before and after treatment. To examine the asymmetry, we used 15 lines on postero-anterior cephalogram (PA), 8 for linear measurements, 2 for angular measurements and 5 as construction lines. To find the correct midline we used: ZL-ZR: passing through frontozygomatic suture left and right; CG: crista galli; FH: Frankfurt plane, passing through porion and orbital point. We obtained: MP: midline plane, starting from Crista galli and perpendicular to ZL-ZR and FH; To evaluate the maxilla and maxillary canting, we used: OP tilt: the angular measurement between FH and occlusal plane (the horizontal line bisecting upper and lower first molars of each side of the mandible); ZL-JL, ZR-JR: connecting frontozygomatic suture and jugal point of each side. To evaluate the mandible, we used: Co-Go: connecting condilion-gonion of each side to evaluate ramus high; AG/GA-MP: passing through antegonial notch of each side and midline to evaluate mandibular body width; AG/GA-Me: connecting antegonial notch of each side and menton; Angle between Me-ANS-MP: the angle formed between the midsagittal plane and the line through anterior nasal spine and menton. Patients were divided, according to their asymmetry, in five groups: Group 0: relative symmetry; Group 1: mandibular body asymmetry, lateralization of the mandibular body only; Group 2: mandibular body and ramus asymmetry with menton deviation to the shorter ramus side; Group 3: difference in ramus heights with menton deviation to the longer ramus side, gonion contour more prominent on the larger mandibular side and reverse maxillary canting; Group 4: C-shape asymmetry, the smallest ramus and the occlusal plane canting on the same side of the asymmetry.
Result: Before treatment, patients' distribution was: Group 1: 33,3%; Group 2: 16,7%; Group 3: 20,8%; Group 4:29,2%. After treatment: 45,8% of the patients were relatively symmetric in Group 0. 29,4% reduced their asymmetry and only 21% of the patients stayed in the same group as before the treatment but the emimandibular discrepancy was lower. On the other side: 75% of the patients had no TMD after the treatment, 20,8% of the patients had no pain symptoms with a diagnosis of disc displacement with reduction. Only 4,2% had light muscular tensions.
Conclusion: Our data confirm orthodontic therapy has led to a reduction of asymmetry in 23 patients out of 24 (95,8%). We also find a reduction of TMD signs and symptoms after the treatment. According to these results we can associate mandibular asymmetry and deflecting malocclusions to TMD.

Comparison between ultrasound and magnetic resonance of the temporomandibular joint in juvenile idiopathic arthritis: a comprehensive review

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Aim: Juvenile idiopathic arthritis (JIA) is the most common chronic rheumatic disease in childhood and adolescence. The prevalence of JIA is reported as 0.07- 4.01 per 1000 children with an high frequency in females (F:M=2:1). It is an autoimmune chronic inflammation with not well known etiology. It can affect one or more joints, with symptoms persisting for more than six weeks and onset before 16 years of age. The involvement of temporomandibular joint

(TMJ) ranges from 17% to 87% depending on subtype, diagnostic criteria and ethnicity. Typical craniofacial alterations can occur in patients with JIA as mandible micrognathia and retrognathia, skeletal open bite, various types of malocclusion and, in the case of unilateral joint involvement, facial asymmetries. The aim of this review was to evaluate the sensitivity and specificity of ultrasound (US) compared to magnetic resonance imaging (MRI) for early diagnosis of TMJ arthritis in JIA patients.
Methods: An electronic search was performed via PubMed/Medline, Ovid and Embase databases using the following keywords: Temporomandibular joint, Juvenile Idiopathic Arthritis, Magnetic Resonance Imaging, Ultrasound. Titles and abstracts obtained from the search were screened by two reviewers. To be accepted for eligibility review, studies had to compare US and MRI in JIA patients and had to include at least 10 patients. Case report were excluded. All studies that appeared to meet the criteria were retrieved as complete articles. For those articles accepted for final eligibility review sensitivity and specificity of diagnosing acute changes (joint effusion, synovial thickening) and chronic changes (any bony irregularities) were assessed.
Result: Three prospective studies met the inclusion criteria. Weiss et al. 2008 investigated acute and chronic TMJ arthritis in 32 JIA patients using a 12.5-MHz probe compared to MRI. Joint effusion and disk thickening were considered as acute arthritis, and for this condition the study found a sensitivity of 0% and an agreement of 23% when comparing US to MRI. Whereas condylar alterations were considered as chronic TMJ arthritis with a sensitivity of 40.9% and an agreement of 50% between US and MRI. Muller et al. 2009 evaluated 30 patients with JIA using 12-MHz probes with MRI comparison. The US showed a sensitivity of 33% and specificity of 83% in detecting the combined acute and chronic conditions unlike Weiss' study that assessed sensitivity and agreement of acute and chronic signs separately. Kirkhus et al. 2016 evaluated joint effusion in 55 patients with JIA using 12–18-MHz probes. The cut-off for joint effusion was a 1.2 mm capsule. This study found a sensitivity of 72%, a specificity of 70% and a low agreement between US and MRI. The main limitation in these three studies was the absence of a control group. Due to the wide variety of parameters being studied - condylar changes/deformity, joint effusion, etc. - and the differences in what are considered acute and chronic changes, it was difficult to compare the results.
Conclusions: Although a moderate correlation in early diagnosis of JIA through TMJ evaluation between US and MRI was found, further studies comparing the two diagnostic methods with wider samples and controls are needed. Nowadays, MRI remains the best tool for the detection of acute and chronic arthritis in the TMJ of JIA patients, however the US may be considered less invasive, low-cost diagnostic technique, better accepted by children.

A new polyamide oral device for the treatment of patients with OSA

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Aim: Obstructive sleep apnea syndrome (OSAS) is a common disorder with significant morbidity and mortality. Many studies showed a link between bruxism, TMD, and OSAS, so the dentist can play an important role in recognizing and treating OSAS. We aimed to confirm the efficacy of a new mandibular advancement device in polyamide in patients with OSAS, and its consequences on their quality of life.
Methods: A total of 26 patients came to our attention. Adult patients of any age were included in the study, having as an only prerequisite the anamnestic relief of one or more of the following symptoms: excessive fatigue and daytime sleepiness, repeated awakenings during the night, night snoring reported by a partner. Many patients came to our attention after being sent by professionals specialized in different branches of medicine. OSAS patients were included in our study and treated with a polyamide MAD. Their AHI values were measured before and after treatment, and each patient completed ESS and TSS questionnaires before and after therapy to evaluate changes in their quality of life. Some of these subjects had bruxism or TMD for which they had a Michigan bite. These patients were asked to perform polysomnography with and without the Michigan bite, to evaluate the effects on the apnea index.
Results: after MAD therapy, the average AHI value recorded by new polysomnography decreased from 16.86 ± 9.93 (interval 1.5 - 39.7/h) events/h, to 5.69 ± 5,85 (range 0.4 - 19.3/h) event/h; the median from 15.4 events/h dropped to 3.4 events/h. The average scores of the ESS and TSS questionnaires decreased from 9.923 to 3.692 and from 8.692 to 2.154, respectively, reflecting an improvement in the patients' quality of life. Being a cross-over study, in which we had the same sample evaluated before and after therapy, and having a normal distribution of the data, these were statistically analyzed with a Student test for paired data, corrected with the Bonferroni

system. The results (alpha error) were considered statistically significant for a p-value <0.05. About the sample size, a beta error test was performed, which must have been greater than 80%. Despite the many advantages of recent mandibular repositioning devices, such as Narval, it is not always possible, with the only mechanical therapy that can be prescribed by dentists, to completely resolve the patients' night apneas. The possible presence of comorbidities (obesity, diabetes, overlap syndrome), insurmountable anatomical and functional factors, familiarity, and more, should be taken into consideration from the beginning of the study.
Conclusions: the polyamide MAD used in this study turned out to be a good alternative solution to CPAP. The dentist plays an important role in the interception and possible management of patients with OSAS, in collaboration with other sleep medicine specialists.

Pharyngeal airway passage (PAP) evaluation with cbct in patients treated by andresen activator

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Aim: In patient with sleep-disorders breathing (SDB), the position of the mandible is often retruded and this can cause narrowing of the Pharyngeal Airway Passage (PAP) causing nocturnal complications such as snoring, Upper Airway Resistance Syndrome (UARS) and Obstructive Sleep Apnea Syndrome (OSAS). Many studies reported improvement of PAP dimension after following functional appliance therapy in children and oral appliance therapy in adults. Traditionally, the effects of functional appliances are evaluated using casts and 2D radiographs. Cone-beam computed tomography (CBCT) provides more accurate and reproducible imaging for assessing all craniofacial skeletal structures. The aim of this study is to assess the changes to pharyngeal airway passage (PAP) after treatment with class II Andresen appliance in class II growing patients with Obstructive Sleep Apnea Syndrome (OSAS), evaluated through CBCT.
Methods: Forty patients with a class II malocclusion in the age range of 9 to 14 years (17 females between 8-10 years, and 23 males between 10-14 years) with mandibular retrusion (SNB<80°) and OSAS were considered. A CBCT was taken before treatment (T0) and a second one was taken after 16 months (T1). The Scans were reconstructed with a 3D image segmentation software (Mimics 11.1 Materialize, Leuven Belgium). Pharyngeal Airway Passage was evaluated with the following linear parameters: DOP, PAS, DHP, MP-H, PNS-P. In particular, DOP is a plane between P (tip of soft palate) and MPW (Middle Pharyngeal Wall); the Posterior Airway Space (PAS) was evaluated between the base of the tongue and the posterior pharyngeal wall using a line drawn from point B through Gonion; DHP between V (vallecula) and LPW (lower pharyngeal wall); MP-H is important to evaluate the position of the hyoid bone, it was determined by a line perpendicular to the mandibular plane (Gonion-Gnathion) through the hyoid; and the soft palate was evaluated by a line constructed from PNS (Posterior Nasal Spine) to P.
Result: The changes to the sagittal position of the mandible (SNB angle) and ANB were significant. Also, the changes to PAS was significant. The DOP improved by 2.43 mm. MP-H decreased significantly by 4.93 mm indicating that the body of the hyoid bone moved superiorly due to mandible traction. The length of the soft palate was improved. The follow-up polysomnography confirmed improved breathing in these patients.
Conclusion: Airway dimension assessment through CBCT imaging is more appropriate, reproducible and highly accurate than other methods used for the evaluation of the PAP dimension and it is a valuable and reliable diagnostic tool. The sagittal dimension of PAP was increased secondary to the forward positing of the tongue caused by the anterior relocation of the mandible. Class II correction by functional appliances during childhood might help to eliminate the adaptive changes in the upper airway and predisposing factors to OSAS. The data suggest that in addition to control polysomnographic examinations, orthodontic treatment can be considered for patients with obstructive sleep apnea/hypopnea.

Sport injuries, treatment and prevention

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Aim: Urgent intervention on a direct trauma on tooth number 21, dislocated in an antero-palatal position. The main purpose of the emergency visit is to put back the tooth in its normal position within the dental arch. Another secondary purpose is allowing the athlete to go back to competitions as soon as possible, thanks to an adequate protection of the dental arches. Objective examination: the patient, a 15-year-old female in good health, show no signs of parafunctions in her the medical history. She arrives two hours after the

traumatic event, which occurred during a basketball game. The patient feels pain at compression, there could be a greenstick fracture of the palatal cortical, but there are neither bleeding nor injuries. We take a pulp vitality test on tooth number 21 with crio spray, and there is a positive response to the cold thermal stimulus. We find a lacerated and contused wound in soft tissues.
Methods: under anaesthesia, the tooth is manually put in its initial position. Then, we block it with elastic splinting, using orthodontic and composite thread. The patient undergoes an electromyographic evaluation which assesses the absence of anterior overloads and a general balanced occlusion. No manifest signs lead to suspect episodes of nocturnal bruxism. After covering the splinting with orthodontic wax, we take the arches' alginate imprints. It is also important to record the facial arch and the inter-maxillary connections with Easy Bite. Everything is then sent to the laboratory, which will create a customised mouthguard after assembling the models on an individual articulator.
Materials: the material used for the customised mouthguard is a thermoplastic disc with hardness over 80 Shore. Before receiving the mouthguard, the patient undergoes a careful evaluation of the mucous compressions, which is necessary to thin the material wherever it causes ischemia. The mouthguard is also accurately balanced thanks to red and blue 200µm articulating paper, used to develop an occlusal pattern, resembling the Michigan plaque, with back punctiform contacts and canine guides. Then, we test the balancing with Teethan, documenting the absence of interferences on the functional parameters recorded by the instrument. Eventually, together with the mouthguard the athlete receives instructions about hygiene maintenance protocols and mucous protection through the application of hyaluronic acid.
Conclusions: the recovery of the tooth and the following high-level protection carried out according to the SIOS standards not only promote the optimisation of the athlete's health, but they also allow an immediate return to sporting activities without fear of further traumas that could damage the newly-healed tooth.

Electromyographic support to the occlusion balancing in a disfunctional patient

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Aim: According to the literature, the prosthetic approach to aesthetics should depend exclusively on aesthetic and technical purposes. However, this does not apply to a low percentage of patients with poor counterbalancing capacity or frankly symptomatic patients, who must undergo a preliminary clinical and instrumental functional analysis. In these cases, the balancing of the occlusion should take into account both the distribution of contacts and guides on the occlusal plane and the response of the mandibular elevator muscles to our treatment, to prevent the appearance or exacerbation of tension or joint overload symptomatology. Hereinafter, a clinical case related to the topic.
Method: a bruxist patient with extensive dental abrasions, mild previous myogenic algic symptoms (Axis 1), showing neck stiffness in osteopathic treatment and involvement of Axis 2 related to somatised emotionality at an oral level. The reported symptomatology has affected the daily habits of the patient. The rehabilitation of the upper aesthetic area is carried out with zirconium-ceramic crowns and disilicate veneers. The occlusal balancing is complicated by the presence of different intercuspidation relationships between the two arches, so the best practise is to associate the clinical balancing with articulating paper and a Teethan electromyographic evaluation of the muscular response to the occlusal load.
Results: the clinical evaluation, made with red and blue 200µm and 65µm articulation paper, highlights a different arrangement in the pre-contacts compared to the one set in the previous appointment. To investigate the functional correlations between the reported symptomatology of the patient and the occlusal balancing, we perform a surface electromyography with Teethan method, which shows an abnormal recruitment response of the masticatory muscles; the instrumental parameters suggest torsion and mandibular advancement. The balancing is then performed following the clinical and instrumental guidelines, until the patient's comfort is improved and the electromyographic report is normalised. It is undeniable that the occlusal loads, analysed with articulation paper, are better distributed. The patient's occlusal center of gravity tends forward, so much so that is overloads the recently positioned veneers. A Michigan plaque is then applied to protect the patient and the prosthetic rehabilitation.
Conclusions: Surface electromyography has proven to be a valid support in balancing the occlusion, allowing the treatment of complex cases that otherwise would present a higher risk of failure due to dental or muscular overload.

Implantology

12-year follow-up of single implant restorations: biologic considerations

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Aim: The aim of the present study was to identify the peri-implant conditions (bleeding on probing (BOP), pocket probing depth (PPD)) and marginal bone loss (MBL, marginal bone level change between follow-up and occlusal loading) around screw-retained single crowns on bone-level im-plants (EVEN, Mech & Human, Albignasego, Italy).
Methods: The study was a retrospective cohort study with up to 12 years (mean 6.5 years) follow-up. Patients with single screw-retained crowns were included. Implant survival, BOP, PPD, MBL, biologic complications (peri-implant mucositis and peri-implantitis) were evaluated. Technical complica-tions such as prosthetic screw loosening were also noted down during recalls.
Results: 42 patients with a total of 56 implants were included. The implant survival rate was 98.21%. Peri-implant mucositis was moderately frequent (30.35%). Two patients (with three implants total, 5.35%) were diagnosed with peri-implantitis: conservative treatments were first performed, but in one case we were unable to maintain the fixture in place. Given a score to four areas of the implant restoration, we obtained an average value of 3.89mm for PPD and we found 72/224 bleeding sites (BOP 32.14%). Mean MBL was 1.18mm, ranging from 0.24 to 5.80 (median 1.09mm). Prosthetic screw loosening was found in 2 restorations (3.57%) at follow-up visit.
Conclusion: High implant survival rate was achieved. Screw-retained single crowns on bone-level implants showed healthy peri-implant tissues up to 12 years after functional loading.

Bone platform switching: a restrospective analysis of 171 consecutive implants

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Aim: The aim of the present study was to evaluate the peri-implant conditions (bleeding on probing (BOP),

pocket probing depth (PPD)) and marginal bone loss (MBL, marginal bone level change between follow-up and occlusal loading) around screw-retained implant-supported fixed dentures (IFDs) on bone-level implants (EVEN, Mech & Human, Albignasego, Italy).

Methods: The study was a retrospective cohort study with up to 12 years (mean 5.8 years) follow-up. Patients with screw-retained IFDs were included. Implant survival, BOP, PPD, MBL, biologic complications (peri-implant mucositis and peri-implantitis) were evaluated. Technical complications such as pro-sthetic screw loosening were also noted down at recall appointments, during prosthesis removal procedure for hygienic purposes.

Results: 32 patients with 171 implants were included. The implant survival rate was 100%. Peri-implant mucositis was frequently observed (37.42%), while peri-implantitis affected 14/171 implants (8.18%) in 10 patients. After probing the mesial, buccal, distal and lingual aspects for each implant supporting the restorations, we measured a mean PPD of 3.78mm; also, we noticed 35.23% blee-ding sites (BOP). The average MBL was 1.03mm, ranging from 0.35 to 4.86 mm.

Conclusion: High implant survival rate was achieved in the described clinical condition. The investigated bone-level dental implants showed good behavior in terms of MBL, but some patients were more prone than others to develop peri-implantitis in screw-retained IFDs configurations.

Assessment of the outcomes of maxillary sinus floor elevation and concomitant implant placement with bidimensional vs tridimensional radiographic exams

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Aim: to evaluate the level of agreement between peri-implant measurements performed on 2-dimensional (2D) and 3 dimensional (3D) radiographs taken 1 year following implant placement and concomitant sinus floor elevation.

Methods: Data from a bi-center, parallel-arm, single-blind, randomized controlled clinical trial comparing the outcomes of transcrestal and lateral sinus floor elevation (tSFE and lSFE, respectively) were collapsed into a single dataset. At 12-month post-surgery visit, 2D exam (periapical radiograph taken with a paralleling technique using a Rinn film holder) and a 3D exam (CT or CBCT) had been performed. 2D exams were digitized at 600 dpi resolution, while 3D exams were saved as DICOM files. The following study parameters were considered: (i) percentage ratio between the linear length (in mm) of the implant surface in direct contact with the peri-implant radiopaque area (native bone + newly formed bone) and the linear length (in mm) of implant surface, as assessed at mesial, apical and distal aspects of the implant on 2D exam (totCON%2D) or obtained as average of the measurements from 179 CT/CBCT sections (totCON%3D); (ii) height of the radiopaque area apical to the implant apex as assessed at the mid-portion of the implant on either 2D or 3D exam (aGH2D and aGH3D, respectively). Data were expressed as median and interquartile range. 2D and 3D data were compared using Wilcoxon test, and Pearson's or Spearman's rank correlation was performed. totCON% was the primary outcome variable.

Results: The per protocol (PP) study population consisted of 50 patients. Thirty-seven patients (74%) presented totCON%=100% in both 2D- and 3D-exams, while the other patients reported a median difference of 1.8% [IR: -16.9, 24.0] (p= 0.552) between totCON%2D and totCON%3D. totCON%2D and totCON%3D showed a significant, positive correlation (r= 0.422; p= 0.002). aGH2D and aGH3D were 2.63 mm (I.R: 1.04-6.30) and 2.25 mm (IR: 0.60-7.00), respectively (p= 0.629), with a difference between aGH2D and aGH3D of -0.10 mm. aGH2D and aGH3D were significantly, positively correlated (r= 0.889; p<0.001).

Conclusions: The 12-month outcomes of sinus floor elevation as assessed on 2D (periapical radiograph) or 3D exams (CT or CBCT) are highly consistent, thus suggesting that 2D exam should be preferred to 3D exam for the radiographic follow-up of this intervention.

Volumetric dimensional changes of heterologous bone graft in maxillary sinus augmentation: preliminary study

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Aim: Although autologous bone grafts still represents the gold standard in bone augmentation procedures, heterologous bone substitutes are successfully used to overcome autologous tissue limited availability, reducing morbidity, operating time and costs. The aim of the present study is to evaluate volumetric dimensional changes of a xenograft 12 months after maxillary sinus augmentation with lateral approach.
Materials and Methods: Four patients requiring an implant rehabilitation of the posterior maxillary were referred to our Oral surgery department. All patients presented an insufficient alveolar bone height (residual crest height ≤ 4 mm) therefore needed a maxillary sinus augmentation. Lateral sinus lift was performed using a non-sintered xenogenic bone substitute (Creos™ Xenogain, Nobel Biocare, Switzerland), characterized by micro- and interconnected macropore structures. The graft presents a unique processing procedures aimed to remove the bovine proteins and lipids and a calcium phosphate ratio that reflect the composition in human bone. For the processing of the biomaterial, a temperature below 600 degrees is exploited, with the advantage of conserving the carbonates of the heterologous bone and of preserving the crystalline structure of the granules, thus promoting adhesion and cellular interactions. To prevent the migration of undesired soft tissue into the bone augmentation site a resorbable collagen membrane was placed on the area of bone window. All the patients underwent a maxillary CBCT preoperatively (T0), in the immediate post-operative period (T1) and 12 months after surgery (T2). The volumetric dimensional changes was evaluated by means 3D Superimposition Tecnique with a dedicated software (Rhinoceros 4.0, Robert McNeel & Associates) and with CAD reconstructions of graft bone volumes, was possible to evaluate the amount of regenerated bone volume.
Results: The average volume in the immediate post-operative period was of 1,170 cm3 and the average volume one year after the surgery was 1,072 cm3. Thus the average volumetric dimensional changes in cm3 and in percentage was respectively -0,097 cm3 and -8,106 %. The results obtained demonstrate how the heterologous bone graft shows a mechanical stability such as to be able to maintain the space necessary to favor a bone regeneration.
Conclusion: The bovine bone substitute under study was confirmed as a valid alternative in the context of lateral sinus lift. Furthermore the volumetric variation of the graft over time was comparable to the other xenografts and less than the dimensional contraction suffered by the autografts.

Influence of implant threads morphology on primary stability: a prospective clinical study

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Aim: The purpose of the present study was to evaluate the primary stability of two implants with the same micro- and macro-morphology but different thread designs and investigate the relation of implant threads design with clinical outcomes over a one-year period.
Methods: Fourteen patients (8 males and 6 females, mean age: 61.7 years) needing a partial rehabilitation with a delayed loading approach (DEL group: 9 patients) or a full-arch rehabilitation treated with immediately loaded fixed prostheses supported by 4 implants following the Columbus Bridge Protocol (CBP) (IL group: 5 patients) were included. In each patient at least one SY (implant with standard threads) and one SL implant (implant with augmented depth of the threads) were randomly inserted. Primary outcome measures were number of threads exposed at a torque of 30 Ncm and 50 Ncm and final insertion torque. Secondary outcome measures were implant and prosthetic failure, peri-implant bone resorption and periodontal parameters: bleeding on probing (BoP), plaque index (PI), and probing depth (PD) evaluated at 3, 6 and 12 months of healing.
Results: Nineteen SY and 19 SL implants were inserted in 14 patients. Twenty implants (10 SL, 10 SY) were inserted in the IL group, while 18 (9 SL, 9 SY) were inserted in the DEL group and followed-up for 12 months. No patients dropped out. No implants and prostheses failed. No biological complications were identified. No significant differences were found between SY and SL implants comparing the number of exposed threads when inserting the implant with a torque insertion of 30 N (T student test p=.142 and U test p=.164). At 50 N no threads were visible in either groups. Final torque insertion values were higher for SL (mean: 48.42 Ncm) compared to SY implants (mean: 43.42 Ncm) without a statistically significant difference. All the implants showed good clinical outcomes at the 1-year-in-function visit.
Conclusion: The outcomes of the present research highlighted that dental implants with an increased depth of the threads presented higher insertion torque values without a statistically significant difference compared with standard threads. No differences in bone resorption over time were noted among the two implant morphologies. A difference in insertion torque (even if not statistically significant) was found with higher insertion torque values for SL implants with a larger thread depth. Deeper threads might be useful in implant sites with low bone quality and in immediate loading rehabilitations when the obtainment of primary stability is a fundamental prerequisite.

Costumized bone regeneration with novel titanium mesh

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Aim: The biological principles that causes an alveolar bone resorption are normally the teeth loss associated to the bundle bone resorption. Mild or moderate alveolar resorption are normally treated by means of GBR technique with bone substitutes and membranes. The severe resorption usually due to a traumatic event or subsequent to implant failure can be treated with special device as titanium mesh. The aim of this case series study was to evaluate the clinical outcome of a novel 3D titanium mesh for the customized bone regeneration (CBR), either for the vertical and horizontal ridge augmentation.
Methods: Ten patients were treated in the OMF Surgery and Dentistry Of the G. Rossi of Verona. The inclusion criteria were as follows: the presence clinically and radiographically of horizontal, vertical or mixed bone defects of the maxillary bones; the presence of residual bone <6 mm in height and <4 mm in width for the insertion of at least one standard- size implant in a correct position from the prosthetic point of view; absence of local or systemic contraindication to surgical treatment; replacement of the implants 8–12 months after bone regeneration. Five patients with partial edentulism had already received prosthetic rehabilitation while about the other patients, three were treated at the upper jaw and two patients at the lower jaw, for a total of twelve regenerated alveolar defects. The material used for the GBR was 50% autologous and 50% heterologous bone (Bio- Oss®, Geistlich Biomaterials, Wolhusen, Switzerland). To protect the titanium mesh a collagen membrane was positioned (Bio- Gide®, Geistlich Biomaterials, Wolhusen, Switzerland). For the flap design the poncho technique was adopted which allows a reduced exposure rate according to literature.
Results: Post-operative healing in the following 8–9 months was regular for all patients, obtaining results that allowed subsequent implant placement. In only one case there was a slight exposure of the membrane which however did not compromise the healing process of the graft, but partially reducing the amount of regenerated bone. The exposure was treated with dressings and rinses with chlorhexidine- based mouthwash. Premature removal of the titanium mesh after exposure was not necessary, as it did not compromise the clinical outcome of the procedure. From a radiographic point of view (CBTC) we obtained good results both for the horizontal and vertical augmentation, respectively an average horizontal gain of 3.6 mm and an average vertical gain of 5.2 mm. Thanks to poncho technique we suffered only 10% of the grid exposure. A long follow- up will be needed to draw definitive conclusions.
Conclusion: The results show that this customized bone regenerative surgery (CBR), with this 3D titanium mesh, represents an alternative in GBR: the manipulation of the device is unnecessary, making immediate the placement of the mesh without adjustments and facilitating the filling operations of the bone chips. The flap design and the closure free of tension remains the critical phase of the technique. Although more demanding for the surgeon, the poncho technique eliminates at the best the presence of harmful stresses.

Oncological guided implantology: case series

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Aim:: The purpose of this study is to evaluate a new therapeutic option to treat patients who underwent radiation therapy, which represent a major challenge in the field of implant rehabilitation due to the effects that radiation therapy induces in the oral cavity: in fact, these patients are likely to develop hyposalivation, mucositis, reduced angiogenesis and vessel damage, delayed tissue healing and oteoradionecrosis. Computer guided implantology is an innovative technique that is often used to rehabilitate these patients because it allows considerable advantages, including a better diagnostic phase, which allows to visualize in a more precise way the bony bases of the patient that are often reduced or altered, and the possibility of performing minimally invasive surgery "flapless" that allows a better and faster healing of the surgical site, low probability of developing infections and greater implant success. In irradiated patients the implants positioning must be performed taking into account the radiation dose received, which could be different in the different maxillas areas. In fact, the risk of developing osteoradionecrosis and implant loss is concrete in areas that have absorbed more than 50 Gray and very likely (and therefore not feasible) in areas that have absorbed over 74 Gray. It is therefore clear that, in situations where the dose of Gray is between 50 and 74, we must try to find the best position available with less Gray absorbed. An innovative technique has been developed to combine the benefits of IMRT and guided implantology: using the MIM software it's possible to superimpose

the images of the radiation-planning CT scan with the CBCT scan of the areas of interest for implant rehabilitation to find the optimal area to insert the implants, both in relation to the absorbed dose of Gray and in relation to residual bone bases.
Methods: 5 patients were evaluated with a diagnosis of HNSCC who had received radiotherapy as part of their oncologic treatment, for an oral prosthetic rehabilitation. Selection criteria were: good general health, age between 18 and 72 years, absence of metastatic disease or local recurrence, disease-free interval of at least 18 months. A CT Cone Beam was realized for all five patients. On the basis of the CTs, the most suitable implant placement program was created in every case. Head and neck radiation planning CT scan with intravenous contrast had been acquired for each patient, one week prior to CRT. A dose-accumulation co-registration was performed using planning CT and treatment doses structures. Afterward a new rigid co-registration was performed adding Dental scan images with the MIM software.
Results: The new imaging method that we propose was able to provide information about radiation isodoses received in the planned osseointegrated implants positions. In every case of this study, a modification of the implant placement program was necessary. Following this method was always possible to evaluate the safe site for the implant placement, avoiding the most irradiated areas.
Conclusion: This study explains a new method, for the first time reported in the literature, to program implant placement and it has proven to be safe, fast and easy to obtain, to apply and to consult. This procedure could easily become a new routine measure in rehabilitation plan of patients who undergo radiation therapy of head and neck areas.

Immediate, early (6 weeks) and delayed (4 months) post-extractive single implants: 3-year results from a randomised controlled trial

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Aim: To compare outcomes of single implants placed immediately after tooth extraction with implants placed 6 weeks after (early placement), and with implants placed after 4 months of extraction (delayed placement).
Methods: Two hundred and ten patients requiring one single implant-supported crown to replace a tooth to be extracted were randomised to receive immediate post-extractive implants (70 patients), early implants at 6 weeks (70 patients), and delayed implants after 4 months of healing (70 patients) according to a parallel group design. Implants inserted with at least 25 Ncm torque were loaded after 4 months, whereas those inserted with less than 25 Ncm were loaded after 6 months. Temporary crowns were to be replaced by definitive ones after 4 months. Outcome measures were crown and implant failures, complications, peri-implant marginal bone level changes, aesthetic, and patient satisfaction recorded by blinded assessors.
Results: Thee years after loading, five (7.1%) patients dropped out from the immediate, nine (12.9%) from the early, and eight (11.4%) from the delayed group. Five implants (9.2%) failed in the immediate, four (6.6%) in the early, and one (1.6%) from the delayed group (P = 0.282). Eleven patients of the immediate group, 12 of the early and eight of the delayed group were affected by complications (P = 0.596). Mean peri-implant marginal bone loss was -0.33 ± 0.22 mm at immediate, -0.43 ± 0.26 mm at early, and -0.49 ± 0.30 at delayed implants; P <0.001. Mean overall PES was 12.25, 11.98 and 11.17 at the immediate, early and delayed groups, respectively (P <0.001). There were no differences in patient satisfaction regarding function (P = 0.353) and aesthetics (P=0.531) and all patients would undergo the same procedure again.
Conclusions: No statistically significant differences for failures, complications and patient satisfaction were observed when placing single implants immediately, 6 weeks or four months after tooth extraction, nevertheless failures were more frequent at immediate and early placed implants. Bone loss was significantly smaller at immediate implants and aesthetic evaluation showed better results at immediate and early implants.

5-year results from a randomised controlled trial comparing 5x6 mm short implants to longer implants in augmented bone in posterior atrophic jaws

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Aim: To evaluate whether 5x6 mm short dental implants could be an alternative to augmentation with anorganic bovine bone and placement of at least 10 mm long in posterior atrophic jaws.
Methods: Fifteen patients with bilateral atrophic mandibles (5-7 mm bone height above the mandibular canal) and 15 patients with bilateral atrophic maxillas (4-6 mm bone height below the maxillary sinus), and bone thickness of at least 8 mm, were randomised according to a split-mouth design to receive

one to three 5 mm short implants or at least 10 mm long implants in augmented bone. Mandibles were vertically augmented with interpositional bone blocks and maxillary sinuses with particulated bone via a lateral window. Implants were placed after 4 months, submerged and loaded, after another 4 months, with provisional prostheses. Four months later, definitive provisionally cemented prostheses were delivered. Outcome measures were: prosthesis and implant failures, any complication and peri-implant marginal bone level changes.

Results: In 5 augmented mandibles the planned 10 mm long implants could not be placed and shorter implants (7 and 8.5 mm) had to be used instead. Five years after loading 6 patients, 5 treated in mandible and 1 in maxilla, dropped out. Three prostheses (1 mandibular and 2 maxillary) failed in the short implant group versus none in the long implant group. In mandibles one long implant failed versus two short implants in one patient. In maxillae one long implant failed versus three short implants in 2 patients. There were no statistically significant differences in implant (P = 1.00) and prosthetic (P = 0.250) failures. Eleven patients had 16 complications at short implants (1 patient accounted for 6 complications) and 12 patients had 14 complications at long implants. There were no statistically significant differences in complications (P = 1.00). Five years after loading, patients with mandibular implants lost on average 1.72 mm at short implants and 2.10 mm at long implants of peri-implant marginal bone. This difference was statistically significant (difference = 0.37±0.43 mm; P = 0.022). In maxillas, patients lost on average 1.31 mm at short implants and 1.79 mm at long implants. This difference was statistically significant (difference = 0.48±0.43 mm; P = 0.002).

Conclusions: Five years after loading 5x6 mm short implants achieved similar results as longer implants in augmented bone. Short implants might be a preferable choice to vertical bone augmentation, especially in mandibles, since the treatment is faster and cheaper.

4 mm-long versus longer implants in augmented bone in posterior atrophic jaws: 3-year post-loading results from a multicenter randomised controlled clinical trial

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Aim: To evaluate whether 4 mm-long dental implants could be an alternative to bone augmentation with xenografts and placement of at least 10 mm-long implants in posterior atrophic jaws.

Methods: Forty patients with atrophic posterior (premolar and molar areas) mandibles having 5 to 6 mm bone height above the mandibular canal and 40 patients with atrophic maxillae having 4 to 5 mm below the maxillary sinus, were randomised according to a parallel group design to receive one to three 4.0 mm-long implants or one to three at least 10 mm long implants in augmented bone at two centres. All implants had a diameter consisting of 4.0 or 4.5 mm. Mandibles were vertically augmented with interpositional equine bone blocks and resorbable barriers. Implants were placed 4 months after grafting. Maxillary sinuses were augmented with particulated porcine bone via a lateral window covered with resorbable barriers and implants were placed simultaneously. Implants were not submerged and were loaded after 4 months with provisional prostheses. Four months later, screw-retained reinforced acrylic restorations were delivered, replaced after 4 months by definitive screw-retained metal-composite prostheses. Patients were followed up to 3-year post-loading. Outcome measures were: prosthesis and implant failures, any complication and peri-implant marginal bone level changes.

Results: Nine patients dropped-out: six from the augmented group and three from the short implant group. In six augmented mandibles it was not possible to place implants at least 10.0 mm-long implants, so shorter implants had to be placed instead. In mandibles, two implants from the augmented group failed in two patients versus two 4.0 mm-long implants in two patients from the short implant group. In maxillae, four short implants failed in three patients versus seven long implants in four patients (two long implants and one short implant dropped into the maxillary sinus). Three prostheses on short implants (one mandibular and two maxillary) failed or were placed at a later stage because of implant failures versus eight prostheses (three mandibular and five maxillary) at augmented sites. There were no statistically significant differences in implant failures (P = 0.79) or prostheses failures (P = 0.82). There were more patients affected by complications in the augmented group (18 patients affected by 28 complications versus 8 patients affected by 10 complications), however, the difference was not statistically significant (P = 0.52). At 3-year post-loading, average peri-implant bone loss was 0.62 mm at mandibular 4 mm-long implants, 0.71 mm at 10 mm or longer mandibular implants, 1.14 mm at short maxillary implants and 0.73 mm at long maxillary implants. The difference was not statistically significant in mandibles (P = 0.568) but was significant in maxillae with more bone loss at short implants (P = 0.037).

Conclusions: Three-year after loading 4.0 mm-long implants achieved similar results, if not better, than longer implants in augmented jaws, but were affected

by less complications. Short implants might be a preferable choice to bone augmentation, especially in mandibles, since the treatment is less invasive, faster, cheaper, and associated with less morbidity, however 5 to 10 years post-loading data are necessary before making reliable recommendations.

Use of ceramic implants in a case of titanium intolerance

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Aim: The aim of this case report is to describe the management of a case of unusual progressive bone loss around titanium fixtures and internal resorption of the adjacent teeth in suspect of titanium sensitivity
Methods: A female patient was referred to our observation due to peri - implantitis in area 4.6. In spite of the non - surgical therapy, months later the problem has not been solved and pain was reported all around the implant. The orthopantomography showed a rapid progression of vertical bone loss around the implant which led to the failure of it in few months and internal resorption of the teeth close to it on both of the jaws. In agreement with the patient, the affected teeth were extracted, whereas the implant was preserved as support of a provisional fixed prothesis. Three new titanium fixtures were inserted and loaded with a fixed prothesis four months after the extractions. Six months later, a vertical bone loss compromised the new implants and the internal resorption affected the teeth up to the 3.3. A bone biopsy was planned and executed not showing any kind of lesion, and even the bacterial culture was negative. Blood tests instead revealed an high number of eosinophils, so a titanium intolerance was supposed. It was later confirmed with the MELISA test, an optimised, clinically validated blood test which establishes allergy to a number of different metals from a single blood test. Accordingly to the results of the MELISA test, it was planned to extract all the problematic teeth and all the titanium fixtures.
Results: After a nine months healing period, five one-piece zirconia implants were subsequently located, 4 in the anterior jaw and 1 in the right molar region (Straumann PURE Ceramic Monotype, Straumann). The implants were loaded with a fixed metal-free PEEK made prothesis. Two months after the loading, the posterior implant was lost, and it was replaced with a two pieces zirconia fixture (Straumann PURE Ceramic, Straumann). After a 18 months follow up, the fixtures look both clinically and radiographically in good health.
Conclusions: Zirconia implants are a worthy solution not only in patients with periodontal diseases or with elevated aesthetic expectations, but they are as well essential in cases where metal free rehabilitation is indispensable. Materials such as zirconia and PEEK allowed, as it was shown in the presented case, to accomplish a completely metal free rehabilitation to cope with the titanium intolerance diagnosed in the patient.

Fully digital and model free two arches rehabilitation: a case report

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Aim: The aim of this work is to describe a case of immediate implant-prosthesis rehabilitation with all on four fully digital technique.
Methods: A 50 years old patient in good general health, was referred to our observation complaining of dental mobility and gingival bleeding. A severe periodontitis in both arches with a consequent recession of the supporting tissues and bone atrophy was found on clinical examination. As a result of orthopantomography of the dental arches, in agreement with the patient, it was decided for the avulsion of the elements of both dental arches with the exception of the lower canines. The extracted teeth were replaced with a total upper and partial lower temporary prosthetic rehabilitation with hooks on elements 3.3 and 4.3, and then with fixed implant-supported prosthesis. During the three months healing period, the implant placement was planned on the CBCT scan thanks to the 3D rendering software GuideMia (GuideMia Digital Dentistry, Los Alamitos, California). The final denture was built on with CAD/CAM technology, based on the temporary rehabilitation and on the 3D planning. The project therefore included the insertion of four implants per arch: in areas 1.2, 1.4 and 2.4 with a diameter of 3.75 x 13 mm; in areas 2.2, 4.1 and 3.1 with a diameter of 3.75 x 11 mm; in areas 3.4 and 4.4 with a diameter of

4.2 x 13 mm. In the same appointment the surgery was performed and the Toronto bridges were screwed on the implants.
Results: After 18 months of follow up soft tissue and marginal bone level around implants were analyzed and showed high stability.
Conclusion: The introduction of CAD/CAM technologies in daily practice, has significantly reduced the working time of dental technician, surgeon-implant and prosthetist without affecting the functional and aesthetic level of the rehabilitation. Computer aided implant planning is helpful in edentulism with reduced bone volumes, to finalize the treatment in a single session. The costs for the patient are however still considerable compared to the different load protocols. This technique is currently in continuous development; it has significant long - term advantages and successes, as long as the operating protocols and patient choice are adequate. However, further research is needed in order to improve the accuracy, the reliability, and the reproducibility of the results.

Fracture resistance analysis of zirconia neck implants

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Aim: The purpose of this study was to compare the fracture resistances and the failure patterns of a new type of zirconia neck dental implant combined with two different angulation titanium abutments after in vitro dynamic loading compressive test. Dental implants requires different features, one of those is the resistance to fracture. The compressive test is common to measure the resistance of a material and indicates the workability of an alloy.
Methods: Ten dental implants with zirconia necks (Z1 implants, T.B.R.® ide@, Sudimplant, Toulouse, France) were considered for this study. They were subsequently divided into two test groups A and B (n=5). They were all inserted in a resin box with an angulation of 30°. In the first group A implants had a 0° angulation; whereas in the second group B they had a 15° inclination, corrected thanks to angulated abutment. The specimens were subjected to static loading; according to the Instron test, the resistance of the implants was valuated with a universal testing machine (0.5 mm/min speed). Then failure patterns were analyzed. One-way ANOVA (α= .05) and Chi-square tests were used to test the null hypotheses.
Results: Failures generally occurred due to abutment deformation in both groups. The behavior of the neck was almost the same in group G1 and G2 but with a slight majority of neck fractures in the group G1. The fracture strength values (mean ± standard deviation) of the groups were as follows: group G1 had a mean value of 255,78 with a standard deviation of 19,71; while group G2 had a mean value of 299,1 with a standard deviation of 70,9. The fracture resistances were higher in the second group compared to group G1 (P value =0,22). For the ANOVA analysis, no significant difference was observed between groups G1 and G2. Almost 70% of failures were performed as an abutment deformation, while 20% of the specimens showed a fracture in the screw.
Conclusion: Starting from data analysis, it is possible to deduce that failures generally occurred in the screw; moreover there was a slight majority of neck fractures in group G1. A larger number of samples would have helped in the determination of the failure patterns.
Angled abutments supported a greater loading than straight abutments, even if the difference was not statistically significant. Zirconia neck was subjected to fracture or infraction before failure, but it always happens at very high force value.

Spal technique in the treatment of peri-implantitis: a case report

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Aim: The aim of the present case report is to illustrate the use of Sub-periosteal Peri-implant Augmented Layer (SPAL) technique to correct class Ib/c peri-implantitis defects.
Methods: Three systemically healthy patients affected by peri-implantitis were consecutively treated. Supra- and sub-gingival debridement was performed to improve inflammatory conditions of peri-implant tissues. The persistence of a 5 mm pocket associated with bleeding and/or suppuration and bone loss > 3 mm (as assessed radiographically) were regarded as indication for surgical correction. The morphology of the peri-implantitis lesions was diagnosed by both probing (bone sounding) and radiographic assessment. A buccal, partial-thickness flap (namely, the mucosal layer) was elevated, leaving the periosteal layer on the buccal cortical bone plate.

The periosteal layer was in turn elevated to create a pouch that could stabilize a bone substitute. A full thickness flap was elevated on the palatal/lingual aspect, according to the extension of the lesion. Peri-implant bone defect and implant surface were debrided by mean of ultrasonic tips and a specifically designed titanium brush. Deproteinized bovine bone mineral (DBBM), moistened in sterile saline, was used to fill the intrabony component of the defect. No barrier membrane was used. Periosteal layer was sutured to the oral flap to contain and stabilize DBBM graft. In case of insufficient dimensions of peri-implant mucosa, a connective tissue graft (CTG), harvested from the palate by mean of a single incision technique, was buccally positioned at the most coronal portion of the implant. The mucosal layer was then coronally advanced to ensure primary wound closure. Following surgery, patients were instructed not to brush the treated area for 2 weeks. Pain killers were prescribed as needed. A 0.12% chlorhexidine solution was prescribed for chemical plaque control for 3 weeks. Sutures were removed at 2-weeks post-surgery. At 3 months, the patient entered a secondary prevention program based on 3-month recalls. Peri-implant pocket depth (PD), bleeding on probing (BoP), suppuration on probing (SoP), buccal recession (REC) and radiographic bone level (RBL) were assessed immediately before surgery and at 6 months.

Results: Healing was uneventful in all cases. SPAL technique resulted in the clinical remission of peri-implantitis defects associated with buccal bone dehiscence in terms of pocket reduction, gain in bone support and elimination of signs of infection/inflammation. Successful therapy, defined as PD ≤4 mm, absence of bleeding/suppuration on probing and substantial RBL gain, was observed in all treated implants at 6-month re-evaluation.

Conclusions: SPAL technique with or without additional CTG may be considered a viable approach for the regenerative treatment of class Ib/Ic peri-implantitis lesion.

Implant-prosthetic rehabilitations in HIV-positive patients: five-years follow-up

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Aim: The aim of the present study was to evaluate the predictability of implant-prosthetic rehabilitations in HIV-positive patients showing adherence to the antiretroviral drug regimen, studying failures and marginal bone level change (MBLC) of these rehabilitations as indicators of therapy success and relating them to serological parameters and implant surface roughness.

Methods: This mono-centric study included HIV+ patients with stable disease and showing adherence to the antiretroviral drug regimen. Single implants or full-arch rehabilitations (according to All-on-4® protocol) were performed. Implant and prosthetic failures, marginal bone level change and biological/mechanical complications were recorded at 6 (T2), 12 (T3), 36 (T4) and 60 (T5) months after implant insertion and related to serological parameters such as CD4+ cell count, CD4/CD8 ratio and HIV-RNA. Two different implant surfaces were compared: one group of implants had a higher surface roughness (Microrough surface-MRS) and the other one had a lower surface roughness (Full Contact Covering Surface-FCC).

Results: Implants were placed in 83 patients and the overall number of fixtures was 284 divided into 160 single implants and 31 All-on-4® rehabilitations (124 fixtures). After five years of follow-up, high survival rates (95,42%) were recorded, with results similar to healthy patients. The implant survival rate was 94,54% for MRS implants and 97,03% for FCC implants, with slightly better results in the group with lower surface roughness. Implant failures occurred in 10 patients (13 fixtures out of 284: 4,58%), due to early primary infection and failure in the osseointegration process (7 fixtures out of 284: 2,47%), periimplantitis (5 fixtures out of 284: 1,76%), and fracture (1 fixture out of 284: 0,35%). Mean marginal bone level change in single implants measured at T2 were 0.50 ± 0.32 mm for MRS implant surface and 0.51 ± 0.25 mm for FCC implant surface, at T3 were 0.76 ± 0.40 mm for MRS implant surface and 0.81 ± 0.30 mm for FCC implant surface, at T4 were 1.28 ± 0.60 mm for MRS implant surface and 1.08 ± 0.23 mm for FCC implant surface and at T5 were 1.35 ± 0.21 mm for MRS implant surface and 1.75 ± 0.35 mm for FCC implant surface. Mean marginal bone level change in All-on-4® rehabilitations measured at T2 were 0.45 ± 0.16 mm for MRS implant surface and 0.58 ± 0.26 mm for FCC implant surface, at T3 were 0.68 ± 0.26 mm for MRS implant surface and 0.78 ± 0.31 mm for FCC implant surface, at T4 were 1.33 ± 0.47 mm for MRS implant surface and 0.98 ± 0.19 mm for FCC implant surface and at T5 were 1.70 ± 0.42 mm for MRS implant surface and 1.35 ± 0.21 mm for FCC implant surface. A statistically significant linear correlation ($p<0.05$) was found between marginal bone level change and HIV-RNA. A statistically significant negative correlation was found between marginal bone level change and CD4/CD8 ratio ($p<0.05$), as the MBLC values increase the values of the CD4/CD8 ratio decrease significantly.

Conclusion: Within the limitations of the present study, serological parameters such as HIV-RNA and CD4/CD8 ratio showed to be important markers for marginal bone level change of implant-prosthetic rehabilitations. Moreover, a lower roughness surface seems to be

less likely to develop implant failure. In conclusion, implant-prosthetic rehabilitations in HIV-positive patients with stable and pharmacologically-controlled disease showed to be a predictable therapeutic option, with similar results to healthy patients.

Multicenter evaluation of one-stage vs two-stage technique using extra-short implants in partially edentulous patients rehabilitations: preliminary results

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Aim: The aim of the present study was to evaluate the differences between peri-implant tissue behaviour using extra short implants inserted in one-stage or two-stage technique.
Methods: 12 subjects, 7 males and 5 females, aged 46-77 years (mean 60,8) who needed to receive two adjacent extra-short implants have been enrolled. They were all partially edentulous, eight in the upper jaw and four in the lower jaw with high level of bone resorption evaluated on a tc cone bean dental scan. Bone quality was evaluated by the Hounsfield scale with the BTI scan® program before the surgery. Two adjacent distal implants (extra-short BTI 5,5 or 6,5 length) were inserted during the same surgery. One was submerged (two-stage technique) and one was immediately connected by the multim abutment (one-stage technique). The second stage surgery was performed after three months. The two implants were then loaded with screw-retained splinted rehabilitation. ISQ value (Osstell) was performed to analize the implant stability. Peri-implant bone levels were evaluated on intraoral paralleling radiographs. Peri-implant probing depth (PPD), plaque index, bleeding on probing (BOP), mobility and pain were also evaluated. Follow-up and mesurements were made at T0 (surgery time: radiograph, torque insertion, ISQ), T3 (prosthetic phase: radiograph, ISQ, peri-implant indexes), T6 (six months after implants insertion: radiograph, peri-implant indexes), T12 (twelve months after surgery: radiograph, ISQ, peri-implant indexes) and then each year. A statistical analyse was then elaborated.
Results: The linear mixed model of the ISQ results shows a non-significant difference between one-stage group and two-stage group (p=0.367) at T0. The linear mixed model shows a non-significant difference between one-stage group and two-stage group (p=0.559) at T3. The MB mesial for one-stage was: mean 0.36 (SD: 0.55) at T0 and mean of 0.62 (SD0.63) at T3. For two-stage was: mean of 0.10 (SD:0.27) at T0 and 0.55(SD:0.58) at T3. The MB distal for one-stage was: mean of 0.08 (SD:0.63) at T0 and mean of 0.52 (SD:0.61) at T3. For second-stage was: mean of 0.07 (SD: 0.40) at T0 and 0.12 (SD:0.57) at T3. The use of mixed generalized models, including the interaction of the technique and type of bone, shows a non-significant relationship with the improvement of the MB. The chi square test shows a non-significant difference for the plaque between the two-stage and one-stage groups. The t test shows a significant difference for the probe depth (mean) between the two-stage and one-stage groups.
Conclusion: According to preliminary results, no statistically differences resulted between one-stage or two-stage technique.

Soft tissue stability in relation to implant design

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Aim: Inspite the popularity of dental implant restorations, several questions remain unanswered as the existence of a key factor that allows achieving of long term stability for both soft and hard tissues. Connective tissue fibers are stabilized on the implant by combined action of thickness and physiological mechanisms, factors nowadays recognized for contribute to therapeutic success. Soft tissue stability is strongly connected with the hard tissue one and periosteum is the major player in bone growth processes. Fibers emerging from periosteum can end up into gingiva connective tissue surrounding the implant abutment or can insert into the tooth neck the cementum. The latter act stretching the periosteum, inducing bone remodeling and augmentation during the eruption or extrusive orthodontic movements of the tooth. The presence of similar fibers in implant rehabilitation would explain why some designs achieve increasing and corticalization of the peri-implant bone. Fibroblasts in extracellular matrix sense environmental modification of physical parameters, transduct them from mechanical into chemical information, inducing specific changes in gene expression. The aim of our study is to demonstrate the existence of oblique fibers originating from periosteum and directed towards the abutment.
Methods: Nowadays the study is at an early stage, samples consist in the connective tissue around an abutment with hemispherical base, platform

switching and with conometric locking taper connection at 12 and 18 months from the functional load. Among the patients who volunteered to participate in the study, a female patient of 44 was chosen, non-smoker, rehabilitated in the UOC of Oral Surgery in Sapienza University with five implants in the posterior sectors to be individually prosthesized and negative to systemic and local pathologies that could compromise the healing of peri-implant tissues, with thick keratinized tissue and good oral hygiene. Calibration samples were taken at the time of insertion of the final prosthesis two and four months after implants were uncovered. A full-thickness mucoperiosteal biopsy of the gingiva surrounding the implant healing abutment was harvested by a cold blade. Some of the biopsies were fixed in 4% formalin to be studied with light microscopy others were submerged in glutaraldehyde 2.5% to be studied with scanning electron microscopy.

Results: The clinical examination did not reveal any substantial differences between soft tissues observed at two and four month of healing, both showed healthy tissue clinical signs. Histological findings, evaluated on images captured by light microscope, show that at two months tissues are still healing, signs of remodeling were evident, with lymphocytic and perivasal plasma-cells infiltrate and residues of bone spicules. At four months, the tissues showed a greater organization of the collagen fibers that are arranged circumferentially to the abutment. Ultrastructural findings, evaluated on SEM images at four months, revealed the absence of soft tissue inflammation and the presence of fibers, mainly circularly oriented, surrounding the abutment. In addition a small amount of fibers were observed starting to orient towards the abutment.

Conclusions: Despite the limitations of the study, we can conclude that improving stability and health of soft tissues would increase long-term implant success. The response of the peri-implant tissues is a predictable physiological response to the insertion of a foreign body, the onset of pathologies or complications therefore depends on the choice of the implant device which must be dictated by the knowledge of the physiology and biomechanical properties of the tissues.

Implant design and BIC: comparison between two implant lines

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Aim: From engineering concepts we know that the surface area where forces are applied is inversely proportional to the stress found on the implant system (stress = force/surface), so to reduce the stress we could decrease the applied force or increase the surface area. Biomechanically, the implant surface area should therefore be optimized to ensure the correct functional loads. The purpose of this study is to highlight the possible difference in total surface area between two implant lines with the same length and diameter by comparing the two different macrodesign.

Methods: The two implants compared are: MODEL A (on the market) Tapered implant with internal hexagonal connection and V-threads design, coils with a constant depth of 0.3 mm and an overall ridge angle of 65° (Prime, A); MODEL B (In sperimentation, prototype) Tapered implant with internal conical connection, Knife-edge coils, spiral depth increasing in apical direction up to 0.8 mm and total crest angle 10°. A total of 40 implants were analyzed, 20 Model A and 20 Model B. Divided by heights and respective diameters: HEIGHTS: 7 mm, 8.5 mm, 10 mm, 11.5 mm, 13 mm and 15 mm. DIAMETERS: 3.8 mm, 4.2 mm, 4.6 mm (6 implants each). The 5.1 mm diameter was analyzed only for 4 implant heights (7mm; 8.5mm; 10mm; 11.5mm). The measurements were made with a SolidWorks tool (CAD modeling software), which provides measurement of the selected faces on the model in mm2 to approximately 2 decimal places.

Results: The results show that modifying the Implant MacroDesign results in a significant increase in total surface area that compares to peri-implant bone. Model B has a larger surface area in each measurement. In implants with a diameter of 3.8 mm and a height of 15 mm, Model A is 193 mm2 while Model B is 303 mm^2, showing a percentage increase of 156.99%. Equally with a diameter of 4,2 mm and a height of 15 mm, the percentage increase is 155,96%, Model A has a contact surface area of 218 mm^2 and Model B 340 mm^2. The minimum increase is 123.90% in implants with a diameter of 5.1 mm and a height of 8.5 mm, Model A has a surface area of 159 mm^2 and Model B 197 mm^2.

Conclusions: It is obvious that a new designed implant (B) with a lower height and diameter than an implant already on the market (A) has a surface area equal to or greater than a larger implant. The surface area of a Model B 3.8 x 8.5 mm is 158 mm2, while that of a Model A 4.2 x 10 mm is 143 mm2, it is understood that in order for the Model A implant to match the Model B implant under consideration, it is necessary to increase in size to an implant with a diameter of 4.6 mm and a height of 10 mm. The implant design, therefore, plays a decisive role on the management of the available surface useful to ensure better BIC (bone to impact contact) and consequently better primary stability and subsequent osseointegration. Knowing how to choose

a particular implant design could help to improve primary stability especially in less favorable situations, such as poor bone quality and quantity, post-extractive implants and immediate loading.

Posterior atrophic jaws rehabilitated with 6 mm long 4 mm wide implants or by longer implants in augmented bone. 5-Year post-loading results from a randomised controlled trial

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Aim: To evaluate whether 6 mm long by 4 mm wide dental implants could be an alternative to implants at least 10 mm long placed in bone augmented with bone substitutes in posterior atrophic jaws. Methods: A total of 20 patients with bilateral atrophic mandibles and 20 patients with bilateral atrophic maxillae, having 5 to 7 mm of bone height below the maxillary sinus or 6 to 8 mm above the mandibular canal, had their side of the jaws randomly allocated according to a split-mouth design. They were allocated to receive one to three 6 mm long and 4 mm wide implants, or implants at least 10 mm long in augmented bone by two different surgeons in different centres. Mandibles were vertically augmented with interpositional equine bone blocks and resorbable barriers, and implants were placed 3 months later. Maxillary sinuses were augmented with particulated porcine bone via a lateral window and implants were placed simultaneously. All implants were submerged and loaded, after 4 months, with provisional prostheses. Four months later, definitive prostheses were delivered. Outcome measures were prosthesis and implant failures, any complication and radiographic peri-implant marginal bone level changes. The follow-up was 5-year after loading for all patients.
Results: Eight patients (five treated in mandibles and three in maxillas) dropped out before the 5-year post-loading follow-up. Four short implants (2 maxillary and 2 mandibular) affected by peri-implantitis failed together with their prostheses versus three mandibular prostheses which could not be placed on implants at least 10 mm long due to graft failures; one was associated with the loss of three implants because of infection. There were no statistically significant differences in implant (P = 1.0) and prosthesis failures (P = 1.0). In total, 19 complications occurred in 14 patients at augmented sites versus five complications in four patients with 6 mm-long implants (P = 0.118). More complications occurred at grafted sites in mandibles (P = 0.727), than in maxillae (P = 0.063), although the difference were not statistically significant. In mandibles, patients with 6 mm-long implants lost an average of 1.34 ± 0.35 mm of peri-implant bone at 5 years versus 2.11 ± 0.59 mm in patients with implants at least 10 mm long. The difference was statistically significant (mean difference = 0.77 ± 0.70 mm, P = 0.003). In maxillae, patients with 6 mm-long implants lost an average of 1.52 ± 0.47 mm of peri-implant bone at 5 years versus 1.85 ± 0.51 mm in patients with implants at least 10 mm long. The difference was statistically significant (mean difference = 0.33 ± 0.36 mm, P = 0.002).
Conclusions: Results at 5 years after loading indicate that 6 mm-long implants with a conventional diameter of 4 mm achieved similar results than longer implants placed in augmented bone. Short implants might be a preferable choice to bone augmentation, especially in posterior mandibles since the treatment was faster, cheaper and associated with less morbidity. However, 10-year post-loading data are necessary before making reliable recommendations.

Prediction of titanium implant success by analysis of microrna expression in peri-implant tissue. A 5-year follow-up study

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Aim: the biological mechanisms of possible complications and failure in implant dentistry are today still object of debate. The innovative study of microRNA (miRNA, small noncoding RNAs of about 22 nucleotides regulating the post-transcriptional gene expression) in peri-implant tissue, may help in identifying the individual susceptibility and predict clinical implant outcomes. The aim of this study is to evaluate miRNA expression in peri-implant soft tissues and to correlate epigenetic information with the clinical outcomes of the implants up to the 5-year follow-up.
Methods: 7 patients (4 women, 3 men; mean age: 64.6 years) have been rehabilitated with fixed screw-retained bridges, each supported by 2 adjacent implants. After 3 months from surgery, a mini-invasive sample of peri-implant soft tissue containing both epithelium and connective tissue was collected using a surgical blade to be histologically analyzed by miRNA microarray. Peri-

implant parameters, such as spontaneous bleeding (SB), periodontal depth (PD), bleeding on probing (BoP), plaque index (PI) were recorded at 3 and 6 weeks and at 3-, 6-, 12-months post-surgery and at the 5-year follow-up appointment. Intraoral radiographs were taken, in order to measure the bone resorption (BR) over time. Technical and biological complications were also recorded. The epigenetic data obtained by microarray technology has been statistically analyzed by dedicated software and compared with measured clinical parameters.

Results: During the 5-year follow-up, there were no dropouts and neither implant failure nor technical complications occurred, with a both implant and prosthodontic cumulative survival rate (CSR) of 100%. Mean bone resorption at the 5-year follow-up appointment was 1.98 mm. No patient presented spontaneous bleeding or suppuration. MiRNA can effectively predict clinical outcomes: mi-RNA expression was able to predict peri-implantitis (PITI) occurrence in all patients, unlike the periodontal biotype. Some of the miRNAs altered at T0, were predictors of BR, BOP, PD and PITI in the following 5 years. Some specific miRNA signatures appeared to be "protective" from bone resorption despite the presence of plaque accumulation.

Conclusions: The results of the present study suggest that miRNA may be predictors of dental implants clinical outcomes and may be used as diagnostic and prognostic biomarkers in implantology.

Primary stability and alveolar cancellous bone trabeculae condensing with osteocondensation protocol: in vitro polyurethane study

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Aim: The aim of the study was to evaluate an osteocondensing drill protocol for dental implant positioning compared to standard drilling protocol on low density polyurethane block.

Methods: A total of 40 implants with conical shape and internal hexagon connection (diameter 4,8 mm and length 10 mm) were used for the present in vitro experimental study. Moreover, 20 control implants were inserted with a standard drilling following the protocol of the manufacturer: implant lance drill, cilindric drill 2,3 mm, 2,5 mm, 2,8 mm, 3,2mm and 3,7mm drill (800 rpm) with a forward rotation. A total of 20 test implants were inserted with osteocondensation drillings following the protocol of the manufacturer: implant lance drill, cilindric drill 2mm, 3mm and 4mm at 800rpm in reverse rotation .Test and control implants were inserted in two Different types of solid rigid polyurethane foam (SawBones H, Pacific Research Laboratories Inc, Vashon, Washington, USA) with homogeneous densities. Two polyurethane foam blocks were selected for the present investigation of size of 13x18x4cm. The block densities of the samples used in the present in vitro study were: 16.01 kgm3 (10 PCF), analogous to D3 bone quality, and 32.02 kgm3 (20 PCF), analogous to D2 bone. Insertion Torque (IT), Removal Torque (RT) and Periotest were statistically analysed.

Results: Mean values for Insertion Torque values are presented in tables 1. The IT means were higher for condenser drills preparation if compared to standard drills for all groups ($p<0.01$).The removal peaks showed a statistically significant difference between the condenser drills vs standard preparation ($p<0.01$).The implant micro movement analysis by periotest showed a statistical difference between the condenser and standard drills at 10 PCF. No differences were presented at 20 PCF between groups.A significant difference of IT, RT and Periotest were present in favour of an increased stability of the implant positioned with osteocondensing protocol.

Conclusions: As reported by the evidences of the present in vitro investigation, the using of a systematic protocol sequence of osteocondensing drill could represent a clinical advantage for the clinician, in order to standardize the procedure for implant primary stability obtaining in poor density bone regions.

Multiple and single rehabilitation with zirconia dental implants: 10-years follow-up evaluation study

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Aim: The use of zirconium oxide implants were introduced to overcome limits of titanium implantsand were indicated for single and multiple tooth replacement. The aim of this study was to evaluate radiographic marginal bone loss (MBL) and the success rate of zirconia implants placed in the aesthetic and posterior areas of the jaws in association with multiple or single implant restorations with a follow-up period of 10 years.

Methods: Three different patients were treated in our hospital. The first patient presented a partial edentulism in 21-26 area. The second

submit edentulism in aesthetic zone 32–42. The last patient had to restore only a single tooth 34. Seven one-piece Yttrium-stabilized zirconium dioxide implants (White-Sky®, BredentMedical) were inserted. Six months after surgery, the implants were definitely restored with a zirconia bridge and crowns.
Results: After ten years, no pain and mobility were recorded. Radiographical evaluation reported areduction of marginal bone loss (MBL) around zirconia implants. Every implants were probing and none of them the PD values were > 5 mm. Zirconia one-piece dental implant allows a significant reduction of the bacterial contamination. Moreover, in one-piece dental implants the absence of microgap between fixture and abutment decrease marginal bone loss and promote the early formation of the biological with preventing bone resorption.
Conclusion: Ceramic implant is an aesthetic alternative to titanium implants. Zirconia dental implants offer a successful rate in single and multiple teeth rehabilitation permitting preservation of peri-implant hard and soft tissue.

Posterior atrophic jaws rehabilitated by 5x5 mm or longer implants in augmented bone. 5-Year results from a randomised controlled trial

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Aim: To evaluate whether 5x5 mm dental implants with a novel nanostructured calcium-incorporated titanium surface could be an alternative to implants at least 10 mm long placed in bone augmented with bone substitutes in posterior atrophic jaws.
Methods: Forty patients with atrophic posterior (premolar and molar areas) mandibles having 5-7 mm bone height above the mandibular canal and 40 patients with atrophic maxillae having 4 to 6 mm below the maxillary sinus, were randomised according to a parallel group design to receive one to three 5 mm implants or one to three at least 10 mm long implants in augmented bone at two centres. All implants had a diameter of 5 mm. Mandibles were vertically augmented with interpositional bovine bone blocks covered with resorbable barriers. Implants were placed after 4 months. Maxillary sinuses were augmented with particulated porcine bone via a lateral window covered with resorbable barriers and implants were placed simultaneously. All implants were submerged and loaded after 4 months with provisional prostheses. Four months later, definitive screw-retained or provisionally cement metal-ceramic or zirconia prostheses were delivered. Patients were followed up to 5 years post-loading and the outcome measures were: prosthesis and implant failures, any complication and peri-implant marginal bone level changes.
Results: Sixteen patients dropped-out before the 5-year evaluation (four short mandibles, three short maxillae, six augmented mandibles and three augmented maxillae). In mandibles, two grafted patients were not prosthetically rehabilitated because of multiple complications and three implants failed in the same patient (one was a replacement implant) versus one patient who lost its short implant and crown 2 year after loading. In maxillae one short implant failed with its provisional crown 3 months post-loading. There were no statistically significant differences in prostheses (P = 1.000) and implant failures (P =0.609) up to 5 years after loading. Significantly more complications occurred at mandibular grafted sites: 17 augmented patients were affected by complications versus nine patients treated with short implants in mandibles (P = 0.013). In the maxilla seven sinus lifted patients versus two patients treated with short implants were affected by complications, the difference not being statistically significant (P = 0.128). Patients with mandibular short implants lost on average 1.22 mm of peri-implant bone at 5 years and patients with 10 mm or longer mandibular implants lost 1.70 mm. Patients with maxillary short implants lost on average 1.25 mm of peri-implant bone at 5 years and patients with 10 mm or longer maxillary implants lost 1.73 mm. Longer implants showed a greater bone loss up to 5 years after loading than short implants both in maxillae (P = 0.024) and in mandibles (P = 0.004).
Conclusions: Five years after loading 5x5 mm implants achieved similar results than longer implants placed in augmented bone. Short implants might be a preferable choice to bone augmentation especially in posterior mandibles since the treatment is faster, cheaper and associated with less morbidity, however 10-year post-loading data are necessary before making reliable recommendations.

Short implants versus bone augmentation for placing longer implants in atrophic maxillae. 5-Year results from a randomised controlled trial

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Aim: To evaluate whether short (5 to 8.5 mm) dental implants could be a suitable alternative to longer (at least 11.5 mm long) implants placed in atrophic fully edentulous maxillae augmented with autogenous

bone for supporting dental prostheses.
Methods: Twenty-eight patients with fully edentulous atrophic maxillae having 5 to 9 mm of residual crestal bone height at least 5 mm thick, as measured on CT scans, were randomised into two groups either to receive four to eight short (5 to 8.5 mm) implants (15 patients) or autogenous bone from the iliac crest to allow the placement of at least 11.5 mm-long implants (13 patients). Both bone blocks and windows at lifted maxillary sinuses were covered with rigid resorbable barriers. Grafts were left to heal for 4 months before placing implants which were submerged. After 4 months, provisional reinforced acrylic prostheses or bar retained overdentures were delivered. Provisional prostheses were replaced, after 4 months, by definitive screw-retained metal-resin cross-arch restorations. Outcome measures were: augmentation, prosthesis and implant failures, any complications, peri-implant marginal bone level changes and patient satisfaction. Patients were followed up to 5 years after loading.
Results: All patients could be rehabilitated with implant-supported prostheses but four patients dropped-out from the augmented group and three from the short implant group. One bilateral sinus lift procedure failed for infection, though short implants could be placed. Four implants failed in four patients of the augmented group versus three short implants in three patients (P = 0.6500). All failures occurred before loading. No prosthesis failed. Significantly more complications occurred in augmented patients: 12 complications occurred in nine augmented patients versus 1 complication in the short implant group (P = 0.0003). Periapical radiographs of only four patients were readable, so no bone level could be measured at 5 years after loading. With the only exception of three patients of the augmented group who were partially satisfied for function, all remaining patients were fully satisfied with the treatment and all would do the treatment again.
Conclusions: This study showed that for patients with fully edentulous atrophic maxillae short implants can be a preferable alternative to longer implants placed in bone augmented with autogenous bone, being the treatment less invasive, associated with less complications, cheaper and faster.

Short implants versus bone augmentation for placing longer implants in atrophic maxillae. 5-Year results from a randomised controlled trial

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Conclusions: This study showed that for patients with fully edentulous atrophic maxillae short implants can be a preferable alternative to longer implants placed in bone augmented with autogenous bone, being the treatment less invasive, associated with less complications, cheaper and faster.

Immediate loading of 3 mm-diameter implants versus horizontal bone augmentation for placing normal diameter implants: 4-month post-loading data from a multicentre randomised controlled trial

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Aim: To evaluate the effectiveness of 3 mm-diameter immediately loaded implants in alternative to horizontal bone augmentation procedures to allow placement of implants with a conventional diameter of 4 mm.
Methods: Forty-five partially edentulous patients with a bone width between 4 to 5 mm 3 mm below the crest in areas requiring one to three adjacent implants were randomised, according to a parallel group design, to receive one to three 3.0 mm-wide implants to be loaded immediately (23 patients) or to have the crest horizontally augmented with a granular bone substitute covered with a bone lamina for placing, after 6 months of healing one to three at least 4 mm wide implants (22 patients) at two centres. Implants at augmented sites were left to heal unloaded for 4 months. Four mm-diameter implants were restored with provisional screw-retained reinforced acrylic prostheses, replaced after 4 months by definitive prostheses. Three mm-diameter implants were loaded immediately (if the insertion torque was ≥ 35 Ncm) or after 4 months, directly with definitive metal-composite prostheses. Patients were followed up to 4-month post-loading. Outcome measures were: prosthesis and implant failures, any complication, peri-implant marginal bone level changes and patient satisfaction.
Results: No patient dropped-out. In three patients, five 3 mm-diameter implants could not be inserted with a torque of 35 Ncm, so were submerged unloaded for 4 months. Two implants failed in two patients of the augmented group (P = 0.2333) and both patients were not rehabilitated. Three patients with small diameter implants were affected by three complications versus nine augmented patients with 10 complications, the difference being statistically significant (P = 0.0346). Patients with 3 mm-diameter implants lost on average 0.09 mm of peri-implant bone at 4-month and augmented patients lost 0.26 mm. The difference in bone loss between the two groups was statistically significant (mean difference = 0.17 mm, P = 0.0235). All patients were fully satisfied with both function and aesthetics with two exceptions: one patient of the 3 mm group was only partially satisfied by both aesthetics and function and one patient of the augmented group was only partially satisfied by the aesthetics. All patients would undergo the same procedure again.
Conclusions: Four months after loading patients treated with 3 mm-wide implants achieved better results, than those horizontally augmented to receive 4 mm-wide implants. Three mm-wide implants might be a preferable choice to bone horizontal bone augmentation, since the treatment is less invasive, faster, cheaper, and associated with less morbidity, however 5 to 10 years post-loading data are necessary before making reliable recommendations.

Guided Bone Regeneration in the atrophic jaws: a retrospective study with a 3 to 7-year follow-up

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Aim: To evaluate clinical and radiographic outcomes of the Guided Bone Regeneration (GBR) procedures in the rehabilitation of partially edentulous atrophic jaws with a 3 to 7-year follow-up, with a special focus on trying to evaluate a possible threshold on maximum vertical bone gain especially in the posterior mandible.
Methods: a retrospective study was conducted including patients with previously partially edentulism, bone atrophy treated with GBR performed with non-resorbable membranes and with at least 3 years of follow-up. In 1-stage approach implants were placed after flap releasing. A 1:1 mixture of particulated autogenous bone and of bovine-derived xenograft was used. Non-resorbable membranes used were made of polytetrafluoroethylene titanium-reinforced. In 2-stage approach implants were placed after the removal of the membrane (9 months after), left submerged and exposed 4 months later. Temporary prostheses were delivered 3-4 weeks after implant exposure and definitive prostheses were delivered 6 months later. Outcomes measures were: biological complications; implant and prosthetic failures; vertical and horizontal mean bone gain; peri-implant marginal bone level changes. Data were summarized using frequencies, means and standard deviations. P < 0.05 was set as the level for statistical significance.
Results: 58 GBR procedures were considered and 122 implants (In-Kone, Global D, France) were placed. The total of 58 patients had a follow-up of 3 years, 38 patients had a follow-up of 5 years, 28 patients had a follow-up of 7 years. Twelve temporary paresthesia lasting from 1 to 8 days occurred after augmentation procedure with full recovery. 4 premature exposure of the membrane (6,9%) were reported. 2 implants and, as a consequence, the prosthesis failed in the same patient (survival rate: 98.4%). A statistically significant difference was found in the number of patients with complications (14 complications in patients with bone height increase > 6 mm, p = 0.046) and paresthesia (9 vs 3, p = 0.039) when the bone height increase was > 6 mm in the posterior mandible. Mean bone width after reconstructive surgery was 8.03 ± 1.45 mm with a mean increase of 1.40 ± 1.37 from baseline. At 3, 5 and 7 years after loading implants gradually lost statistically significant marginal peri-implant bone.

Conclusion: Within the limitations of the study, in order to reduce the number of complications increasing success rate and bone stability during time, vertical augmentation in posterior mandible should be limited up to 6 mm, probably due to the biology concept because the greater is the increase, the longer is the distance away from the native bone that guarantees blood supply and cells. This technique requires expert surgeons and these findings should be confirmed by RCTs with long follow-ups.

Seal of the implant tunnel with silver plug

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Aim: In common implant-prosthetic clinical practice, implant abutments of screw- retained prostheses are sealed with various materials (more often Teflon), and are sometimes left without a material that acts as a seal. It has been shown that inside the abutment-fixture connection there is a significant bacterial contamination and that the latter can reach the external surfaces of the connection itself and potentially be responsible for starting chronic inflammatory phenomena that lead to peri-implant mucositis and / or peri-implantitis . The materials (Teflon, cotton) more often uses to fill the implant tunnel are not effective in reducing the bacterial load. In addition, 80% of apparently healthy implants have mucositis.
Methods: Pubmed was investigated for papers regarding on different abutment filling materials, microbical leakage of the implant tunnel, Silver Plug device and implant mucositis and perimplantits.
Results: Silver Plug is a device developed with the aim of sealing the abutment and at the same time reducing peri- implant inflammation. The shape of the silver plug is truncated cone so that it can easily adapt to the implant tunnel, and with its composition based on silver zeolite it is effective in reducing bacterial load especially anaerobic which is widely recognized as being most responsible for peri-implantitis. Silver is in fact commonly used as a local antiseptic agent in bandages and ointments. The Silver Plug remains unchanged within the implant tunnel and therefore can also be easily removed. It has been shown that the effect of the silver zeolite contained in the device leads to a preservation of the peri- implant mucous membranes from mucositis, which represents an inflammatory factor that can lead to the onset of bone resorption phenomena around the implant. The use of Silver Plug first involves disinfecting the inside of the implant with chlorhexidine in gel, then, depending on the diameter of the tunnel, the Silver Plug is measured and cut. Then proceed with a further disinfection of the abutment and crown with ultrasound instruments and hypochlorite and finally the Silver Plug of the implant tunnel is placed and then sealed with composite materials.
Conclusion: S: In order to prevent the development of perimucosites of the peri-implant tissues, it is essential to avoid contamination in the gap between the abutment and the implant. The use of classic materials to seal the implant tunnels cause bacterial proliferation in these sites. The use of sealants with silver-based polymers (Silver Plug) with antimicrobial activity could improve the prognosis of implant treatment. Scientific studies are still needed to strengthen the scientific evidence of this technique.

Factors associated with the post-surgical morbidity of maxillary sinus floor elevation with concomitant implant placement: a retrospective analysis

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Aim: To evaluate the association between patient- and surgery-related factors and the post-operative morbidity of transcrestal and lateral maxillary sinus floor elevation (tSFE and ISFE, respectively) with concomitant implant placement.
Methods: The study is a re-analysis of data from a previous bi-center, parallel-arm, single-blind, randomized controlled clinical trial that comparatively evaluated tSFE and ISFE under several perspectives (Farina et al. 2018, 2019). Patients were consecutively recruited at the University-Hospitals of Ferrara and Modena, Italy, according to specific selection criteria. Briefly, each patient contributed the study with one maxillary quadrant

with ≥1 maxillary posterior site edentulous for at least 6 months and showing a residual bone height (RBH) of 3 to 6 mm. tSFE was performed according to a standardized sequence of manual and rotating instruments with adjustable stop devices (Smart Lift technique; Trombelli et al. 2010) in association with a xenograft and a collagen matrix. For lSFE, the sinus was grafted with xenograft, and the antrostomy was covered with a resorbable collagen membrane. In both tSFE and lSFE groups, implants were inserted immediately after the completion of the grafting procedure. The postoperative course was evaluated through questionnaires for the first 14 days post-surgery. For the present analysis, the following outcome measures were considered: (i) pain level recorded on day 0 using a 100-mm visual analogue scale (VASpain); (ii) number of anti-inflammatory tablets taken during the first 14 postoperative days (FANStot); (iii) swelling, reported as present / absent on day 0 for tSFE and on day 1 for lSFE (SW); (iv) willingness to repeat the same type of surgery, recorded on day +14 on a 4-point visual rating scale (VRSwillingness). Within lSFE and tSFE group, patients were stratified according to each outcome measure, and subgroups were then compared for patient- and surgery-related factors.

Results: Twenty-nine and 28 patients were included in tSFE and lSFE group, respectively. In tSFE group, higher VASpain was associated with longer duration of the procedure, and higher FANStot was associated with female gender and longer duration of the procedure. In lSFE group, VASpain was positively associated with male gender and RBH. Higher values of FANStot were associated with some surgery-related factors, i.e. the use of rotating instruments only to perform the antrostomy, the medial rotation of the lateral sinus wall, and antrostomy dimensions. Higher incidence of SW was observed for longer lSFE procedures.

Conclusions: The limited number of factors associated with the morbidity of tSFE interventions and the fact that most of these are modifiable by adequate treatment planning and operator training seem to suggest that transcrestal access (Smart Lift technique) should be preferred to lateral access when performing sinus lift with concomitant implant placement at sites with RBH of 3-6 mm.

Full arch hybrid zygomatic rehabilitation with bioHPP prosthesis: a case report

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Aim: The aim of this study is to illustrate the application of a prosthesis realized with a BioHPP's structure in a full arch rehabilitation with zygomatic implants and axial implants.

Methods: A case of edentulous atrophic maxilla in a 58 years old male patient was treated with a hybrid zygomatic rehabilitation and subsequently with a BioHPP (polyetheretherketone) prosthesis. Surgical pre-visualization was done with a planning on the CBCT. A crestal incision was made in the maxillary alveolar crest with two posterior vestibular releasing incisions and a median one. After the elevation of the mucoperiostal flap, two axial implants (JD Evolution, JDdental Care s.r.l, Modena, Italy) and two zygomatic implants (JDZYGOMA, JDdental Care s.r.l, Modena, Italy) were placed according to the planning. A provisional made by a particular PMMA enhanced with ceramic particles (MultiCOM, Bredent srl, Bolzano, Italy) was positioned in the upper jaw. The final prosthesis, placed 6 months later, was made with a structure in BioHPP (Bredent srl, Bolzano, Italy) with teeth in HIPC (High Impact Polymer Composite). The framework made off BioHPP has some peculiar property: elastic modulus similar to human bone (4200-4800 MPa), perfect polishing that allowed to leave exposed surfaces of the structure without risk of plaque engraftments, very low specific weight (1.4 g / cm^3) and excellent level of adhesion with aesthetic laboratory composites (38.8 MPa). The clinical controls were carried out after to 2 weeks, 6 weeks, 6 months and 12 months.

Results: The rehabilitation with zygomatic implants was one of the various techniques described in the literature to treat the atrophic maxilla, and several prospective studies have reported successful outcomes. Zygomatic approach yielded a 94,9 % to 100 % success rate for endosseous implants and a 95,12% to 100% success rate for zygomatic implants according to the literature. The prosthetic complications reported in literature were screw-loosening, fracture of prosthetic and abutment screws, wear or loss of the prosthetic teeth and fracture of the prosthesis. The research of materials and techniques could decrease prosthetic complications and implant failures and different authors focused also on BioHPP's features.

Conclusion: The use of BioHPP to realize the structures of implant-prosthetic rehabilitations, lighter than those in titanium and with an elasticity similar to that of the bone, could reduce the stress present on rehabilitation, thus reducing possible complications.

Computer-guided rehabilitation with zygomatic implants: a case report

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Aim: The aim of this report is to describe the clinical and surgical management of an implant-prosthetic rehabilitation with zygomatic implants in the upper jaw using computer-guided surgery and surgical template.
Methods: A 54 years-old female patient with an edentulous atrophic maxilla was treated with zygomatic computer-guided surgery. Pre-surgical evaluation was performed, after the first check-up, with the visualization of an orthopantomography and a CBCT with dicom files. The use of the native dicom files allowed to analyze and study the future position of the zygomatic and axial implants in the rehabilitation. Through the digital execution of the data, three surgical template (one for the axial implants in resin and one in titanium for each zygomatic implant) and a stereolithographic model of the upper jaw were obtained using 3D printing technology. For the surgery protocol a slightly incision was made in the maxillary alveolar crest, extending from the first right molar to the first left one, with a median and two posterior vestibular release incisions. Afterward a mucoperiosteal flap was raised simultaneously bilaterally along the whole incision. The surgical templates were positioned in the upper jaw using pins after the elevation of the flap. The preparation of the implants site were performed using dedicated drills. Three axial implants (JD Evolution, JDdental Care s.r.l, Modena, Italy) and two zygomatic implants (JDZygoma, JDdental Care s.r.l, Modena, Italy) were placed according to the surgical template. A provisional prosthesis in PMMA was placed 24 hours after the end of the surgery. The clinical controls were carried out after two weeks, four weeks and three months.
Results: Zygomatic implants have been used for rehabilitation of the edentulous atrophic maxilla as an alternative to regenerative treatment (onlay, sinus lift) in the last two decades. Preliminary studies related to the use of computer-guided surgery for positioning zygomatic implants have been carried out under experimental conditions. Zygomatic implants passed quite near important anatomical structures and any deviation of the drills could cause serious injury to the patient; therefore, the use of a computer-guided surgical guide could help the clinician having a visual control of the drills during preparation of the implant site. The visual control is necessary, even when using computer-guided systems, in relation to angular deviation that exist due to the inherent length of zygomatic implant fixtures.
Conclusion: The placement of zygomatic implants required surgical experience, and there are risks of placement being in too close proximity to vital anatomical structures. Using the surgical template, the surgeon has a constant visual control of the preparation and this allows to check the positioning of the zygomatic implants limiting the problems associated with the angular deviation given by the length of the zygomatic implants.

Treatment of severely atrophic maxilla using zygomatic implants: hybrid vs quad technique -4 year retrospective study

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Aim: The aim of this study is to relate two surgical approach in a severaly maxillary atrophy with zygomatic implants by HYBRID and QUAD technique, concerning the position, the inclination, the length and the complication there might be, the eventual indications and contraindications there are between them.
Methods: We have been studied 32 subjects, including 20 female and 12 male treated from 2016, 62 zygomatic implants and 74 traditional implants have been performed for a total of 136 implants, 28 patients have been categorized as Hybrid rehabilitations (single or bilateral) and 4 as Quad zygoma rehabilitations. Thanks to the use of 3D software reconstruction of dicom files from the preoperative CT, the clinician had the possibility to plan, manage and modify the position of the implants and through the procedure to double scan he could print a stereolithographic model of the maxillary bone and produce a surgical template to perform guided surgery. Afterwards the immediate loading of the implants have been performed with a temporary fixed resin prosthesis. Data have been organized in a Microsoft Excel table and all the statistical analysis have been calculated with ERRE software.
Results: The analysis of the angles of the implants in Hybrid rehabilitations showed an average angle value of 38.91 ° with SD value of 8.73 ° ($p < 0.001$). Instead, the Quad rehabilitations, an overall average

value have been assessed, including the anterior and posterior implants, of 56.15 ° with SD value of 15.06 ° (p <0.001). Afterwards the angles of the anterior and posterior implants have been observed, the measured values have been respectively the following: 60.83 ° with SD of 12.91 ° and 52.14 ° with SD of 16, 56 ° (p = 0.320). The average value of distance from the head of the implant to the midline was 26.50 mm for Hybrids (SD = 6.10 mm) and 17.38 mm for Quads (SD = 9.69 mm) (p <0.001). On the subject of length of all zygomatic implants, the Quad technique has been used more implants longer than 40mm unlike the Hybrid (p<0,001). The cumulative survival rate of the zygomatic implants of the overall sample analyzed have been 100%. Follow-up have been performed at 6 months, 1 year, 2 years, 3 years and 4 years.
Conclusion: Hybrid zygomatic rehabilitation seems to be a preferable therapeutic solution compared to the Quad type, in fact we have been observed less complications in Hybrid compared to the Quad; this data are not statistically significant, probably due to the reduced number of cases treated with Quad technique, however, suggests a trend of significance. In addition, the Quad technique uses statistically longer implants and with a greater average angle, this could lead to an increase in lateral flexion forces. The possibility of being able to position the zygomatic implants distal further away from the midline in the Hybrid is certainly a big advantage about the possibility of rehabilitating the arch with more dental elements and a less prosthetic extension. According to the study and the literature, Hybrid rehabilitations seem to guarantee a better success than Quad Technique.

Impact of alveolar ridge preservation on optimal implant placement

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Aim: Alveolar Ridge Preservation (ARP) is a preventive grafting technique that aims to reduce the bone volume loss that occurs after a tooth extraction. Almost regardless of the used biomaterials, ARP has the proven ability to better the ridge dimension when compared to extraction alone. The aim of this randomized, controlled trial is to evaluate how an ARP technique by means of deproteinized bovine bone mineral and a collagen matrix could affect a prosthetically-driven implant position compared to unassisted extraction.
Methods:: Patients with a single, intercalated and periodontally uncompromised tooth to be extracted were enrolled. They underwent flapless tooth avulsion alone or with ARP, according to a random assignment to test or control group. After 6 months, a CBCT scan with a prosthetic template was performed and an implant planning was carried out with a guided surgery software. Virtual implants were placed according to prosthetic and surgical criteria and then the amount of bone around implants and, as a consequence, the need of additional grafting was recorded.
Results: : Thirty-two patients (16 per group) underwent the complete protocol. Data were assessed by a blind to the treatment operator and Kolmogorov–Smirnov's test for normality was passed by all the groups of continuous variables measurements. The mean buccal bone thickness, as measured after the virtual positioning of the implants, was 2,504±0,7762 mm for the ARP group, whereas it was 1,731±1,048 mm for the UH group (Fig.2). The difference was statically different (p=0,0244). The mean thickness of palatal bone after implant virtual insertion was 1,511±0,5751 mm for the ARP group and 1,681±0,7828 mm for the UH group, with a non-statistically significant p value (p=0,4877). No statistically significant difference between groups was detected about initial buccal bone thickness (p=0,2474), with a positive correlation at Pearson's test of r=0,5186 for ARP group and r=0,601 for HU group. According to the Single Implant Positioning Index criteria, all the patients were arranged in one of the four classes, as shown in figures 4 and 5. When compared to the UH group with Mann-Whitney's test, ARP one turned out to be favorable (p=0,332) to better classes. Four out 16 patients of the UH group underwent a grafting procedure before or during implant insertion, whereas no additional procedure was needed in the ARP group. One implant per group clinically lost stability about 3 weeks after the surgery, and it was gently removed and re-inserted after 3 months of healing by means of the same surgical template. Then, the implants followed the expected osteointegration and were loaded with full-ceramic crowns. All the thirty-two single implants were successfully rehabilitated.
Conclusion: The ARP procedure in case of single, flapless tooth extraction seems to be a reliable technique, able to reduce the need of additional surgical tissues reconstruction and, in general, to better the clinical conditions for a single-tooth rehabilitation by means of implant-supported crown.

Case report: insertion of post extractive implant and use of biomaterials

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Aim: The possibility of immediately rehabilitating an edentulous patient offers significant advantages today because it satisfies the patient's needs in terms of comfort, aesthetics and functionality and reduces the surgical phases for the professional. In particular, the concept of post-extractive implantology was developed to avoid bone resorption after dental extraction. Thanks to recent advances in biomaterials and surgical technique, the dentist has effective tools available to implement complex treatment plans. In particular, the original osseointegration operating protocols have been redefined in order to meet the growing expectations of the patient both as regards the reduction of the treatment period and the improvement of aesthetic and post-operative comfort. This work reports the post-extractive implant surgery of a single dental element.
Methods: An adult male patient with negative anamnesis had a fractured tooth (46). Therefore it was decided to extract it and to place a post-extractive implant. The extraction was performed atraumatically. A careful and delicate curettage of the alveolus was then performed. The implant chosen is AnyRidge from the Megagen implant house and has a diameter of 4.5 mm and a length of 8.5 mm. It was decided to resort to the use of THE Graft ™ produced by the Purgo Biomaterials company. It is a natural and porous bone mineral matrix. It is produced by removing all organic components from the pig bone. The implant site was subsequently closed with a 4/0 monofilament suture. At the end of the surgery, according to the protocol, some general warnings were given to the patient: he must avoid para-functions and chewing loads on the inserted implant and follow the instructions of home oral hygiene in order to promote optimal tissue healing . Antibiotics for 6 days and non-stereoidal anti-inflammatories were prescribed. The sutures were removed after 8 days and the patient was visited every 10 days.
Results: A month and a half after the operation, positive data can be observed such as the presence of the implant in the surgical site, the absence of infection, the absence of damagingl micro-movements and optimal healing of the tissues.
Conclusions: Recent works have appeared in the literature and our clinical experience allows us to declare that post-extractive implants are today a reliable alternative to traditional implantology. However, to achieve satisfactory results is necessary to select carefully the clinical case and to follow strictly the surgical and prosthetic protocols.

Full-arch rehabilitation with conical connection implants

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Aim: The aim of this paper is to present a case report of a minimally invasive complete fixed rehabilitation of a partially edentulous mandible with 5 immediately loaded conical connection implants.
Methods: A 75 years old man presented to the Department of Dentistry, IRCCS San Raffaele hospital in Milan. Anamnestic exam revealed Warfarin and Metformin assumption respectively for past heart attacks, coronary artery bypass and diabetes type II. The patient required the implant-prosthetic rehabilitation of the lower jaw that presented compromised teeth in the interforaminal area and posterior alveolar bone atrophy. After an accurate evaluation of first level (OPG) and second level (CBCT) radiographic examinations, it was decided to rehabilitate the partially edentulous jaw with 5 conical connection implants (TTc, Winsix BioSAFin). Immediate loading was performed. The day of the surgery the patient presented with an I.N.R. value of 2.2 after replacement therapy based on subcutaneous calcium heparin. Antibiotic prophylaxis (1gr Amoxicillin every 12 hours) was assumed by the patient since the day before. The surgical procedure was performed under local anesthesia (Articain 40mg/mL with adrenaline 1:100.000). The residual teeth were carefully extracted and a full-thickness flap was elevated exposing the buccal bone wall and allowing detection of the mental foramina. The implant sites were prepared and under abundant irrigation with saline solution the 5 TTc fixtures were axially inserted. Axial multifunctional extreme abutments (EAMF) were positioned and the flap stabilized with crossed mattress. After surgery, a provisional complete-arch all-acrylic resin prosthesis was delivered to the patient based on preliminary impressions. The patient was discharged without any bleeding and mouth rinsing with a CHX containing solution (0.2%) was prescribed in addition to standard post-surgical medication: ibuprofen and amoxicillin (1g,

two times per days for 5 days after surgery).
Results: one week after surgery the patient was re-evaluated, sutures were removed and a 3-months control and professional oral hygiene session was planned. After 6 months the requested OPG showed excellent bone healing. In addition, intraoral radiographs were taken to confirm the perfect fixture-abutment connection. Open tray impressions were taken for the realization of the definitive prosthesis. At 1-year control the prosthesis proved to be stable and functional, marginal bone loss was absent and peri-implant soft tissues were healthy.
Conclusions: The TTc Winsix implant proved to be very effective in reaching an adequate torque for the immediate loading because it presents a double thread coil and an undersized apex of 1.8mm less than the implant body diameter. In addition, thanks to the internal conical connection with an antirotational hexagon (taper 3°) and incorporated platform switching we got to achieve an optimal prosthetic stability and minimize the fixture-abutment microgap.

Evaluation of spiral dental implants - noris medical cortical - for post-extractive sites: a case report

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Aim: Cortical implant by Noris Medical is a spiral dental implant (SDI) with a conical internal helix that confers the characteristic of self-drilling, self-tapping, and self-bone condensing. These properties offer better control during the insertion of SDI giving a high primary stabilization, even in the poor quality bone. A shorter diameter of SDI results in reduced drilling during insertion and consequently less trauma and minimal bone loss. Immediate dental implants have greatly reduced the treatment time and the number of surgical interventions. Recently it has been noted that this treatment modality can be used in aesthetically demanding cases especially the anterior maxilla.
Methods: In the present case report a 47-year-old female patient reported to our clinic with poorly prognostic upper right second molar. After careful examination and treatment planning, immediate implant treatment was initiated. The tooth was extracted atraumatically with minimal hard and soft tissue trauma and without flap reflection. The socket was prepared to the required depth and a spiral dental implant was inserted. We placed one implant between the sockets. The defect was closed with synthetic bone, and then the suture was performed.
Results: SDIs are reliable tools for difficult cases for oral rehabilitation. They have a higher success and survival rate, which means stable results over time. It was found that immediate implant therapy has several advantages such as reduced treatment length, preservation of soft and hard tissues surrounding the implant, and reduced number of operations. Immediate implant treatment, therefore, has a great future in the treatment of aesthetic zones. The atraumatic operating technique and the immediate insertion of the implant resulted in the preservation of the hard and soft tissues at the extraction site. The patient exhibited no clinical or radiologic complications through one month of clinical monitoring after loading. The dental implant provided the patient with immediate preservation of tissues.
Conclusion: Primary implant stability and bone density are variables considered essential to achieve predictable osseointegration and long-term clinical survival of SDIs. For osseointegration of SDI, not only adequate bone quantity is required, but adequate density is also needed. The initial bone density not only provides mechanical immobilization of the SDI during healing but also permits distribution and transmission of stresses from the prosthesis to the implant-bone interface. No differences were detected among SDI lengths; implant/crown ratio. In addition, the insertion of SDIs in the banked bone can be performed without adverse effects. Finally, flapless and computer tomography-planned surgery does not significantly increase the clinical outcome of SDIs in complex rehabilitation.

Longevity of teeth and dental implants in periodontally compromised patients following periodontal maintenance in a private specialist practice: a long-term retrospective study

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Aim: Dental implants represent a successful solution for replacing lost tooth in partially edentulous patients. Nevertheless, reduced survival of dental implant has been shown in periodontally compromised patients as well as an higher marginal bone loss (MBL) and an increased risk of developing peri-implantitis, compared to dental implants placed in subjects with an healthy periodontium. The purpose of the present study was to retrospectively evaluate the longevity of implants and teeth in a long-term period (10 years) in a cohort of patients with a clinical history of chronic periodontitis.
Methods: 58 subjects (30 males and 28 females) undergoing active periodontal therapy (ATP) and regular periodontal maintenance (PM) for over 10 years were included. Clinical and radiographic parameters were statistically evaluated both in patients who lost

teeth and implants during maintenance therapy and in those who did not, considering them in six sites/tooth/implants. The clinical evaluated parameters were plaque score, bleeding score, bleeding on probing, periodontal probing depth, gingival recession and mesial and distal bone crest loss. Moreover, the relationships between the number of lost teeth/implants and the potential risk factors were also studied.

Results: During PM the significant average value of tooth loss was 0.07 teeth/patient/year (0.04 teeth/patient/year for periodontal reasons) whereas the overall value of implants loss was 0.4 implants/patients/year. The whole number of implant failures was 10% of which 9.8% of them were related to biological causes. An association between clinical factors such as attachment level, percentage of bone loss, furcation involvement and prognosis at baseline with the higher risk of incidence of tooth loss was found.

Conclusion: The results of the present study could demonstrate that in patients with chronic periodontitis who had received ATP and long-term PM, these were effective in the maintenance of the majority of periodontally compromised teeth. In the same patients there was a greater tendency to lose implants rather than teeth. Furthermore, in patients with recurrent periodontal disease, a higher incidence of peri-implantitis was statistically found. Despite this, the study was influenced by the close follow-up to which our patients were subjected and the lack of control over time could influence the results in a negative way.

Incidence of biological and biomechanical complications in implants with screwless conometric connection by Leone®

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Aim: In the modern era of dental implantology a new solution in prosthetic connections has arisen, introducing a "third way" in the historical dichotomy between cement- and screw-retained prosthesis: the screw-less conical connection. The widely-proved advantages of a Cono Morse connection (optimal bacterial seal, no microgap formation during load, optimal stress distribution) that led to its widespread applications at the implant-abutment connections can now be extended also for the prosthetic-abutment interface, without affecting final reliability and implant success. To validate this concept, the aim of our study was to investigate the incidence of adverse events in single or partial implant-supported restorations, based on the fully conometric and screw-less prosthetic-abutment connection, during an average follow-up period of 2 years from loading (min 12, max 40, average 24,9 months). Thus, a retrospective study was set.

Methods: 1 sample of 35 patients (20 females and 15 males, mean age 63,4 years) for a total amount of 62 implants (25 supporting single crowns, 37 supporting bridges up to a maximum of 4 prosthetic elements) were observed during this period and occurrence of disconnections, fractures of any of the prosthetic or implant components, mucositis or periimplantitis, or any other adverse event were recorded.

Results: No disconnections or fractures have occurred during our study, while one mucositis was diagnosed and immediately treated thanks to the easy and quick removal of the prosthetic framework. An undesired cement penetration in the implant sulcus also occurred during an intra-oral cementation of the caps. It was immediately identified at the final radiographical check-up and the cement fully removed.

Conclusion: The conical connection, gathering significant advantages from both screw-retained prosthesis, such as possibility of multiple removals and absence of cement, and cement-retained ones, such as absence of screw-access holes and predictable esthetics, can also provide a reliable prosthetic solution with no mechanical complications and a quick-and-easy removal, as our study demonstrates. In fact, despite some limitations of this study, such as relatively short follow-ups, a very low compilations-rate is clearly defined. Moreover, while literature demonstrates a strict association between mucositis and its progression towards periimplantitis, as well as high incidence of biological complications around dental implants, it is widely recognized that early diagnosis and immediate treatment are particularly crucial for a long-term success, and conometric connections, providing instant disconnection for a proper examination of the tissues and all the others aforementioned advantages, can play an important role in this.

Platform switching vs platform matching: radiographic analysis of marginal bone loss in implants with external connection

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Aim: The objective of this study was to analyze differences in the process of periimplant bone resorption between sites treated with platform switching (PS) protocol and

sites treated with platform matching (PM) protocol.
Methods: A retrospective case-control analysis of patients undergoing implant-prosthetic treatment was carried out including either patients receiving PS or PM. In total 24 patients were selected, of these: 12 patients had been treated with a PM protocol and formed the control group, while 12 patients were treated with a PS protocol and formed the test group. 36 implants had been inserted in 24 patients: out of 15 implants the PS protocol was applied and on 21 the PM protocol. For each patient, periapical radiographs were made using the long-cone technique at the end of the surgical phase (T0) and at the end of the prosthetic phase (T1). An average time range of 4-6 months elapsed between the surgical phase and the delivery of the definitive prosthesis. After collecting all the oral radiographs at T0 and T1 for each implant in each patient from both study groups, the bone height around the implant with the AutoCAD® program was assessed on each oral radiography. Measurements were performed on both mesial and distal bone height of the fixture, in such way it was possible to evaluate both the initial- (I-MBL) and the final- Marginal Bone Level (F-MBL). Subsequently, the Marginal Bone Loss (Δ-MBL) was calculated as a difference between I-MBL and F-MBL at both mesial and distal side of the implant, in addition the average Δ-MBL between mesial and distal aspect was also calculated.
Results: The calculated Δ-MBLs in the two groups were statistically compared by means of the Mann-Whitney U test. Results of this study revealed a significant lower distal Δ-MBL in the PS group than in the PM group. Indeed, both mesial Δ-MBL and average Δ-MBL showed no statistically significant differences between the two groups. It is to note, a large group of implants included in this study were inserted mesially tilted.
Conclusion: Radiographic evaluation of Δ-MBLs between implants treated with PS and PM protocols showed small differences in favor of the PS protocol at mesial side, while no differences were detected at distal side and as average between the two sites. Results of this study are limited by the small sample size, in addition, this cohort should be integrated and deepened with a radiographic follow-up of medium-long term, analyzing therefore to distance the variations of MBL mesial and distal and involving a greater number of implants and patients.

Fibronectin adsorption and osteoblastic response of a rough titanium surface compared to machined titanium

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Aim: Dental implants and osseointegration are paramount in nowadays dentistry, where rough surfaces are the preferred option. It is a known fact that surface topographical features are powerful drivers in conditioning cell adhesion and consequently bone formation adherent to the fixture. The interaction between surfaces and cells is directly mediated by protein adsorbed on the substrates. Under this perspective, key factors are represented by the proteins adsorbed on the surfaces that are recognized by transmembrane protein receptors. Especially fibronectin and its receptor (integrin α5β1) may be considered truly paradigmatics. The authors' aim is to compare one of the most clinically diffused subtractive surface modifications to machined titanium, in terms of fibronectin (FN) adsorption, early cell adhesion and osteogenic potential.
Methods: Commercially pure titanium samples were treated to generate a machined surface (MS) and a sand blasted (biomedical corindone) and acid etched (HF and HCl/H2SO4 solutions) surface (SBAES). A qualitative characterization of the surfaces was obtained through Scanning Electron Microscope, as well as surface roughness. The optical contact angle (OCA) with water (dH2O) and diiodomethane (CH2I2) was used to assess Surface Free Energy, according to the Owens Wendt method. To quantify FN adsorption, a 2% solution in Posphate Buffered Saline (PBS) was incubated at 37°C, for 30 minutes, as reported elsewhere (REF), while the pre-osteoblastic murine cell line MC3T3-E1 (ECACC, Salisbury, UK) was employed to test cell adhesion and viability. To test cell adhesion in presence of saturating values of FN 5% solution were prepared. Further osteogenic assays were performed by quantification of Alkaline Phosphate Activity and Alizarin Red Staining.
Results: S displayed the typical marks produced by the milling process and SBAES appeared as roughened surfaces with a stochastic presence of peaks and valleys. Based on Sa values, MS was smooth while SBAES was moderately rough. Skewness (Ssk) values measured on SBAES were negative, while MS resulted proximal to zero. According to kurtosis values, SBAES was bumpier than MS. As for the wetting properties of the surfaces, MS showed a quite hydrophilic behavior, while SBAES resulted slightly less hydrophilic than MS. The Contact Angle of SBAES in presence of CH2I2 reached a value of 40°. The surface free energy (SFE) as determined according to the Owens-Wendt theory was the higher for MS and lower for SBAES. Fibronectin adsorption resulted higher on SBAES than on MS in a statistically significant way; also a fibronectin coating on the surfaces was capable of reducing this effect dramatically. At 10 minutes, there were twice as many MC3T3 cells adherent on SBAES than on MS. At 1day, both surfaces sustained cell viability, but SBAES

behaved better as for cell proliferation. The difference between SBAES and MS progressively were reduced along osteogenic differentiation.
Conclusions: It is a common knowledge that different surface modifications, through their own physical and chemical features, are capable to affect cell adhesion. The capability of biomaterials to osseointegrate can be predicted based on in vitro behavior of osteoblasts. SBAES promoted higher fibronectin adsorption, more efficient cell adhesion and proliferation than MS, but this difference resulted almost absent after a longer period of osteogenic induction.

Peri-implant marginal soft tissue stability at immediate post-extraction implant sites: a case report and description of a novel technique

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Aim: It has been reported that immediate implant placement and provisionalization in the aesthetic zone is a viable treatment choice to replace failing teeth. At the same time several advantages from the patient viewpoint have been described such as reduced treatment time and employment of only one surgical intervention. Unfortunately, the resorption process is not countered by immediate implant placement and recession of the mid-buccal mucosa is not uncommon. As a consequence, to overcome this drawback, sub-epithelial connective tissue graft has broadly been employed and is still considered as the gold standard. The main aim of this case presentation is to describe a novel less-invasive and cost-effective procedure to manage post-extraction sites in the aesthetic zone
Methods: A 39-year old male patient presented with cervical external root resorption of his maxillary right central incisor. The failing tooth was removed as atraumatically as possible by detaching the periodontal ligament from the failing tooth without raising a flap. The implant site was prepared on the palatal side of the alveolus and the implant lenght was chosen in order to apically reach at least 3 mm of pristine bone. The implant diameter was selected to leave a gap between 1,5 and 2 mm which, in turn, was filled with a xenograft. After performing a 2mm pouch half-thickness incision, an bovine-derived collagen matrix soaked with rifamycin was stabilized through the provisional prosthesis.
Results: : On the same day as implant placement, a pre-formed screw-retained provisional crown was directly placed onto the implant with 20Ncm and adapted to be free from centric and lateral contacts with antagonist teeth. Thus the patient was instructed to follow a soft diet and to avoid exerting force on the provisional restoration. After a 6 months provisional phase for soft tissue conditioning, a final open-tray impression was taken at implant level using polyether impression material and a definitive all-ceramic crown was delivered. Here is reported the final aesthetic result after a 18-month-follow-up
Conclusion: Within the limits of the present case presentation, it should be noticed that a commonly available connective tissue matrix soaked with rifamycin might be considered as a suitable treatment option to separate the xenograft from the oral environment in the very early healing phases. Moreover, future studies of adequate methodology are warranted to better elucidate whether the above-reported procedure would be considered non-inferior to immediately placed and provisionalized implants plus connective tissue graft.

Digital intraoral scans of edentulous arch when using different devices: systematic review

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Aim: With the development of intraoral scanners, there has been a change in the registration of impression. The analog impression is increasingly being replaced by the digital impression, but not in all cases the accuracy and precision of the digital impression equals or exceeds the analog impression. The main problems were found in the case of completely edentulous mandibles with the presence of implants positioned distant from each other. The anatomical conditions of the tissues, such as the portion of the symphysis where we will inevitably have a reduced bucco-lingual surface, a limited height of the bone crest and the mobility of the surrounding soft tissues generate critical issues. These critical issues increase for the lower arch with the lack of anatomical references unlike the upper arch, where we can take advantage of the palatine folds. In fact, the lack of useful references to overlap the frames, together with the reduced size of the lenses of the main intraoral cameras and the average focus of 10-15 mm, makes it difficult to simultaneously capture two consecutive Scan Abutments and therefore consequently the virtual construction of the image is difficult. The aim of this systematic review is to compare the different strategies proposed in the literature in order to overcome the limitations of intraoral digital scanning.
Methods: A literature search was carried out on the subject and those that proposed methods to deal with intraoral scanner problems in case of reading implants positioned in the edentulous mandible were included.

Three studies have been identified. Both the first and the second proposed the use of a polymeric device. The third involved the use of stereophotogrammetric technology and also in this case it was necessary to carry out two scans with special flag abutments and classic Scan Abutments. In all three studies, two scans had to be performed, one with the device or the flag abutments and one without and subsequently the two scans were superimposed in order to obtain both information regarding the implant position and those relating to the tissues surrounding the implants.
Results: In the first study, it was observed that the use of the polymeric device allowed the scanner to perform a more accurate alignment and the acquisition of the position of the implants. In the second study, a statistically significant difference (P <.05) was observed depending on whether the polymeric device has been used or not. Accuracy improved when the scans were performed using the device. In the third study, the structures produced with this technique showed correct passive clinical adaptation.
Conclusion: The use of a polymeric device, or stereophotogrammetric technology allows intraoral scanners to obtain more accurate digital scans. Both the accuracy and precision values have been significantly improved. But these methodologies, even if they exceed the limits of the intraoral scanners, provide a method of execution too complex and expensive, both for the execution of individual polymeric devices, or use of stereophotogrammetric technology, both for the execution of two scans and the subsequent combination and modification of these. Therefore, further research is desirable through the identification of simpler, reliable, repeatable and validated protocols for digital acquisition in the specific clinical situations required.

Risk factors for peri-implantitis in implants inserted in augmented maxillary sinuses: a multicenter retrospective investigation with up to eighteen years of follow-up

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Aim: To evaluate the prevalence of peri-implantitis in implants inserted in augmented maxillary sinuses and to analyze possible risk factors.
Methods: A retrospective cohort study was conducted in four centers including patients who underwent lateral or crestal sinus augmentation and received dental implants before January 2018. All patients whose medical charts and previous radiographs were available were recalled. Clinical records and periapical radiographs of patients attending follow-up visits were collected using a standardized form. Univariate logistic regression analysis for both implant-level and patient-level variables was applied. In addition, a multivariate multilevel mixed effects model with random slopes was built including most significant variables of the univariate analysis. The predictive capability of the best fitted model was analyzed by means of the receiver operating characteristic (ROC) analysis.
Results: 158 patients (62 males, 96 females; age range: 20-80 years; mean: 55.0±11.5 years) with 315 implants inserted into augmented maxillary sinuses with a follow-up varying from 1 to 18 years were examined. Seven implants (2.2%) in 7 patients resulted previously lost for peri-implantitis. Peri-implantitis was diagnosed in 24 implants of 14 patients (7.6% and 8.8%, respectively). Among the considered variables, history of periodontitis, cemented restorations, sinus elevation with lateral approach and implant placement contextual to sinus augmentation procedures resulted significantly correlated with the presence of peri-implantitis at the multivariate analysis. The model showed good prediction performance with a value of area under ROC curve of 0.9142.
Conclusion: From the data of the present study, history of periodontitis and cemented restorations confirmed their well-known role of risk factors for peri-implant pathologies. In addition, both lateral window approach and the insertion of implants contextual to sinus augmentation procedure seem to represent significant risk factors for peri-implantitis. The reduction of vascular support to the residual bone crest (due to extended full-thickness flap and to the bony window removal), together with the cortical compression necessary to stabilize the implant in reduced bone height, could cause early marginal peri-implant bone loss and favor the onset of peri-implant pathologies.

Short implants versus longer implants in vertically augmented atrophic mandibles: a systematic review of randomised controlled trials with a 5-year post-loading follow-up

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Aim: To compare the clinical outcome of fixed prostheses supported by 4 to 8 mm-long implants with prostheses supported by longer implants placed in vertically augmented atrophic mandibles after a follow-up of 5 years in function.
Methods: The Cochrane Central Register of Controlled Trials (CENTRAL) and MEDLINE were searched up to 1st September 2018 for randomised controlled trials (RCTs) with a follow up of at least 5 years in function comparing fixed prostheses supported by 4 to 8 mm-long implants with prostheses supported by longer implants placed in vertically augmented atrophic mandibles. Outcome measures were prosthesis failure, implant failures, augmentation procedure failures, complications, and peri-implant marginal bone level changes. Screening of eligible studies, assessment of the risk of bias and data extraction were conducted in duplicate and independently by two review authors. The statistical unit of the analysis was the prosthesis. Results were expressed as random-effects models using mean differences for continuous outcomes and risk ratios (RR) for dichotomous outcomes with 95% confidence intervals (CIs).
Results: Four eligible RCTs which included originally 135 patients were included. Two RCTs had a parallel group design and two a split-mouth design. Short implants were 5 to 6.6 mm long and were compared with longer implants placed in posterior mandibles augmented with interpositional blocks of bone substitutes. All trials were judged at unclear risk of bias. Twelve (14%) bone augmentation procedures failed to achieve the planned bone height to allow placement of implants with the planned length. Five years after loading 28 patients (21%) dropped from the four RCTs. There were no differences for patients having prosthesis (RR = 1.46; 95% CI 0.52 to 4.09; P = 0.47; Chi^2 = 1.35, df = 3 (P = 0.72); I^2 = 0%) or implant (RR = 1; 95% CI 0.31 to 3.21; P = 1.00; Chi^2 = 0, df = 3 (P = 1.00); I^2 = 0%) failures between the two interventions, but there were more patients experiencing complications (RR = 4.72; 95% CI 2.43 to 9.17; P < 0.00001; Chi^2 = 3.02, df = 3 (P = 0.39); I^2 = 0%) and peri-implant marginal bone loss (mean difference = 0.60 mm; 95% CI 0.36 to 0.83; P < 0.00001; Chi^2 = 5.47, df = 3 (P = 0.14); I^2 = 45%) at longer implants in augmented bone.
Conclusions: Five years after loading, prosthetic and implants failures were similar between the two interventions, but complications and peri-implant marginal bone loss were higher and more severe at longer implants placed in vertically augmented mandibles. Larger trials and longer follow-ups up to 10 years after loading are needed to confirm or reject the present preliminary findings. However in the meantime short implants could be the preferable option.

Clinical and radiographic analysis of trans-alveolar maxillary sinus lift technique without grafting material, with a 15 years follow-up

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Aim: The purpose of the research was to evaluate implant success and survival rate (according to Albrektsson e Zarb's criteria) in association with the surgical procedure of trans-alveolar sinus lift without the use of osteotomes or grafting materials. The procedure uses the simultaneous positioning of the implant to support the Schneiderian membrane creating a "tent effect" similar to the socket preservation technique and relies on blood clot stabilization to ensure bone regeneration.
Methods: In this study 32 patients underwent maxillary sinus augmentation and subsequent implant rehabilitation, with the placement of a number of 52 osteotite 3i type implants, which have a rough surface and a smooth collar. All the surgeries were executed by the same operator with the same technique. The surgical procedure provides first access to the sinus with a cylindrical diamond burr with rounded tip inserted on a sonic handpiece which allows a selective osteotomy, reducing the risk to damage the sinus membrane in case of contact with it. When the sinus cortical bone is reached and consumed, a rounded probe is used to lift the Schneiderian membrane around all the osteotomy circumference. Verified the membrane integrity, the implant site is widened using biomet 3i burr sequence up to the previously established depth and the implant is placed. The success of the procedure requires a first intention healing, so a precise stitching of the surgical flap is needed. In this study the implants were loaded after an average of 8 months. The measurement of the residual bone height was evaluated before each surgery with an intraoral x-ray and a CBCT, then the width of augmentation was measured calculating the average distance between the sinus floor and the fixture apex. The implant survival was evaluated measuring annually the marginal bone reabsorption, considering the distance between the implant collar and the most coronal point of the bone crest touching the implant surface.
Results: Considering that the height of residual cortical bone was on average 7,51 mm (in a range between 3 mm and 11,80 mm) the distance measured between the alveolar crest and the sinus floor after the used procedure was on average 11,91 mm (in a range between 10 mm and 13 mm); the measure stayed

unchanged for 15 years. There weren't any failure cases in the pre-loading phases caused by lack of osseointegration or infection. During the follow-up period 7 implant failures were counted over the years due to biomechanical causes of excess of loading. The cumulative rate of survival during 21,9 years amounts to 83,67%. The average peri-implant bone reabsorption was 0,51 mm at the 10 years follow-up and 0,39 mm at the 15 years follow-up.
Conclusion: At the end of this clinical-surgical study we can conclude that the trans-alveolar maxillary sinus lift techniques without the use of grafting materials represents a biologically less invasive solution that allows to gain a stable bone augmentation in association to a high rate of implant success and survival over time.

Post-extractive implant positioning with only hypnotic analgesia in a poly-allergic patient: a case report

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Aim: The aim of this study is to report on a poly-allergic patient with dental phobia submitted to oral surgery with hypnosis as sole anaesthetic.
Methods: The patient had a previous a diagnosis of allergy to latex, NSAIDs, Lipid Transfer protein and lidocaine. She also had a dental phobia, with a VAS-anxiety score (VAS-A) of 9, a Dental Anxiety Scale (DAS) of 16 and reported previous paradoxic reaction to benzodiazepines. Therefore she refused pharmacologic sedation and asked for hypnosis. The patient needed the extraction of the element 46 due to chronic and untreatable periodontal lesion, while elements 15 and 16 were missing. The extraction of element 46 and the implant-prosthetic rehabilitation of elements 15, 16 and 46 were planned to get a correct mastication in the right side of the mouth. Hypnotic ability was tested with the Hypnotic Induction Profile; the induction score was 9, showing a high hypnotizability. Then, hypnosis was induced with suggestions of relaxation, well-being and instructions for hypnotic focus analgesia in the right lower arch, a procedure calling for less than 10 minutes. The element 46 was extracted and simultaneously an immediate implant with healing abutment was positioned. At the end of surgery post-hypnotic suggestions of post-operative analgesia in the surgical area were delivered. The position of the fixture was checked by intra-oral x-ray. The patient was visited again two months later for the follow-up.
Results: During surgery all vital parameters (spO2, NIBP, HR) remained stable. Both during and after the surgery the patient reported a full analgesia and tranquillity. At the follow-up she also reported a postoperative full well-being with no need for analgesic drugs. The implant site was checked clinically after two months, the peri-implant tissues healing was good and there was no sign of inflammation. Given the successful use of hypnosis, the implant-prosthetic rehabilitation of the edentulous part of the maxilla with a sinus floor lift and the positioning of two implants was performed with hypnotic analgesia as well.
Conclusions: Hypnosis can be considered as manageable and safe method to control dental anxiety and phobia in dentistry; it also allows for the increase of pain threshold up to the level of surgical analgesia, a fact especially relevant in selected patients (i.e., those with adverse reactions to local anesthetics and/or sedatives).

Customized non-metallic meshes for bone regeneration

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Aim: Custom-made non-metallic membranes for bone augmentation have been recently introduced as alternatives to the more commonly used titanium (Ti) meshes, in order to overcome the main drawbacks related to non-absorbable metallic membranes (e.g. high rate of exposure, need for removal before implant positioning). The aim of this systematic review was to give an overview of the development of customized non-metallic meshes for the reconstruction of bone defects.
Method: A 2-stage systematic literature research was conducted in MEDLINE (PubMed) online library for studies involving the use of customized non-metallic meshes for bone regeneration. The search was executed with various combinations of the following keywords: "mesh", "custom", "3D printing", "bone", "augmentation", "polycaprolactone", "PCL", "polyetheretherketone", "PEEK", "PLA", "polylactic acid". Only in vitro, in vivo and clinical studies in English language, published in peer-reviewed journals by 20th February 2020, were considered. A hand search was performed for completeness. The reports of the most relevant data were qualitatively analyzed.

Results: total of 130 articles were identified. Following the initial screening of titles and abstracts, 26 papers were included as relevant for the purpose of this review. After the screening of these 26 full texts, 5 articles completely fulfilled the inclusion criteria and were assessed qualitatively. One relevant article could also be extracted through hand search. The publications consisted of 1 in vitro study, 1 in vivo animal study, 2 including both in vitro and in vivo experiments, and 2 human studies. Based on our findings, the most investigated material was polycaprolactone (PCL), followed by polylactic acid (PLA), alone or in combination with lignin, and poly ether-ether ketone (PEEK). Addictive manufacturing technologies were applied for the production of the meshes in all the studies, but one, in which the tailor-made meshes were fabricated by milling. Non-metallic meshes showed better resiliency and flexibility, but lower stiffness, compared to Ti meshes. The resorbability of the investigated non-metallic meshes was confirmed both in vitro and in vivo studies. Regarding bone regeneration, when compared, no significant differences between non-metallic and Ti meshes were found. Moreover, no inflammatory events, infections, bleeding or mesh exposures were observed in most cases.

Conclusion: 3D printed or milled customized non-metallic biodegradable polymeric or composite meshes can be considered an effective alternative to traditional Ti meshes for the treatment of bone defects, though further evidence is needed to verify whether the degradation periods are sufficient for their integration and replacement by host bone tissues, if resorption of the mesh could impair the quality of the bone, while maintaining adequate mechanical properties.

Implant rehabilitation in aesthetic area with zirconia metal-free dental implants: a case report

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Aim: After an implant rehabilitation in the anterior area, one of the principal critical issues of the patient long-term satisfaction is the aesthetic result. The use of Titanium dental implants may cause grayish shimmers and unaesthetic discolorations of thin peri-implant mucosa. Being white, Zirconia implants have superior optical properties and the possibility to get an aesthetic success, a more natural one than Titanium. The aim of the present study is to analyze implant rehabilitation in anterior edentulous areas with Zirconia implants, describing surgery procedures and materials, and finally assessing the efficacy of new Zirconia implants versus Titanium implants in the aesthetic areas.

Methods: In the clinical case presented, we used metal-free AZT Zirconia implants (AZT has a greater flex resistance than the TZP Zirconia: 2000 MPa vs 1200 MPa) for their excellent soft tissue compatibility, low bacterial plaque affinity and demonstrated osteointegration. SLR, a male of 48-years-old, came to our attention for the rehabilitation of the edentulous area 1.1 and 2.1. In the absence of systemic and local contraindications for the implant surgery, SLR was included in a case series of 10 patients that needed a rehabilitation with Zirconia metal-free implants. The preview on the DTX software points out that SLR needed a pre-prosthetic surgery by means of GBR with the application of a xenogenic bone graft (Creos™ Xenogain, Nobel Biocare, Switzerland) and a resorbable collagen membrane (Creos™ Xenoprotect, Nobel Biocare, Switzerland). After 8 months, we placed two Zirconia dental implants through guided static surgery using Guided Pilot Drilling. These implants are delayed-loading dental implants; therefore, after 6 months we uncovered the implants. Using analogs, we took the impression for the temporary teeth prosthesis and then we placed the healing caps. At the same time we applicated a collagen matrix (Creos™ Mucogain, Nobel Biocare, Switzerland) to improve the healing of the soft tissues and reach a satisfactory aesthetic result. After a week we placed the temporary teeth prosthesis and we included our patient in a program of regular prosthesic visits for adjusting the prosthesis and shaping the soft tissues around the dental implants.

Results: After more than a year from the placed of the implants, the results are promising: the tissues are excellent, the peri-implant gum has a natural appearance thanks to the minimally invasive flapless surgery technique. It was also demonstrated that Zirconia may promote microcirculatory dynamics in peri-implant mucosa that are comparable to those around natural teeth. The inside implants geometry is without angles in order to transfer the forces tangentially, to allow an high rotational stability and to prevent stress concentrations. The implant and the abutment are screw-connected through dedicated screw, which is a carbon-fiber reinforced PEEK plastic in which the carbon fibers are aligned with the longitudinal axis of the material.

Conclusion: Our future goal is to complete the cases series of 10 selected patients and evaluate: biological (ppd, BOP, plaque index), functional (torque test), radiographic (BIC with a base line radiograph and a 1-year post-prosthetic radiograph) and aesthetic

parameters (WES, PES) and patient satisfaction (VAS, PSQ-18, QOLS).

Assessment of peri-implant conditions of short and ultrashort plateau design, locking-taper implants in the rehabilitation of the posterior mandibular regions: a 5-year retrospective study

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Aim: The purpose of this 5-year retrospective study was to determine implant survival, peri-implant marginal bone loss and soft tissues conditions of short and ultra-short locking-taper implants placed in the posterior mandible and restored with single or splinted crowns.
Methods: Between February 2008 and June 2015, 202 short and ultra-short locking-taper implants were placed in the atrophic posterior mandible of 94 patients with a two-stage approach and restored with single or splinted crowns. Clinical and radiographic examinations were performed at 5-year recall appointment: proportion of implant survival, crestal bone level variations (mean crestal bone loss and mean apical shift of the "first bone-to-implant contact point" position) and success rate were assessed. Mucositis was defined as probing pocket depth ≥ 4 mm and presence of bleeding on probing, while peri-implantitis was defined as bone loss ≥ 1mm and presence of bleeding on probing/suppuration when comparing the radiographs taken between the loading time and the final examination.
Results: Implants examined at 5 years from loading time were respectively: sixty-nine 8 mm-length, seventy-eight 6 mm-length and fifty-five 5 mm-length. 57.92% of patients were female and overall mean age at follow-up was 60.07±10.71 years old. Five implants failed. The overall proportion of survival was 97.52%: 98.55%, 96.15% and 98.18% for 8, 6 and 5 mm-length implants respectively, with no statistically significant differences among length-groups (p value 0.73). The implant survival for splinted and single crowns was respectively 90.62% and 98.82%, with statistically significant differences between prosthetic-groups (p value 0.02). Mean crown-to-implant ratio was 1.95±0.98: 1.38±0.27, 1.99±0.51, 2.60±0.58 for the 8, 6 and 5 mm-length implants respectively. Crestal bone level variations were not statistically different among length-groups at 5-year follow-up. 12.69% of implants presented signs of mucositis: 10.29%, 8% and 21.81% for 8, 6 and 5 mm-length implants respectively. During the 5-year follow up period, 10 subjects (10.63%) and 13 implants (6.59%) exhibited marginal bone loss of more than 1mm. Furthermore, 6.09% of implants (9.57% of patients) displayed signs of peri-implantitis: 4.41%, 6.66% and 7.4% for 8, 6 and 5 mm-length implants respectively. Overall cumulative success rate was 91.59%: 94.21%, 89.75% and 90.1% for 8, 6 and 5 mm-length implants respectively, with no significant differences between length-groups (p value 0.23).
Conclusion: Outcomes of this study suggest that short and ultra-short locking-taper implants can be successfully placed and restored with single and splinted crowns in the atrophic posterior mandibular regions. Further investigations with longer follow-up are necessary to validate our results.

Rehabilitation of the lower jaw with Trefoil™ system: a case series with 18-month of follow-up

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Aim: This case series aimed to evaluate the clinical outcomes of the Trefoil ™ system, an alternative solution to rehabilitate the lower jaw with an immediate implant fixed complete dental prostheses made with pre-manufactured prosthetic components.
Methods: From February 2018 to June 2019, patients were enrolled in a private practice by a group of clinicians with experience in implant placement and immediate loaded prostheses. The insertion of the Trefoil™ system was carefully planned by means of Cone Beam Computed Tomography (CBCT) scan analysis and measuring width and height of the residual jawbone. The minimum requirements for this system are a ridge width of 7 mm, mandibular body height of 13 mm, 3 mm of distance from the mental foramen and a mouth opening of 40 mm. With the aid of treatment-specific surgical guides and templates, three implants were placed in predetermined positions between the mental foramina and a pre-fabricated framework was secured onto the implant conical connections after adjusting the compensation mechanism for passive fit. The immediate and definitive prosthesis made with 12 acrylic teeth was delivered 3 hours later and hard reline of the intaglio was done after 6 months.

Follow-ups at 3, 6 and 12 months were scheduled and radiographic evaluation of peri-implant bone level changes was conducted. Biological and technical/mechanical complications were also assessed at all visits.

Results: Six patients were treated (1 female and 5 male) with an average age of 67 years (range 51-78 years). Three of them were smoker with a daily consumption of less than 10 cigarettes. A total of 18 implants were placed and followed for a minimum of 1 year. No complication occurred during the surgical phase or the delivery of the immediate fixed prosthesis. After 3-month, the marginal bone loss (MBL) averaged 0.6 mm (range 0.34-0.89 mm), at 6-month it was 0,65 mm (range 0.4-0.92 mm) and after 1 year it reached 0.72 mm (range 0.38-0.92 mm). Overall after 18-month all implants survived and all prostheses were free of complications. Patients's satisfaction for both esthetics and esthetics was high.

Conclusion: The present preliminary data suggest that the Trefoil ™ system can be considered a viable treatment modality for the edentulous mandible. However, further studies with a bigger group of subjects and a longer follow-up are needed.

Changes in radiographic trabecular bone density and peri-implant marginal bone around non-submerged dental implants with a laser-microtextured collar after 5 years of functional loading

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Aim: Jaw bones constantly receive functional loads, such as mastication, swallowing and parafunctional loads (grinding, clenching and tapping), that positively and negatively influence their status. Occlusal stimuli may influence jaw bone remodeling around stable dental implants. Particularly, dynamic cycles of microdamage and bone repair under occlusal functional loading could change peri-implant bone quantitative and qualitative characteristics. Attempts to reduce the peak stresses on the peri-implant marginal bone have been made by increasing the area of bone-implant contact through the modification of the micro and/or macro design of the implant collar. One promising implant collar surface treatment is the creation of microgrooves by laser ablation. The study aimed to evaluate the radiographic trabecular bone density and peri-implant vertical dimensional changes around non-submerged laser-microtextured implants (NSLI) after 5 years of functional loading.

Methods: Digital periapical radiographs of 58 NSLIs supporting fixed single crowns and fixed partial dentures in 26 patients (14 men, mean age of 52±3.8 years) were used for a comparative evaluation. Tissue Level Laser-Lok© implants (BioHorizons, Birmingham, AL, USA) were inserted by the same surgeons (RG, LT), using the same one-stage protocol. Radiographs were performed immediately at implant placement [baseline (BSL)], at temporary or definitive crowns delivery (CD) 4/6 months after surgery, and at each year after loading (T1, T2, T3, T4, and T5), with a paralleling technique using a Rinn film holder with a rigid film-object X-ray source. The bone density calculations were performed by first obtaining the grey shades of the ROI and then dividing them by the grey shades defined by a reference ROI. Then two statistical orders were identified: (a) first-order: mean gray levels, SD, and coefficient of variation; and (b) second-order or texture analysis: angular second moment, contrast, entropy, and correlation.

Results: Compared to BSL, at T5 the mesial and distal MBL showed a statistically significant gain of 0.9±0.5, and 1.0±SD 0.6, respectively ($P<0.05$). From CD to T5, mean gray levels increased from 94.4±26.8 to 111.8±27.1 ($P<0.05$), while coefficient of variation decreased from 0.08±0,03 to 0.05±0.04 ($P<0.05$). Time of loading was statistically correlated with the mean of gray level ($P<0.05$). No statistically significant correlation between variables [use of provisional denture, location, crown/implant ratio, type of prosthetic design (single or splinted)] and gray levels and texture parameters were found ($P > 0.05$).

Conclusion: Non-submerged laser-microgrooved implants showed an increase of radiographic vertical peri-implant marginal bone levels and bone density as measured by an increase mean gray levels and a decrease in coefficient of variation after 5 years of loading.

Treatment of full and partial arches with internal-conical-connection and platform-switching dental implants: clinical results after 5 years of follow-up

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Aim: Implant dentistry is nowadays a valid and predictable treatment option for the rehabilitation of partially and completely edentulous arches. Due to the high success and survival rates in the dental literature concerning dental implants, the classical "success criteria by Albrektsson" underwent an evolution so that, at the present day, the attention is mainly focused on the maintenance of the marginal bone

levels over the years. The main aim was to evaluate the outcomes of implant therapy over a period of 5 years and to analyze several patient risk factors which might influence both peri-implant tissues and implant failures over time

Methods: Seventy-eight patients were consecutively treated between 2009 and 2017 and restored with implant-supported fixed prostheses. The following inclusion criteria were applied: partial or complete edentulism; adequate bone volume at implant site for an implant at least 3.3 mm in diameter and 8 mm in lenght; a favourable maxilla-mandibular relationship; a minimum 5-year follow-up for each implant included in the measurements. Intraoral radiographs were taken at loading, 6 and 12 months after loading and annually thereafter. They were subsequently stored on a personal computer and analyzed to determine the bone level changes. Peri-implant bone resorption was assessed at bone levels both measially and distally with respect to the implant head.

Results: 78 patients receiving 209 dental implants were considered at baseline. One – hundred implants were inserted in the maxilla while 109 were inserted in the mandible. 11 out of 78 patients (14,1%) did not complete an observational period of at least 5 years and, consequently, were considered as drop outs. 3 implants were diagnosed with peri-implantitis. The average final probing pocket depth at implant level was 2,5 +/- 1,2 mm. The average final bone loss after 5 years was 0.3 +/- 0.4 mm. The effect of prosthesis design, sex and implant site did not statistically influence the marginal bone loss; On the contrary, marginal bone loss was significantly different between smokers and non-smokers (p= 0.021)

Conclusion: Within the limits of the present study, dental implants characterized by reduced microgap and micromovements at the implant-abutment connection interface showed stable peri-implant bone levels after a medium-term follow-up. Newer and stricter success criteria should be considered when reporting implant prognosis. Nevertheless, additional prospective clinical data with adequate methodological design and follow-up are warranted to confirm the trends found in the present study.

The impact of graft remodeling on peri-implant bone support at implants placed concomitantly with transcrestal sinus floor elevation: a multicenter, retrospective case series

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Aim: To evaluate the impact of the remodeling dynamics of varying graft biomaterials used for transcrestal sinus floor elevation (tSFE) on peri-implant bone support (as assessed on periapical radiographs).

Methods: The study is a multicenter, retrospective series of cases of tSFE (performed according to the Smart Lift technique) and concomitant implant placement. According to the operative sequence of the Smart Lift technique, a autogenous bone core (BC) was isolated with the trephine drill during implant site preparation, then condensed, and malleted to fracture the sinus floor by means of a calibrated osteotome. At the operator's discretion, the elevation of the sinus floor was performed with BC either alone or associated with deproteinized bovine or porcine bone mineral (DBBM and DPBM, respectively), synthetic hydroxyapatite in a collagen matrix (S-HA) or ß-tricalcium phosphate (ß-TCP). Immediately after surgery, at 6–12 months post-surgery, and at later (≥24 months) follow-up intervals, the percentage proportion of the implant surface in direct contact with the radiopaque area was calculated for the entire implant surface (totCON%). Also, the height of the graft apical to the implant apex (aGH) was assessed. Two analyses were performed on totCON% and aGH: analysis 1, based on data obtained by all radiographs available for the following observation intervals: immediately post-surgery, 6–12 months, and later observation intervals up to 72 months; and analysis 2, based on data from patients where radiographs had been taken at 6, 12, and 36 months.

Results: Analysis 1 showed that at 6–12 months, the implant surface was embedded in radiopacity for its entirety (totCON% = 100%) either in the entire study population or within each treatment group. When the overall population was considered, median totCON% was 100% up to 60 months and decreased to 84.6% at 72 months. At 6–12 months, median aGH was 1.4 mm, being positive in 88% of the cases. However, median values and prevalence progressively decreased throughout observation intervals. As for analysis 2, totCON% showed a significant reduction from 6 to 36 months within DBBM and β-TCP groups (p = .011 and p = .009, respectively), whereas it showed stability throughout the study for S-HA, and DPBM groups. All grafting procedures experienced a

significant, progressive reduction in aGH from post-surgery to 36 months. No significant inter-group differences in totCON% and aGH were found at each observation interval.
Conclusions: Although the height of the peri-implant radiopaque area apical to the implant apex tends to reduce overtime at sites which have received tSFE, the peri-implant bone support seems to be maintained long term irrespective of the graft material used.

Hyaluronic acid evaluation in the treatment of dental implant surfaces and latest generation prosthetic components: in vitro experimental analysis

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Aim: Implantology is a branch of dentistry that has achieved excellent results in recent years. The fundamentals of osseointegrated implantology have undergone important changes that have made it possible to change the therapeutic techniques of this profession thanks to the introduction of more efficient and versatile components to be used in oral rehabilitations. Implant-supported prostheses have greater benefits when compared to conventional fixed cemented retained prostheses or removable dentures. The titanium dental implant stimulates the bone and maintains its size in a similar way to natural teeth. The purpose of this work is to focus attention on the latest generation of surface treatments and, specifically, on hyaluronic acid capable of interacting with the biological responses of the host, determining positive biological implications during the first stages of healing.
Methods: Analysis of the literature shows the following results. Hyaluronic acid is a non-sulphurous glycosaminoglycan free of protein core, it is made up of long sequences of glucuronic acid and N-acetylglucosamine. The choice of hyaluronic acid is justified by its presence in the human body as a component of the extracellular matrix and by its characteristics of osteoconductivity and positive action on the progenitor cells responsible for creating bone. Hyaluronic acid covalently bonded to the titanium surface of the implant increases bone growth and determines greater maturity for the interfacial bone. The same shows a decrease in inflammation during wound healing since, by increasing the wettability of the surface in contact, it favors the organization of the blood clot and all other closely related phenomena. Scientific studies analyze the effects of hyaluronic acid in the post-surgical phase. The evaluation of the TNF-α on the experimental group showed a higher value for osteoblasts and osteocytes if compared to the control group. On histomorphometric and histochemical analysis, newly formed bone tissue showed greater presence of osteoid tissue and new bone tissue was found in the experimental group. The surface study by X-ray photoelectron spectroscopy showed a layer of titanium oxide on the surface with the presence of high percentages of pure titanium and nitrogen.
Results: With the analysis of surface by atomic force microscopy it has been shown that the layer of hyaluronic acid deposited on the implant surface interacted with the surrounding bone by virtue of its chemical qualities and not correlated to the surface modification at the topographical level. Finally, the micro-TC evaluation confirmed BIC, BAIT and BAOT values more represented in the experimental group than in the control group with a high degree of osseointegration; the lower turns with woven bone and the upper turns with the bone cortex. Type I collagen used as a coating affects the migration, adhesion, proliferation and differentiation of cells on titanium implants, promoting early osteogenesis.
Conclusions: The aim of this research was to demonstrate that, in the osseointegration phases, there is an acceleration around the implant site. Hyaluronic acid has a chemotactic effect on inflammatory cells thus resulting in a faster healing response. The data are still not sufficient to conduct a review and further studies are needed.

Peri-implant tissue conditions at implants treated with sub-periosteal peri-implant augmented layer technique: a retrospective, cross-sectional study

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Aim: To assess peri-implant tissue conditions on the short-term in patients receiving the Sub-periosteal Peri-implant Augmented Layer (SPAL) technique compared to patients with adequate thickness (≥ 2 mm) of the peri-implant buccal bone plate (PBBP) at placement.
Methods: Patients where a deficient or thin PBBP at placement was corrected by SPAL technique (SPALdehiscence and SPALthin groups, respectively) and patients presenting a residual PBBP thickness

≥ 2 mm after implant insertion (control group) were retrospectively selected, with each patient contributing one implant. Patient treated with the SPAL technique received an uncovering procedure in association with either an apical positioned flap or a free gingival graft to crate or increase keratinized mucosa, while implants in the control group received the healing abutment at placement (one-stage procedure). The number of peri-implant sites positive to bleeding on probing (BoP) at 6 months following prosthetic loading was the primary outcome. Also, height of keratinized mucosa, marginal soft tissue level, plaque Index, peri-implant probing depth, suppuration on probing and radiographic bone level (RBL) were compared between groups.
Results: Thirty-four patients (11 in SPALdehiscence group, 11 in SPALthin group and 12 in control group) were included. The vast majority of the patients were non-smokers (90.9% in SPALdehiscence group, 90.9% in SPALthin group, and 75 % in control group). No differences in age, gender and smoking status were observed among groups. In each SPAL group, 10 patients (90.9%) showed peri-implant tissue thickness ≥ 2 mm at the most coronal portion of the implant at uncovering. Implants in SPALdehiscence group were predominantly located in the mandible whereas implants in SPALthin and control group were predominantly placed in the maxilla, however, no statistically significant difference in implant position were found between groups. No implant was lost during the follow up period. No inter-group significant difference in the number of BoP-positive sites was found. Among secondary outcomes, only a significant difference in RBL was found between SPALdehiscence group (0.3 mm) and control group (0 mm).
Conclusion: After 6 months of prosthetic loading, patients treated with SPAL show similar peri-implant soft tissue conditions compared patients with adequate thickness of the PBBP at placement. When SPAL is applied to correct a peri-implant dehiscence, however, a limited, although significant apical shift of the interproximal bone level may be observed.

Assessment of peri-implant conditions of short and ultrashort plateau design, locking-taper implants in the rehabilitation of the atrophic upper maxilla: a 5-year retrospective study.

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Aim: The purpose of this 5-year retrospective study was to determine implant survival, peri-implant marginal bone loss and soft tissues conditions of short and ultra-short locking-taper implants placed in the upper maxilla and restored with single or splinted crowns.
Methods: Between February 2008 and June 2015, 135 short and ultra-short locking-taper implants were placed in the atrophic maxilla of 63 patients with a two-stage approach and restored with single or splinted crowns. Clinical and radiographic examinations were performed at 5-year recall appointment: proportion of implant survival, crestal bone level variations (mean crestal bone loss and mean apical shift of the "first bone-to-implant contact point" position) and success rate were assessed. Mucositis was defined as probing pocket depth ≥ 4 mm and presence of bleeding on probing, while peri-implantitis was defined as bone loss ≥ 1mm and presence of bleeding on probing/suppuration when comparing the radiographs taken between the loading time and the final examination.
Results: All implants, placed in the posterior maxillary regions and examined at 5 years from loading time, were respectively: fifty-seven 8 mm-length, forty 6 mm-length and thirty-eight 5 mm-length. 53.96% of patients were female and overall mean age at follow-up was 58.55±15.28 years old. Four implants failed. The overall proportion of survival was 97.04%: 96.5%, 95% and 100% for 8, 6 and 5 mm-length implants respectively, with no statistically significant differences among length-groups (p value 0.12). The implant survival for splinted and single crowns was respectively 100% and 97.5%, without statistically significant differences between prosthetic-groups (p value 0.6). Mean crown-to-implant ratio was 1.96±0.62: 1.65±0.62, 2.15±0.47, 2.45±0.54 for the 8, 6 and 5 mm-length implants respectively. Crestal bone level variations were not statistically different among length-groups at 5-year follow-up (p value 0.83). After 71 months 13.07% of implants presented signs of mucositis: 9.09%, 10.52% and 21.62% for 8, 6 and 5 mm-length implants respectively. During the 71 months follow up period, 11 subjects (17.46%) and 16 implant sites (12.3%) exhibited marginal bone loss of more than 1mm. Furthermore, 7.69% of implants (14.28% of patients) displayed signs of peri-implantitis: 9.09%, 7.89% and 5.26% for 8, 6 and 5 mm-length implants respectively. Overall cumulative success rate was 89.56%: 87.72%, 87.5% and 94.6% for 8, 6 and 5 mm-length implants respectively, with no significant differences between

length-groups (p value 0.2).
Conclusion: Outcomes of this study suggest that short and ultra-short locking-taper implants can be successfully placed and restored with single and splinted crowns in the atrophic upper maxillary regions. Further investigations with longer follow-up are necessary to validate our results.

Digital flow to optimize the properties of tantalum implants: a case report with 1-year follow up

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Aim: Porous tantalum trabecular metalis (PTTM) is an open-cell porous biomaterial with a structure consist of the repeatitions of three-dimensional dodecahedron, similar to trabecular bone . PTTM implants are charaterized by great biocompatibility, osteoconductivity, bone ingrowth and vascularization in both in vitro/in vivo experiments and in human studies. In addition, PTTM structure allows neovascularization and new bone formation directly into the implant. Thanks to these characteristics, PTTM implants can be placed when immediate provisionalization loading is required or sooner insertion of permanent prostheses is demanded. This case report has the scope to evaluete and test the chance to optimize the properties of the tantalum implants with a digital flow. The goal is to ultimate the definitive crown a few days after surgery.
Method: A 56 years old female patient came to our attention for the loss of a superior element due to caries. Based on anamnestic analys, the patient was classificable as ASA 2. The clinical exam revealed the absence of the dental element 1.6 with a large volume of keratinized tissue. A Cone Beam CT (CBCT) was requested to evaluete an implant treatment. The study of the CBCT allowed the placement of a PTTM implant 4.1 mm x 11x5 mm (Zimmer Biomet Dental) without any kind of bone regeneration. To achieve an adeguate torque for the immediate loading, the bicortical stabilization was chosen. During the surgery, a digital dental scan was taken to create a digital customized healing screw. The same scan was used to make the definitive crown, that was fixed to the implant 15 days after the surgery. The definitive prothesis was made in monolithic zirconia (Catana Kuraray Noritake Dental) with a Gen Tek Ti-base (Zimmer Biomet Dental). Maximum attention has been paid to masticatory contacts, especially to eccentric ones, in order not to affect the process of osteointegration. The patient was followed radiographically and clinically every 2 months and a professional oral hygiene program was scheduled with recalls every 6 months.
Results: One year after the surgery and the prosthetic loading, the implants showed no clinical or radiographic issues, peri-implant marginal bone levels appear to be stable and the patient is fully satisfied.
Conclusion: The completely digital flow is a process that allows to maximaze the properties of PTTM implants. However, other sudies are necessary to validate this result.

Implants and prosthodontics in aesthetic region: comparison of clincal management

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Aim: The implant treatment of the aesthetic zone is a challenging procedure. Indeed, the result must be not just functional, but even aesthetic and stable during the time. The aspects to take into consideration are the tridimentionally controlled implant placement, buccal bone stability and the thickness of the kertinized tissue.
Methods: Case Report 1 - A patient presented with a traumatic fracture of element 2.1. This tooth had an hopeless prognosis, so the extraction was the treatment of choice. Base on the presence of the buccal cortical bone on Cone Beam CT (CBCT) and the thick gingival biotype, a post-extractive implant was scheduled. After the implant placement, deproteinized bovine bone graft was packed between the implant and labial socket wall and connettive tissue was grafted with bilaminar technique. A maryland bridge was bonded with the Chu and Tarnow's Socket Seal technique. This approach allow to protect the socket and to modulate the gengival healing, maintaining the buccal gingival profile and papillae. After 4 months, the implant was uncovered and a second connettive graft was placed. Meanwhile, a temporary crown was fixed to the implant and gradually modified to shape the transmucosal route. When the correct profile was achieved and stabilized, the porcelain crown was created coping the temporary.
Case Report 2 - A patient presente with a traumatic fracture of element 1.1. CBCT showed the anchilotic retained root and the absenced of the buccal bone. At the extraction time, it was appreciable the large buccal bone dehiecence,that could be regenerated.

A graft composed by a mixture of autologous and eterologous bone was placed and covered with resorbable membrane. After five months, the implant was placed with a virtually planned guided surgery and a eterologous graft corrected the bone profile. The implant uncovering was performed after 4 months placing a connetive graft with the bilaminar technique. Contestually, a temporary crown was fixed at the implant. The temporary crown profile was gradually changed to create a good symmetry with the controlateral tooth. Then it was copied to create the permanent crown.
Results: After 3 years, in both cases it is appreciable a stability of mesial and distal bone peaks, the absence of gum inflamation and the mimetism of the rehabilititation.
Conclusion: The achievement of aesthetic and stable during the time in the aesthetic region required a specific study of the case and a good planning of the intervention.

Implant-prosthetic rehabilitation in patient with bilateral maxillary edentulism by lateral way sinus-lift

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Aim: The authors report the case of a patient with reduced periodontium to whom the posterior superior elements were extracted. The patient refuses a mobile rehabilitation and asks for an implant-prosthetic rehabilitation without removing the remaining dental elements. The patient presents a maxillary bone atrophy of V cl Cawood & Howell, therefore it was decided to intervene with a maxillary sinus elevation therapy with a lateral approach for the positioning of four implants, two in each hemiarch. A prosthetic rehabilitation is then performed with screw-on metal-ceramic bridges in both implant sites.
Methods: The 61-year-old patient F.G. came to the Dental clinic of Padua to improve the situation in her oral cavity. During an accurate examination, it was possible to notice that the patient presented: Kennedy's 1st class, bone atrophy of V class by Cawood & Howell and reduced periodontium in the anterior elements. The patient used to wear an upper prosthesis and wanted to intervene in the edentulous saddles with an implant-prosthetic rehabilitation. Before implant positioning, the patient is advised to undergo a process of bone regeneration to raise the maxillary sinuses. After an orthopantomography and a CBCT, a surgery to lift the sinuses is performed using a lateral approach in the two bilateral edentulous areas. The site was accessed via full thickness flap with a mesial release incision, and an oval shaped bone flap is set up using rotating and piezoelectric instruments]. The preparation of the cavity for the sinus lift is performed with a cylindrical diamond bur before perfecting the cavity with piezoelectric instruments. This allows the creation of a space that is eventually filled with Geistlich Bio-Oss® Biomaterial. 3i Biomax implants are inserted during the same session by means of a previously lab-prepared surgical template. It takes 4 months before uncovering and inserting the healing screws. Four healing screws are inserted at 1.6 - 1.4 - 2.4 - 2.6 to allow gingival conditioning and the emergence profile of the implant-prosthetic artifact. A post-operative radiographic check is then performed [fig. 6]. After 4 months, in which the patient wore her temporary relined prosthesis to make room for the healing screws, a prosthetic rehabilitation begins with a 1.6-x-1.4 bridge and 2.4-x-2.6 bridge. The prosthetic products consist of two metal-ceramic bridges screwed onto implants.
Results: The patient comes to the Dental Clinic for the following check ups after the implant insertion, and for suture removal, with both the wound and the sinuses lift process satisfactorily healed. The response of the tissues is extremely good after inserting the healing screws.
Conclusion: At the end of the prosthetic rehabilitation, the patient does not complain of any impediment or difficulty in occlusion. In fact, all the pre-contacts and the impediments are assessed. At a follow-up evaluation, the patient declares that she is very satisfied with the result.

Histological and histomorphometrical evaluation of a new implant macrogeometry. A sheep study

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Aim: The aim of the present work was to test, in an in vivo sheep study, if healing chambers between the threads could produce a better osseointegration process.

Methods: Thirty titanium implants (15 conventional design and 15 implants with healing chambers) were inserted in a random fashion in the tibia of sheep. The animals were euthanized after 30 days of healing, and the retrieved specimens treated to obtain thin ground sections. In all specimens the measurements were made on the following landmarks: the top of the implant (TI); the first bone implant contact (FBIC); the lower portion of the cortical bone (LCB), the most apical newly formed bone in contact with the implant (NB); the apex of the implant(A). All measurements were made at both sides of the implant; in parallel to the long axis of it. The first bone implant contact were measured between TI and FBIC, while the newly formed bone, in contact with the implant surface, was measured between LCB and NB.The distance between FBIC and LCB (cortical compartment) and the distance between NB and A (medullar compartment) were also evaluated to measure all tissues in contact with the implant surface. In particular, in the cortical space the presence and the amount of new bone, pre-existing bone and soft tissues were evaluated. Differences between the experimental conditions were statistically analysed.
Results: A total of n°11 implants for the Control group, and n°14 implants for the Test group underwent analysis. In all samples it was possible to observe that the coronal portion of the implants were in contact with cortical bone while the middle and apical implant portions were included in large marrow cavities, both in Control and Test groups. Histological analysis was performed both in the cortical and in the marrow compartments. Cortical Compartment: In these portions it was possible to observe osteoblastic activity with a rim of osteoblasts, depositing osteoid matrix directly on the implant surface. The TI-FBIC was, respectively 932±729, and 453,3±605,3 µm in the Control and Test groups. The contact between newly formed bone and implant surface was 873,6±428,3 µm in the Control group, while in the Test group was 1839,0±1088 µm. In this portion, the soft tissues were poorly represented. Marrow Compartment: Histological observations showed that the quantity of newly-formed bone growing in an apical direction was lower in the Control group (1095 µm) when compared to the Test group (1658 µm). This difference was statistically significant. The thickness of this osteogenic matrix was from 14,4 to 185,6 µm in the Control group and from 15,1 to 270,9 µm in the test Group.Moreover, a layer of osteogenic matrix was present around the portion of implants immersed in the marrow spaces. This osteogenic tissue was thicker in the Test group.
Conclusion: the present study confirmed the very good results in implants with healing chambers, with a significantly higher percentage of new bone formation and a larger area of an osteogenic matrix in the marrow space.

Cortical implants: a case series

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Aim: Nowadays, the method of post-extraction implants is increasingly to be taken into consideration and required. The aim of this study is to present a series of cases involving the use of this method with the insertion of spiral dental implants (Noris Medical). It has recently been noted that this method can also be used in aesthetic cases, especially in the anterior maxilla. They are particularly indicated in atrophic, low density bone sites or in post-extractive sites.
Methods: In our case series we have recruited cases of patients with elements with poor prognosis following clinical analyzes and radiological examinations, candidates for replacement by post-extractive implantology with deferred load. All patients were in good general health. Antibiotic prophylaxis was administered 1 hour before surgery with 1g of amoxicillin + ac. Clavulanic and subsequently, a 500g therapy every 12 hours for 5 days, accompanied by administrations of an analgesic 2 times a day. The same protocol was followed for all patients. After local anesthesia with 2% lidocaine and epinephrine 1:100.000, the teeth were extracted slightly traumatically, with minimal trauma of both soft and hard tissues and without the need for a flap reflection. Any granulation tissue was removed and the alveolus washed with physiological solution. The sockets were prepared of the required depth. The defect was closed with the aid of synthetic bone. The suturing of the sites was obtained with a 3/0 Vicryl thread. The sutures were removed after 14 days. The second phase of the intervention was carried out after 3 months for the jaw and 4 for the maxilla. The implants were exposed with caution, without damaging the surrounding bone.
Results: Spiral dental implant (SDI) is an implant with a conical internal helix that confers the characteristic of self-drilling, self-tapping, and self-bone condensing. These proprieties offer better control during insertion of SDI giving a high primary stabilization, even in poor quality bone. They also allow us to insert the implant near important anatomical structures (alveolar nerve, maxillary sinus). A smaller diameter of the implant leads to less effort during insertion and consequently to minor bone trauma. Post-extraction implants have drastically reduced treatment time and surgical sessions.

Patients were monitored over time and did not detect any clinical or radiological complications after loading. **Conclusions:** In conclusion, SDIs are reliable tools for the rehabilitation of post-extraction cases. They have a higher chance of success and survival. There was no difference between the lengths of the implants and between the different implant / crown ratios.

Marginal bone maintenance around implants placed at subcrestal level: a 2 to 9 years retrospective cohort study

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Background: The design and the location of the implant-abutment interface (IAI) has been deeply examined to minimize the early marginal bone resorption. Some recent clinical trials evaluated the peri-implant tissues alterations to implants placed at subcrestal levels at 12 and 18 months.These studies did not found any influence in the short term of the vertical positioning of the implant. However, at the present day, the scientific evidence regarding the marginal bone maintenance in the long-term of subcrestally placed dental implants is scarce
Aim: The aim of the present retrospective cohort study was to assess the long-term marginal bone changes around implants initially placed at subcrestal level (namely 1 mm).
Methods: Patients with different types of edentulism were treated with implants subcrestally positioned. Different types of fixed restoration were selected to restore patients edentulism: fixed single crown (SC), partial fixed prosthesis (FPD), full fixed prosthesis (FFD) or Toronto Bridge (TO), respectively. Peri-implant bone levels were measured after prosthesis installation (t0) and after the last follow-up visit (t1). t0 and t1 values were compared. Every patient was followed for a minimum period of 2 years.
Results: Ninety-three patients (44 males and 49 females) aged from 22 to 86 years (mean age 57,3 years) were consecutively followed for a minimum of 2 years from the definitive prosthesis installation and included in the present study. A total of 410 implants were positioned and the average follow-up period was 2,72 years. Two-hundred thirty-one implants were inserted in the upper jaw, while 179 in the lower one. Mucositis and peri-implantitis were detected and treated 21 and 4 times, respectively. Mean marginal bone levels (MBL) of -1.09 (sd 0.65mm) and -1.00mm (sd 0.37mm) were calculated at baseline and at last follow-up visit, respectively. No statistical difference (P>3.27) was observed between baseline and the last follow-up visit. Mean MBL change after 2 years of follow up was significantly lower than that > 2 years (p<0.001). After 2 years a decrease of marginal bone level (-0.24 mm) was observed, while an increase of marginal bone level (0.020 mm) was showed for implants with 3 to 9 years of follow up.
Conclusions: Within the limits of the present investigation, a subcrestal implant placement could not be a negative prognostic factor for peri-implant bone stability, if the level of subcrestal placement is approximatively of 1 mm. Such outcomes are related to implants with internal conical connection and a platform shifting of the implant abutment.

Dental implants as a treatment option in irradiated patient: systematic review

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Aim: Clinical experience shows that cancer patient often represents a challenge: treatment requires continuous collaboration between the patient and the doctors. If radiotherapy is also associated with surgical treatment, the vitality of hard and soft tissues is altered: microvascular disorders, interference with the metabolism and with the remodeling of mineralized tissues are frequent sequelae of radiotherapy. The goal of treatment is to give the patient the opportunity to communicate, masticate and maintain a certain level of social life. In the last twenty years the advent of osteo-anchored craniofacial prostheses has broadened the horizons of maxillofacial prosthetic rehabilitation. Advances in diagnostic imaging, surgical techniques and treatment techniques have enabled a higher survival rate and an increased life expectancy for patients with cancer. This work aims to evaluate, through a systematic review of the literature, whether implant rehabilitation represents a therapeutic option in the patient undergoing radiation therapy.
Methods: A systematic review was conducted using the PubMed platform (from January 2010 to March 2020) to identify the articles to be included according to the inclusion and exclusion criteria. The keywords used were ("dental" OR "osseointegrated") AND ("implant") AND ("radiotherapy" OR "irradiated patient).
Results: The "Pubmed" database identified 627 studies. The eligibility process and quality assessment selected a total of 7 publications to be included in this review. A total of 693 implants were inserted in 206 patients,

with an overall failure rate of 11.4%. The implant success rate varies from 76.5% to 100%. The optimal interval between irradiation and implant insertion varies from at least 6 to 12 months.
Conclusion: The time interval between radiation therapy and implant insertion, as well as the radiation dose are not associated with a high rate of implant failure. Greater survival rates were identified in implants placed in the mandible, compared to those in the maxilla; in addition, there was an association between survival rate and anterior positioning of the implants. Implant insertion into irradiated bone is possible and can be considered a therapeutic option in the treatment of irradiated patients. Radiation therapy should not be considered as a contraindication for this type of surgery.

Osseointegration and implant's surface

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Aim: The process of osseointegration on an implant surface includes quite complex phases and the involvement of multiple factors, which influence the result both in terms of quantity and quality. The most important are surface microstructure and chemistry. Thus various surface treatments have been developed, which allow the topography to be roughened, so that osseointegration takes place as correctly and satisfactorily as possible. The gold standard is represented by rough surfaces on titanium implants, in particular the SLA (sandblasted and acidetched) surface which combines the advantages provided by the two subtraction techniques blasting and etching in a single treatment. In modern implantology there are other types of surfaces and topographies capable of producing osseointegration. The aim of this study is to show the current state of knowledge concerning the different types of surfaces and topographies of dental implants linked to their ability to produce osseointegration, with reference to zirconia and treated laser surfaces.
Methods: This study was conducted by analyzing literature articles on the last 10 years written in English and searched in the PubMed and Cochrane Library databases. Terms such as "osseointegration", "implant surfaces", "implant topography", "titanium implants", "SLA surfaces", "zirconia implants", "laser-treated surfaces" were used for the research.
Results: All titanium and zirconia implants achieved the osseointegration with excellent bone-implant contact, especially those with titanium SLA surface. After a 10 years follow up, titanium implants showed a marginal bone loss occurred in 1-2% of implants affected by periimplantitis According to a systematic review, the survival rate and marginal bone loss of zirconium oxide dental implants stabilized with yttrium oxide, supporting SCs and FDPs after 1 year are increasing and comparable to data on two-pieces titanium implants. Furthermore, short-term cumulative survival rates and marginal bone loss of zirconia implants are promising and improving. Few significant results have been found on laser treated surfaces, due to their short clinical follow up, but it seems that the laboratory studies show a topographiical roughness superior to that created by subtraction, and avoiding also thermic and structural alterations of the bulk.
Conclusion: SThe results confirm the titanium implant and the SLA surfaces are the gold standards in implant rehabilitations, but a new approach should be adopted in treating zirconia. The zirconia implantss,despite the lack of sufficient long term support tests, have several good qualities such as biocompatibility, aesthetic and low percentage of bacteria colonization. They seem to have only a flaw: the low fracture resistance, but with new materials and manufacturing processes this can be improved, becoming a real alternative to titanium implants as a non-metallic implant solution. Finally, the surfaces treated with laser have few clinical evidences but the surface's treatment is very controlled and accurate, creating a specific topography.

Laser in Dentistry

Immediate dental implants placement in post-extraction-infected sites decontaminated with laser: a retrospective cohort study

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Aim: In recent years, the immediate insertion of an implant after tooth extraction (Type 1 implant insertion protocol) has become a common treatment option. Placement of dental implants into fresh extraction sockets offers advantages such as reduced treatment times and enhanced patient comfort. The aim of the present retrospective study is to analyze the success of immediate dental implants placed in post-extraction-infected sites decontaminated with laser. The secondary objective is to record the following parameters to evaluate implant success: implant failures, complications, marginal bone loss from placement to follow-up.
Methods: This study is a retrospective study to verify the success of immediate dental implants placed in infected sites decontaminated with Er,Cr:YSGG laser (test group) compared with the bone loss around implants placed in non-infected sites (control group). Inclusion criteria were: patients who received immediate dental implant therapy placed in infected sites decontaminated with lasers and patients who received immediate dental implant therapy placed in non-infected sites. Outcome measures considered for the study were: implant failures, complications, marginal bone loss from placement to follow-up. Sample size calculation was performed to detect a difference of 0.2 mm in bone loss between the two groups after at least 12 months of follow-up. Using a standard deviation of 0.22 mm of bone loss of immediate implants placed in post-extractive infected sites irradiate with Laser (Montoya-Salazar et al. 2014), $\alpha = 0.05$ (type I error), at least 20 patients per group need to be enrolled to achieve 80% power (type II error of 0.20). For the radiographic analysis, an intra-rater agreement was carried out: an a-priori independent sample of 20 measured implant surfaces was measured twice, 2-weeks apart. The two-way intra-class correlation coefficient for radiographic intra-rater agreement analysis was calculated and a mixed effect model REML (REstricted Maximum Likelihood) was used.
Results: Preliminary results show the success of post-extraction implants in infected sites. One hundred and fifty implants were involved in the study; only one implant in the test group failed, while another implant had complications. No implants from the control group were lost. All implants (Straumann®) were inserted with a minimum torque value of 35N, 1mm below the most apical bone peak, and twenty-nine of them have been immediately loaded. To improve bone healing, Bio-Oss® and a resorbable membrane were used in a lot of cases. No sockets presented signs of residual infection during follow-up. This study shows how immediate placement into infected sites does not lead to an increased rate of complications, nor compromises tissue integration, provided that appropriate clinical procedures are followed to achieve good socket decontamination. The high success rate reported appears to justify the use of laser devices to obtain good socket disinfection.
Conclusion: Immediate implant placement in infected

post-extraction sockets does not seem to increase failure risk, provided that certain clinical procedures are followed. Within the limits of this study, decontamination and debridement of an infected socket using an ErCr:YSGG laser device is an effective and practical tool to prevent retrograde peri-implantitis and infective complications, when placing immediate post-extractive implants. Further studies are needed to investigate a precise role for laser irradiation in this connection.

Efficacy of photobiomodulation and platelet rich fibrin in preventing osteoradionecrosis: a pilot study

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Aim: Osteoradionecrosis (ORN) of the jaws is a side effect of radiotherapy for head and neck tumors. The current prevention protocol for ORN includes the prophylactic use of pentoxifylline and tocopherol. In addition, the employment of photobiomodulation (PBM), through a laser source, has beneficial effects on tissue biostimulation and remodeling, acting on angiogenesis, inflammation, analgesia and immune-modulation. Moreover, autologous platelet rich fibrin (PRF) releases growth factors resulting in osteoid production and cellular proliferation. The aim of this randomized single-blind controlled trial is to assess the efficacy of laser therapy and PRF in counteracting ORN and its local complications.
Methods: Patients, scheduled for tooth extraction, that previously underwent radiotherapy for head and neck tumors were included in the trial. Patients were randomized into four groups: one control group and three study groups. To all patients was prescribed a prophylactic therapy (pentoxifylline 800 mg daily and tocoferol 400 mg daily) starting from one week before up to 10 days after the tooth extraction. The groups 2, 3 and 4 received additional therapies: laser therapy, PRF and laser therapy plus PRF, respectively. Patients were assessed at baseline (T0), the day of surgery (T1) and 1 (T2), 2 (T3), 7 (T4), 14 (T5) and 120 days later (T6). At T1 the following data were recorded: interincisal distance (mm), intensity of pain (0-10 numerical rating scale), duration of surgical intervention (seconds) and bleeding (yes/no). Parameters regarding consumption of pain killers, presence of swelling, hematoma, suppuration, dehiscence, necrosis, anesthesia, paresthesia, dysesthesia and bone exposure were also recorded during each follow-up. Additionally, patients' quality of life (QoL) was evaluated at T4 by a questionnaire focusing on changes in social activities, sleeping and functional capabilities.
Results: A total of 35 tooth extractions were performed according to established inclusion and exclusion criteria. None of the enrolled patient developed ORN. A statistically significant reduction ($p<0.05$) in patients' pain between groups 1 and 4 was registered in T1 and T2. Percentage of pain killers' intake linearly decreased over time between group 1 and 4. Concening QoL evolution over time, none of the patients in group 4 showed any changes in their habits, meanwhile in the other groups a worsening in QoL scores was recorded after tooth extraction.
Conclusions: PBM and PRF, added to the prophylactic use of pentoxifylline and tocopherol in preventing jaw ORN, were able to reduce the pain associated with tooth extraction in head and neck radio-treated cancer patients. Likewise, both therapeutic strategies have proven effectiveness in maintaining a good QoL for these patients in the post-operative course.

Diode blue laser 445nm surgical approach to some vascularized oral lesions

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Aim: The traditional cold blade approach to oral lesions with an important vascular content could be difficult, cause of intraoperatory bleeding that can obstructs the operator's view and complicates the surgical procedure. Laser is an effective device that can be used for excisional biopsies, especially for clinically benign lesions. In particular, the use of a wavelength congenial to hemoglobin can be useful in the management of lesions that have an important vascular component, such as pyogenic granuloma, peripheral giant cells granuloma, angioma, vascular malformations or lesions placed on very vascularized oral areas, such as the soft palate. The lobular capillary hemangioma, known as Pyogenic Granuloma (PG), is a reactive benign neoformation, due to increased capillary growth related to hormones, traumatic or hygienic reasons. This kind of lesion is frequently found in young adults or pregnant women, frequent on the anterior upper jaw. Clinically, PG appears as a reddish exophytic mass that could be ulcerated if traumatized. Histologically, it is a lobulated mass of hyperplastic granulation tissue, often with a larger central vessel surrounded by numerous small vessels.Peripheral Giant Cells Granuloma (PGCG) is another kind of clinically benign lesion with an important vascular content, which can cause complications during cold blade

excision. PGCG is a reactive hyperplastic growth of the connective tissue to an insult of the gingival tissues, for example a local trauma or local irritation after tooth extraction. Bleeding tendency of these lesions is frequent since the presence of a rich vascular stroma, with connective tissue rich in multinucleate osteoclast-like giant cells. The surgical approach to this kind of lesion consists in conservative excision down to the periosteum to prevent recurrences. For lesions with an important vascular component, as PG or PGCG, 445nm blue laser can be used, for its several advantages. This device is a diode laser with a wavelength of 445nm, with a higher absorption coefficient for hemoglobin and melanin, which allows for immediate coagulation and reduced intraoperative bleeding. The aim of this paper is to evaluate the intraoperative efficacy of blue laser to perform excisional biopsies of lesions with an important vascular content.

Methods: Six excisional biopsies of highly vascularized clinically benign lesions, of six patients, four women and two men, were performed in our Department, between 2018 and 2019. After clinical and systemic evaluation of the patients, an excisional biopsy was performed with 445nm diode blue laser (K-laser®, Eltech s.r.l., Treviso, Italy), at 2.5 Watt in Continuous Wave, with a 320µm optical fiber and a fluence of 3100J/cm^2. After surgery a chlorhexidine spray was applied for a week. The specimens were submitted to histological evaluation and the patients were followed up for 1 week, 1 month and 3 months later, to evaluate healing and recurrences.

Results: All biopsies were easily performed with excellent intraoperative bleeding control, no needing of sutures. No complications were reported.All patients showed a normal postoperative course with a secondary intention healing, and no recurrence at three months follow-up. Histologically the six biopsies performed, were four PGs and two PGCGs.

Conclusion: The 445nm laser can be used safely and effectively to excise a vascularized pathologic tissue, even if adjacent to dental elements, without compromising them. According to literature this device offers advantages as optimal hemostasis and minimal post-operative pain and edema, that can be very useful to approach oral soft tissues lesions, with an important vascular component.

Effectiveness of LED device photobiomodulation in reducing pain during RPE in growing subjects: a randomized clinical trial

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Aim: The aim of this study is to evaluate the analgesic effectiveness of LED PBM in the reduction of pain reported by young patients during rapid palatal expansion therapy.

Methods: The evaluation and selection of the sample was carried out at the Orthodontics department of the Odontostomatological Clinic of the San Gerardo Hospital of Monza (University of Milan Bicocca). Patiens were enrolled based on the following criteria: (1) skeletal age between CVS1 and CVS3 evaluated with the cervical vertebra staging on the cephalometric lateral teleradiography, (2) completely erupted first upper molars and (3) clinical indication in undergoing a RPE. The exclusion criteria were: (1) skeletal age CVS4 or higher, (2) bone disease or craniofacial disorders (3) previous orthodontic treatment, (4) disability. A randomized balanced block protocol using sex and age as stratification factors was performed to randomly allocate subjects to receive RPE and LED irradiation and RPE only. At the end of the selection, 30 pediatric patients aged between 6 and 10 (Average age 7,8 years), 14 males and 16 females, were analyzed, candidates to perform a rapid disjunction of the palate with a two-band device cemented on the first upper molars. After taking the alginate impressions for the realization of the rapid expansion device, cementing with glass ionomer cement (3M ™ Ketac ™ Cem) was carried out. The expansion protocol used was the same for the test and control groups, 2 activations / day were carried out at a distance of 12 hours from each other for a total duration of 7 days (2/4 turn per day, 0, 5 mm per day). No LED biostimulation was applied to the control group, the test group, however, was irradiated at the time of the positioning of the RPE with ATP38® (Biotech Dental, Allée de Craponne, Salon De Provence, France). For the purposes of this investigation, the biostimulation scheme used, according to the manufacturer's indications, consists of 6 minutes of irradiation producing a total of 48 J/cm2 of fluence, calculated as the sum of the fluences produced by the light source (16 J/cm2) of each of the three active panels (16 J/cm2 x 3 = 48 J/cm2). These parameters are based on a fixed distance of 4cm of the side panels from the cheeks and of the side panel from the lips. Since 48 J/cm2 are lower than the fluence range used for orthodontic photobiostimulation, 3 consecutive irradiation cycles were used, for a total duration of 18 min and 144 J/cm2 of fluence (48 J/cm2 x 3 cycles) with 1 minute rest time between each cycle. Patients reported the pain experienced by using a Numerical Scale Rate, ranging from 0 to 10, at specific time intervals, that are, 6 hours, 12 hours, 24 hours, and from day 2 to 7. Wilcoxon-Mann-Whitney test was used to assess differences in NRS reported values among the two groups.

Results: The Mann-Whitney test showed that the pain experienced by patients at each time record and the maximum NRS pain score significantly differed among the two groups. In this respect, these values were significantly lower in the tested group at each time record with a P value ≤0.05.
Conclusion: LED photobiomodulation with ATP38® is effective in alleviating the intensity and the duration of pain experienced by young patients undergoing rapid palatal expansion.

Whitening with 980 nm diode laser in a dyschromic devitalized tooth with aesthetic value: long-term success

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Aim: In our society, the progress of aesthetic standards has led to increasing demands from patients to have white and healthy teeth as an index of beauty and health. The main advantages of the laser bleaching technique include greater safety and control, as well as the prevention of tissue damage, the reduction of application times and greater patient satisfaction. Numerous studies in the literature underline that bleaching with diode laser is a safe. The purpose of this in vivo study was to assess the whitening effect of the 980 nm diode laser in combination with the whitening gel, containing hydrogen peroxide, in the discoloration treatment of a dental element undergone to endodontic therapy.
Methods: A 40-year-old female patient in good systemic health came to our attention for an aesthetic problem on the dental element 3.1, due to the dyschromia induced by endodontic treatment. Upon clinical examination, the tooth appeared dark brown, tending to black in some areas. Subsequent radiographic evaluation revealed the impossibility of the whitening treatment with conventional protocol, through lingual access to the endodontic space, to place the whitening peroxide intra-coronally. This was due to the small thickness of the root and its high risk of fracture following. For this reason, an assisted laser bleaching with 980 nm diode combined with a 37.5% hydrogen peroxide was evaluated. The patient signed the consent form before beginning treatment. The treatment was performed in a single session. Firstly, all dental surfaces have been cleaned to eliminate the bacterial biofilm. Subsequently, light-cured rubber dam was applied to protect soft tissues from hydrogen peroxide. The whitening gel was applied in a layer 1.5-2mm thick on the buccal surfaceof 3.1, 3.2 and 4.1. A transparent film was applied on the gel to block the hydrogen peroxide molecules on the enamel, avoiding their dispersion towards the outside and promoting the complete diffusion and penetration through the enamel prisms in the dyschromic dentine. The bleaching agent was activated by 980 nm diode laser using defocused handpiece in continuous mode and output power of 3 W on 3.1 and 2 W on 3.2 and 4.1. The enamel surfaces were scanned continuously. The vestibular surfaces of each treated element was radiated for 30 seconds. Finally, 20 minutes after applying the whitening gel,the surface of each dental element was rinsed with water and dried with an air spray to remove it completely.
Result: Immediately after the treatment (T0) no evident result was found, at the 1-week check (T1) the patient presented a uniform coloring of the dental elements. A second laser assisted bleaching treatment was not necessary. After six months of follow-up, there was no recurrence of the dyschromia, the treatment was effective, quick in results and long lasting.
Conclusion: This case has shown that laser assisted whitening treatment can be considered a valid alternative to conventional internal whitening in dyschromic devitalized teeth due to its efficacy, minimally invasive, safety, rapidity and stability of the results obtained for greater patient comfort. This treatment is not only aesthetic but also conservative as it has avoided the aesthetic veneers that would have required a minimum sacrifice of dental and gingival tissue.

Effectiveness of a novel gel containing aminolevulinic acid and red light irradiation on gram-negative and gram-positive bacteria

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Aim: The combination of aminolevulinic acid and red light irradiation has been largely used in dentistry for removing no malignant lesions of the oral cavity and also the antibacterial activity against gram-

positive bacteria has been largely demonstrated. However, the same treatment was poorly efficacious against gram negatives. The aim of this study is to evaluate the effectiveness of a novel gel containing aminolevulinic acid, (Aladent, Alphastrumenti, Italy) at different concentrations and with different timing of irradiations of red LED light on a gram-negative bacterium, Pseudomonas aeruginosa and on gram-positive, Enterococcus faecalis, to find the better protocol that exerts antimicrobial activity. These bacteria are particularly important for their antibiotic resistance, and in dentistry for being the cause of several oral pathologies.

Methods: Pseudomonas aeruginosa and Enterococcus faecalis were cultivated, in vitro, and bacterial suspensions were subjected to 1 hour of incubation with Aladent gel (Aladent, Alphastrumenti, Italy) and then were irradiated 7 minutes with a red LED (630 nm). An AlGaAs power Led device (TL-01) characterized by 630nm +/- 10 nm FHWM nm-wavelength was used as the light source (Alphastrumenti, Italy). During the experiments, the LED hand-piece was mounted perpendicularly to the wells containing bacteria at 0.5 mm of distance with a particular polystyrene box to maintain a constant distance from the light source. At these conditions, the exit irradiance surface was 380 mW/cm2 and the total specific dose was 23 J/cm2 for each minute of irradiation. The bacterial viability was determined by measuring the colony-forming units (CFU/mL) of each sample and were compared with other groups: positive controls (C+); 1 hour of incubation with different concentration of Aladent (10%, 20%, and 100%) without irradiation; irradiation of the bacteria at 7 min and 20 minutes, without the preincubation with any gel. All experiments were done in triplicate. The data were recorded on a Data Sheet and submitted to ANOVA and Bonferroni post hoc tests at a level of significance of 0.05.

Results: 1 hour of incubation of Aladent followed by 7 min of RED LED permitted to achieve the total deletion of both bacteria. The irradiation with red LED without the gel addition permitted to reduce the CFUs significantly, respect C+. Also the use of Aladent alone, without the light irradiation, was able to promote a significant decrease of the bacterial count, that was proportional to the gel concentration. This effect was confirmed by live/dead observation: ALAD+LED 7 minutes produced an evident killing effect on the E. faecalis cells, characterized by the presence of 95% of red death cells ($p<0.05$).

Conclusion: this novel gel is efficacious in significantly decrease the gram-negative Pseudomonas aeruginosa and gram-positive Enterococcus faecalis, in vitro. The addition of 7 min of red light irradiation permits to achieve the total inactivation of both bacteria.

Randomized in vitro study to assess the effectiveness of diode laser in association with sodium fluoride in the prevention of dental erosion

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Aim: Erosion is the loss of hard dental tissue due to chemical processes without the involvement of bacteria. In order to prevent the enamel demineralization a new approach has been proposed base on the combined use of lasers and fluoride. The purpose of this in vitro study is to develop a simple, repeatable and not harmful protocol to reinforce tooth enamel for patients continually exposed to acid attacks in the oral cavity.

Methods: One hundred permanent healthy molars, extracted for orthodontic reasons or disodontiase were selected following specific criteria of inclusion and exclusion preserved in a thymol solution (0.1%) and numbered. The four axial surfaces of the dental crown have been identified with a letter (A, B, O, X). For each dental surface, a spot area of about 2 x 4 mm was delimited with a ball cutter and then a different pre-treatment protocol were applied before acid etching. This subdivision allowed us to identify 4 study groups. Moreover, the healthy enamel of spot surface was analysed by electron microscope SEM before any pre-treatment and used as a comparison with scans performed post-treatment thanks to the collaboration of the team of the Advanced Materials Laboratory headed by Prof. Antonio Apicella of the Department of Architecture and Industrial Design of the University of Campania Luigi Vanvitelli.The pre-treatment schemes applied for each study group were: for the group A no pre-treatment was applied to the spot (CONTROL GROUP); for the group B the spot was pre-treated by a topical application of an acidulated sodium fluoride gel (MEDICAL®) at 0,33% for 60''. Then the same area was irradiated with soft touch diode laser (Creation Medical Laser) using a 300 µm fibre with a power of 0,2 Watt in continuous mode for 60" at a distance of 1-2 mm from the surface (GEL+LASER GROUP). In the group O the spot was pre-treated only with a topical application of a sodium fluoride acidulated gel (MEDICAL®) at 0,33% for 120'' (GEL GROUP) and finally, in the group X the spot was pre-treated only by irradiation with soft touch diode laser using the same parameters applied for the group B, but for 120'' (LASER GROUP). Then, each area was immersed in fluoridic acid solution (1M) for 30' to create acid etching on the surface and, after rinsing under running water, were again examined by SEM. For each spot surface changes in the grey scale have been interpreted as areas of demineralization compared to the basic values of healthy enamel. The

sum of percentages of demineralized areas for each tested surface were obtained by energy dispersion spectrometry (EDS).
Results: The comparison of the percentage of the demineralized areas estimated between the group A and respectively the goup B, O and X generated a highly significant value p (p< 0.0001, Unpaired T-test) as expected. The sum of percentages of demineralized areas estimated for group B (302%) was found to be the lowest value compared to the values of group O (436%) and group X (370%) (a two-tailed p-value < 0.0001).
Conclusion: In this randomized in-vitro analysis the combined use of the topical sodium fluoride gel and the diode laser on the enamel surface (pre-treatment protocol applied for group B) showed a significant additional resistance to the erosive effect compared to the protocols based only on the use of either the fluoride gel (group O) or the diode laser (group X).

Minimally invasive treatment in closed flap periodontal/peri-implant therapy using multiple wavelength laser therapy

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Aim: Current periodontal literature has been inconsistent in finding an additional advantage in using lasers in periodontal therapy. Therapy for periodontal / peri-implant disease begins with causal therapy with the mechanical removal of pathogens and with instructions for adequate home oral hygiene. Where initial therapy has not been sufficient to restore optimal periodontal health, surgery is required. Periodontal support therapy completes the cycle. Surgical management of intrabony defects is an invasive procedure, time-consuming and associated with expense and morbidity to the patient. The integration of the laser as an adjuvant (and not as a substitute) for the treatment of periodontal and peri-implant disease has largely demonstrated its effectiveness with each wavelength, through different laser-tissue interactions. Lasers vaporize the infected sulcular epithelium and granulation tissue without compromising the underlying connective tissue. Lasers have a bio stimulating effect (the ability to induce faster cell duplication in irradiated tissues without structural and/or functional alterations occurring) and a significant reduction in post-treatment edema due to anti-inflammatory capabilities. The aim of this study was to evaluate the results of the treatment based on the instrumentation of the root surface and with the additional use of Diode and Erbium Chromium laser.
Methods: Patients with a diagnosis of generalized chronic periodontitis, detection of mucositis and / or peri-implantitis were selected during the follow-up insertion. 25 patients were included. All were treated with Airflow powders and Ultrasonic debridement, followed by the flapless application of Erbium, Chromium: Yttrium, Scandium, Gallium, Garnet (Er, Cr: YSGG) laser (wavelength 2780 nm), and by the application diode (laser wavelength 650, 910, 1064 nm). The evaluation took place with a minimum of 1 year. The probing depths (PD≥5mm) of all sites and the bleeding index were analyzed.
Results: The mean PD after one year was 3.2mm, with average PD 3.35mm reductions. The mean reduction in PD for the 7mm group was 4.75mm. There was significantly less bleeding on the survey shortly after treatment and persisted even after one year. The Erbium laser is primarily a surgical benefit on soft tissue, the root surface, and bone, together with a bactericidal and modifying effect on the root surface which can play a role in wound healing; the laser diode has a mainly bio stimulating effect, which contributes to the cytokine regulation and role in the wound healing process. The minimally invasive technique is patient-centered, saves time and money for the doctor, and saves the patient's expenses, often avoided surgical flap treatment, and avoided the use of expensive grafting materials.
Conclusion: The trials showed some improved clinical results and a reduction in morbidity with the use of lasers for non-surgical, periodontal, and peri-implant therapy due to ablation, vaporization, hemostasis and field sterilization. The results compare favorably with traditional surgery and require further validation through randomized controlled clinical trials.

A voluminous labial mucosa mucocele approached with diode laser 980nm

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Aim: Oral Mucocele (OM) is a common exophytic lesion generally determined by a traumatic event that can cause the damage of an excretory duct of salivary gland. It clinically appears as a single painless swelling, soft, round in-shape, with a bluish color lesion. Usually OM involves the lips, cheeks, tongue, palate or floor of mouth, but most of it occurs on the lower lip.

The extravasation type, generally regarded as being of traumatic origin, is caused by tissues accumulation of salivary mucus. Instead, the retention type results from obstruction of the duct of a minor or accessory gland. There are several treatment modalities for OM, but the complete surgical excision with conventional scalpel or laser devices remains the best approach. About laser device approach to this kind of lesion, it can be used for the initial incision that proceeds the enucleation and for the final excision of the cyst, in a mucosal preservation technique. Laser devices can be used for the photocoagulation after the excision, to prevent postoperative bleeding. Diode laser 980nm has high affinity to hemoglobin that can be used for its optimal coagulative properties during the surgery. The aim is to describe diode laser 980nm surgical approach for a voluminous mucocele of the lower lip.
Methods: A twenty-six-year-old male patient with a cognitive impairment and dental no history came to our observation. The patient reported a painless swelling at right side lower lip, referred from five months, that troubled chewing. Intraoral examination showed a bluish nodule, of approximately 2 cm in diameter, covered by normal mucosa with a white area on the top, referred to chronic trauma. The lesion was soft and painless on palpation. Ultrasound examination showed a 21mmx19mmx10mm hypoechoic lesion, extended to hypodermis. Furthermore, Color Doppler Ultrasound identified peripheral small arterial and venous vessels, secondary to flogistic tissue. Diode laser 980nm (DMT Raffaello s.r.l., Lissone, Italy) was used in power of 2.5 Watt in Continuous Wave with a fiber of 300 µm and it was used to perform the initial incision, it works by layers so it can remove the superficial mucous layer by layer to expose the lesion capsule; the lesion was isolated and enucleated with a smooth surgical instrument and gauze pushed between the lesion and the connective tissue so it was enucleated by laser. Laser device allowed an optimal bleeding control during the surgery and prevented hemorrhagic consequences related to perilesional vessels. After the excision, the residual cavity was filled with a hemostatic sponge and 3-0 suture was applied. The specimen was histologically analyzed and follow up at one week, one month and three months.
Result: The histological examination result was as oral mucocele. Suture removal was done after one week and no complications were reported, except for the accidental removal of some sutures, related to the patient's psychiatric profile. One month follow up shown a complete healing and no recurrence. The postoperative site, at three months follow-up, showed in part a scar healing, due to the large dimension of the lesion. Moreover, the patient was suffering from cognitive impairment, so the laser approach was better tolerated by him.
Conclusion: Diode laser can offer an advantage in excision and surgical hemostasis due to its coagulating effect. The superficial layers laser incision allowed to keep the lesion intact surrounded by its capsule, this allowed a complete enucleation of the lesion and no recurrence.

Ex vivo evaluation of Er:YAG laser, Nd:YAG laser molecular and quantum resonance scalpel cut: analysis and thermographic comparison

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Aim: The thermal rise of tissues during surgical incision, performed with other instruments rather than traditional cold blade scalpels, is an important factor that the operator must take into consideration first when choosing the surgical instrument and then throughout the surgical act. At the limit of our knowledge, only few studies have been published in the literature regarding tissue's temperature variations. Surgical instruments such as LASERs and Molecular Quantum Resonance scalpel (RQM) are able to control bleeding during surgeries allowing a better visibility in the surgical field and reducing the total surgical time. These instruments, with different processes, all induce a variation in the temperature of treated tissues. This factor has to be taken into consideration when operating inside the oral cavity: the proximity of noble structures such as nerves, arteries and veins of medium caliber and glandular structures must be acknowledged and considered. This ex vivo study aims to analyze through the use of a thermal imaging camera the temperature variations in soft tissues cut by three different tools: Er:YAG laser, RQM and Nd:YAG laser.
Methods: The thermographic measurements were recorded with an infrared reading thermo-camera positioned at an angle of 45° to the target tissues.
Cut were performed on chicken soft sample tissues, for statistical reasons 3 cuts for each instruments were performed. Chosen instruments were set as follows.
- Er:YAG laser: 2940nm, SSP mode, R02, 235 mJ, 3.5W, 15 Hz, no water.
- RQM: Cut 120W/400Ω.
- Nd:YAG laser: 1064nm, VSP, fiber diameter 300µm, 3.75W, 75Hz.
Temperature was recorded in Celsius degrees; highest

and lowest temperature values in each frame were recorded: before performing the cut (T0), right after the cut was completed (T1), after 30 seconds that the cut was completed (T2).

Results: Values are reported in °C. For each detection the lowest value and highest value were reported, highest values without * symbol were detected to be outside the sample tissue. Er:YAG laser results:
T0: 18,58 / 34,19 - T1: 18,34 / 31,03 - T2: 18,67 - 26,98
T0: 19,28 / 27,65 - T1: 18,93 / 30,84 - T2: 18,72 - 27,62
T0: 19,36 / 35,77 - T1: 19,02 / 31,11 - T2: 19,08 - 28,15
RQM results:
T0: 16,14 / 33,22 - T1: 15,68 / 35,89* - T2: 16,01 - 26,18
T0: 17,42 / 26,32 - T1: 17,70 / 39,01* - T2: 17,88 - 31,27
T0: 18,53 / 26,48 - T1: 18,47 / 45,33* - T2: 17,76 - 28,78*
Nd:YAG laser results:
T0: 16,20 / 34,99 - T1: 16,23 / 46,24* - T2: 16,35 - 24,71
T0: 16,24 / 41,67* - T1: 16,27 / 37,46* - T2: 15,94 - 26,26
T0: 16,32 / 35,19 - T1: 16,23 / 35,67* - T2: 16,17 - 24,73

Conclusions: This ex vivo study highlighted that all three analyzed options lead to a temperature rise which was completely dissipated in the 30 thirty seconds following the cut. The cut performed with Er:YAG laser, even without the cooling water system, did not show significant temperature rise in the sample tissue, meaning that the coagulating effect obtained without water can be used during superficial ablation without the risk of thermal damages. Even if Nd:YAG laser cut showed the highest temperature peak during cut, in comparison to the RQM cut no significant differences in T1 nor T2 were highlighted. Nd:YAG laser's wavelength has high selectivity for hemoglobin and poor water absorption and it allows to operate rapidly and with good hemostasis; the heat dissipation occurs rapidly and this tool can be used safely keeping in mind its ability to penetrate into the tissues up to about 7 mm.

Dental Materials

Evaluation of the degree of conversion and rate of cure of a new BIS-GMA-free nanohybrid composite

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Aim: The polymerization efficiency of the new-introduced Bis-GMA-free nanohybrid composite containing pre-polymerized spherical filler Ceram. X®Duo-D3 (CXDD3, Dentsply) was investigated in terms of degree of conversion (DC) and rate of cure (RC). The obtained results were compared with those of two commonly used composites of equivalent dentin shade: the nanohybrid Tetric EvoCeram®-A3.5 (TECA3.5, Ivoclar Vivadent) and the nanofilled FiltekTMSupreme XTE-D3 (FSAD3, 3M ESPE).

Methods: DC was evaluated using a Fourier Transform Infra-Red Attenuated Total Reflectance equipment (FTIR-ATR, Nicolet 6700-ThermoFisher) recording the photopolymerization kinetic (1 spectrum/s). Each composite (N=10) was placed on the FTIR-ATR diamond stage in a 2-mm thick silicon mold and photopolymerized for 40s with the LED curing-light SmartLite Focus®(Dentsply). Infrared (IR) spectra were obtained between 4000cm−1 and 500cm−1 at a resolution of 16cm−1. DC was calculated as: DC = [1 - (R40)/(R0)] * 100. Where R0 represents the ratio between the intensity of the reactive group signal (C=C, 1635cm-1) and the internal reference (C=O, 1715cm-1) of the unpolymerized material and R40 the same ratio after 40s of photopolymerization. The kinetic trend was obtained plotting DC vs. time for all the materials. The kinetic curves were fitted with a second-grade polynomial expression, from the first derivative of the fitting, the RC at selected times (5, 10s) was calculated. RC≤0.5 between two consecutive times was considered as arbitrary value for the curve plateau.All data were subjected to statistical analysis with dedicated software (Statistical Package for Social Sciences Software v.15.0, SPSS Inc.) and tested for the assumptions for the use of parametrical tests: the normality of the distribution and the equality of variances were verified with a Shapiro-Wilk test and a Levene test, respectively. The influence of the materials' composition on the DC and RC values was evaluated by one-way multivariate analysis of variance (ANOVA), pairwise comparison between groups were performed with a Scheffé post hoc test at a preset $\alpha=0.05$. Separately, RC values registered for each material after 5 and 10s of curing time were compared with a paired-samples t-test.

Results: For all tested materials, the obtained DC after 40s of photopolymerization was lower than 50%. Among the tested composites, CXDD3 showed the highest DC ($p < 0.05$) after 40s of photopolymerization, while TECA3.5 and FSAD3 reached lower DC values, not significantly different between each other ($p>0.05$). Within each composite, RC at 10s resulted significantly lower than that at 5s ($p<0.05$). Among the three composites, RC values, both at 5 and 10s of photopolymerization, were significantly different ($p < 0.05$) following the trend: CXDD3>TECA3.5>FSAD3. CXDD3 showed the faster kinetic reaching the plateau (RC≤0.5) after 25s. Differently, FSA3D and TECA3.5 showed a significantly slower kinetic ($p<0.05$): TECA3.5 kinetic trend reached the plateau after 30s of photopolymerization while the RC of FSA3D slightly decreased with time with a pseudo-linear trend never reaching the RC value set as plateau.

Conclusions: Within the limitation of the present in vitro study, it is possible to assess that DC and RC of the studied composites were material-dependent: CXDD3, characterized by a Bis-GMA-free composition, achieved higher DC thanks to a faster

kinetic. However, considering that for all the tested composites the average DC remained below 50% after 40s of photopolymerization, an increase of the curing-time or a reduction of the layer thickness may be suggested in the clinical setting of the dentine shaded composites.

Fluoride agents and orthodontic alloys, an in vitro study

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Aim: The purpose of the study was to assess the likely release of metal ions from Stainless Steel (SS) and Nickel-Titanium (NiTi) orthodontic arches after in vitro exposure to 5 mouthwashes and 2 gels based on different fluorine compounds.
Methods: 96 samples of 3 cm length were obtained from 12 arches in SS and 12 in NiTi. Weighing of samples with precision balance was performed first. Each arch section was then inserted in a 15 ml volume Falcon vial respectively and completely submerged in 10 ml of the pure fluorinated mouthwash or gel taken in exam. The control group consisted of sample immersing in 10 ml of physiological solution. The 96 sections were divided into 3 random groups and incubated at 37° C for 1 hour, 24 hours or a week. At each time-point each group of 32 vials was removed from the incubator then the previously immersed arch section was extracted and weighed again while the elution sample, including the control group, was analyzed using inductively coupled plasma mass spectrometry (ICP-Ms from AGILENT Mod. 7800), to detect the probably residual concentration of iron (Fe), nickel (Ni) and chromium (Cr) ions.
Results: Metallic ions release by orthodontic arches after fluorine mouthwashes and gels exposure was demonstrated, at all time-points, for all types of wires and in particular in relation to the time of contact with the fluorine solutions, ions elution is shown. The behaviour of the different metal ions exposed to fluorine products is however different and also depends on the chemical nature of the element: Fe was the one released at higher concentrations and longer exposure times while Cr was the least eluted element by all analyzed wires. Ni ions were found almost exclusively in solutions in contact with NiTi wires, with concentrations that increased with increasing exposure time to fluorine solutions.
Conclusions: Although the initial hypothesis has been demonstrated, the results obtained suggest that the eluted metal ion concentrations are however negligible because they are minimal, not uniform in all the time intervals of the test and in any case more significant only at very long exposure intervals, the latter condition difficult to occur clinically. Even if the phenomena of metal corrosion by fluorinated products exists, the orthodontic wires examined in this study showed good chemical stability.

Duplicating a total prosthesis with shutter in the study: clinical case

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Aim: The psychological aspect of the patient carrying mobile dental prosthesis is different from any other patient who has to replace a single tooth. The fracture of a bespoke medical device is a common occurrence in clinical practice and generates a state of emotional apprehension in the patient along with an obvious functional, aesthetic and phonetic discomfort. This highlights the importance of having a spare prosthesis to wear only in emergencies or in cases where repairing or modifying the prosthesis takes a long working time. The goal of this work is to use a technique that facilitates prosthetic duplication in the studio using the materials available in the clinic. The technique was used to duplicate a total prosthesis in which there is a jaw shutter.
Methods: The materials used for the duplication of the prosthesis are: the self-pleasing acrylic resin of pink color; the self-polymerizing acrylic resin of color A3 life; silicone for lite and regular addition; insulation liquid; a self-staffing muffle; lab engine, cutters and gums for polishing. Open the muffle in the two parts we proceed to mix the regular silicone and insert it into the base of the muffle by stretching it well and sinking the prosthesis (the teeth at the bottom) in order to create more space for the silicone lite (the silicone will have to reach up to 1-2 mm of the prosthetic edge); silicone curing is applied to silicone and prosthesis; 15" of the insulation applies other silicone lite on the entire surface of the prosthesis in order to cover it all. Once the curing of the lite is completed, the regular is mixed and fits into the counter-flash of the muffle and closes everything by tightening the screws well; obtained the curing of silicone opens the muffle and we will have a mold where the prosthesis is inserted and a counterstampo where the imprint of the palatal prosthesis will be present; removed the prosthesis and checked the mold is proceeded to mix and then pour the A3 acrylic resin up to the edge of the teeth in the imprint; after the curing of the clear resin is mixed and the pink resin is poured into the mold and the muffle is closed waiting

for the resin to be cured; open the muffle is extracted the prosthesis is controlled and refining it.
Results: The duplication of the total prosthesis was achieved in about 45 minutes while also respecting the curing times of the materials used. The total prosthesis despite being performed with a self-compomerizing cold resin was accurate, fitting and comfortable after the application of the tissue conditioner. Clearly, any occlusive tweaks ensure efficiency. Hold about 5 minutes in hot water to eliminate excess monomer.
Conclusion: The dentist with this technique makes a temporary mobile prosthetic artefact in just 45 minutes using materials already present in the study. The patient with this technique will not experience the psychological discomfort of remaining without prosthesis for any lowering, repair or makeover also would have another spare prosthesis. Before delivering the prosthesis it is advisable to keep it for about 5 minutes in hot water in order to eliminate excess monomer molecules.

Effect of mouthwashes on color stability and surface roughness of composite materials

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Aim: The demand for aesthetic restorative materials depends upon the reproduction of tooth shape and shade, as well as on maintaining the selected color during the functional lifetime in the oral environment. The color change of composite resins depends on intrinsic and extrinsic factors; intrinsic factors involve changes in the filler, matrix and matrix/filler interface; extrinsic factors involve absorption or adsorption of dyes from external sources, such as coffee, tea, nicotine and mouthrinses. Mouthwashes trigger a decrease in the oral pH, which has been associated with an increase in sorption and solubility, thus leading to surface degradation and softening of the composite biomaterial. The aim of this study was to evaluate the effects of different mouthwashes on the color stability and surface roughness of the composite materials used to make dental restorations.
Methods: One BisGMA-based (microfilled composite E), one UDMA-based microfilled composite (G) and one BisGMA/UDMA-based nanofilled composite (T), were evaluated in this study. For each material, the D2 shade was selected. A total of 48 specimens for each tooth colored resin were prepared using moulds (diameter, 2 mm; thickness, 2 mm) with disc-shaped slots, and divided into 6 groups (n = 8 from each material). Five mouthwashes were included in the study: SNF (stannous fluoride), OEW (essential oil-pyrophosphate), OE (essential oil), CHX (0.12% chlorhexidine), CZ (zinc chloride-fluoride), CTR (control-saline solution). Each group was immersed in 20 ml of one of the five mouthwashes examined or in physiological solution used as a control for two minutes, then rinsed with distilled water and subsequently immersed in 20 ml of physiological solution for 24 h at 37 ° C. Every 24 hours, before treatment, the samples were brushed with a soft brush. The test was thus carried out for 30 days. The color of the samples was measured with a spectrophotometer (Spectroshade Micro, Medical High Technologies). A Mitutoyo J-200 profilometer with JIS1994 was used to measure surface roughness. The collected data were statistically analyzed using two-way ANOVA
Results: Profilometer analysis highlighted that OEW, OE, CHX and CZ determined a surface deterioration, increasing surface roughness (Ra) of 66%, 75%, 92% and 86% respectively in the composite T ($p \leq 0.05$). The effect on resin composite G was more evident, SNF, OEW, OE, CHX and CZ increased Ra of 114%, 126%, 227%, 61% and 58% respectively in the composite G ($p \leq 0.05$). The tooth colored resin E was changed minimally by immersion in the different rinses, except for the OE that increase Ra of 131% ($p \leq 0.05$). There were significant differences ($p \leq 0.05$) in color changes between materials tested in the five different mouthwashes. The SNF mouthwash caused a change on ΔE all the composites analyzed, although the greatest change was measured in the composite T and G (ΔE +1.65-1.70). The OE mouthwash determined discoloration on G and T (ΔE +1.34-1.29). The CZ rinse determined a less discoloration on G and T (ΔE +1.49-1.54). These discolorations are considered clinically acceptable. The composite E was discolored in an imperceptible manner only by CHX and CZ. The only mouthwash that did not cause any color variation was the OEW.
Conclusions: All mouthwashes taken into consideration in this study can determine a variation in terms of roughness on all composites used. The mouthwash OE determined the higher surface deterioration on all composites. The resin composite G showed the high increase of Ra and of discoloration. The resin composites T and G following immersion in the SNF mouthwash have shown a discoloration closer to that considered clinically unacceptable.

Mechanical properties of dental composites subjected to nanotechnological and rheological modifications

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Aim: Dental restorations are subjected to intense mechanical forces and composites must have physical properties to prevent occlusal stress. The aim of the study was evaluate the effect of zirconium oxide nanoparticles on dental composite subjected to compression and bending tests.
Methods: Ultra XRV (Kerr) was modified by using 1% and 5% zirconium oxide nanoparticles. 5 samples were prepared for 9 types of composite using Teflon cylindrical cavity molds (3mm diameter, 4mm height). The preparation of 5 samples by type of composite was carried out in a rectangular stainless steel mold (43x60x12mm). Compression tests were performed with an Instron 5566 dynamometric machine equipped with a load cell of 5kN. Tests were performed at a speed of 1mm / min. Samples were polymerized using a commercial LED source (Blue Phase, Ivoclar) at 1200 mW / cm2 power for 20s. Each specimen was stored in a dark environment for three days. Each specimen was positioned between the compression plates of the dynamometer, then a preload of 30N was applied and the load-shifting curve (S-D) was recorded at a speed of 1 mm/min. Stress and deformation have been calculated. The bending test was verified by measuring the resistance of the composites when they were subjected to stresses by means of the dynamometer instrument with 500N load cell. The three-point flexural tests were performed using a steel support. The load was applied and the maximum force applied on the sample at the breaking point was recorded. The maximum bending stress was calculated.
Results: The ULTRA XRV composite was tested both the TYPE 1 (TPM) and TYPE 2 (Premix) rheological modifiers. The addition of TYPE 1 rheological modifier finds its best mechanical properties in the formulation U_6_3TPM (20% resin1, 12% resin 2, 5% silica, 62% filler, 1% rheological modifier). It shows an average compressive strength value (337.76 +/- 14.63) even higher than the control, while the flexural strength (114.52 +/- 36.83) is slightly, but not significantly decreased. Viscosity has improved compared to standard formulation. The 10% ULTRA Premix sample (17% resin1, 12% resin2, 4% silica, 61% filler, 6% premix) was compared to the 1% and 5% zirconium oxide samples. The result shows that the compressive strength values (233.67 +/- 28.27) decreased with the addition of 1% zirconium oxide. However, the addition of 10% zirconium oxide allows the material to recover and exceed the initial mechanical characteristics, allowing to reach and exceed the initial compression resistance values (328.89 +/- 30.60).
Conclusions: Mechanical properties of ULTRA_6_3_TPM was improved compared to the standard formulation, showing an higher values of compressive strength and also showing advantages in terms of viscosity ULTRA Premix 1% zirconium oxide demonstrated that the presence of the rheological modifier (zirconium oxide nanoparticles) had a negative impact on the mechanical characteristics, instead the addition of 10% zirconium oxide (ULTRA Premix 10%) allows the material to recover and overcome the initial mechanical characteristics .

Electrobonding effects on dental adhesives applied on dentinal surfaces

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Aim: The purpose of this study was to validate, using electrochemical impedance spectroscopy EIS and mechanical tests (such as shear stress strength and resistance to micro-traction forces), the electro-bonding technique (EBT), which involves the use of a low amperage electric current (60 µA), during application of dental adhesives on a dentinal substrate. More in detail, the intention was to investigate the ability of the electro-bonding technique (EBT), to improve mechanical adhesion and sealing of dental adhesives applied on dentinal surfaces. The electro-bonding principle is based on the flow of a current (60 µA), between the dentin substrate and the adhesive applicator, enhancing the adhesive penetration. The benefits of this application technique are correlated with the chemical composition of the adhesives. Better results have been achieved with adhesives whose polymers present a higher degree of polarity. Indeed, the current flow orients the polymeric chains, increasing the penetration on the dental substrate. In dentistry, EIS can lead to a valuable method for characterizing surface changes, such as those involved in the application of dental adhesives.
Methods: The samples were prepared starting from human molars extracted not carious by making a horizontal cut of the dental crown and obtaining disks of a few millimeters thickness on which the adhesives were applied with traditional and electrobonding technique. Complex adhesion resulting from the penetration on the conductive surface of the dentine of the insulating dental adhesives modifies the capacity and resistance to the surface-electrolyte interface. These electrochemical surface alterations can be measured and evaluated to estimate adhesive penetration on the dental substrate. Among the latter, shear stress strength has been evaluated by means of a shear bond tester machine, a device that can be used to test and compare different adhesives used in the dental and orthodontic industries. Furthermore, to assess resistance to micro-traction forces, the samples were sectioned with a microtome and stressed under

tension until failure with a simplified universal testing machine at a crosshead speed of 1 mm/min (micro-tensile bond test).
Results: For all the adhesives, the electrobonding technique revealed an increase of the impedance values compared with the standard method application for both self-etch and etch and rinse adhesives. However, the extent of the increment is not the same for all the polymers under test; some seems to have better performances than others. Adhesives have also shown a significant increase in resistance to shear forces; finally, the micro-tensile bond strength test revealed significantly higher bond strengths compared to controls for the adhesive system when it was bonded under effects of direct current.
Conclusion: Therefore, with the aim to investigate the effects of the current flow on the enamel-dentinal adhesives applications, a protocol to compare the standard technique application versus the electro-bonding technique is defined. Finally, the results of this comparative study are shown and final considerations of further implications and future developments are investigated

Accuracy of three elastomeric impression materials: an in vitro study

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Aim: Dimensional accuracy when making impressions is crucial to the quality of fixed prosthodontic treatment, and the impression material is a critical factor affecting this accuracy. The goal of an impression is to provide a void-free negative representation of a prepared tooth, which will produce an accurate cast of the prepared tooth and the surrounding tissue. The aim of this in vitro study was to assess the reproduction accuracy of the surface details of dental impressions made with vinyl-siloxanether and compare the accuracy to a traditional vinyl-polysiloxane and a polyether impression materials.
Methods: A stainless-steel model with two abutments preparations was fabricated and impressions were made 10 times for each of these materials, which gave 20 abutments impressions for each group. All the impressions were made with a 2-phase, 1-step technique (heavy-body/light-body), using a perforated stock tray for vinyl-siloxanether and vinyl-polisiloxan and a not-perforated stock tray for polyether. After the removal of all of these impressions, an examiner counted the number of open voids (approximately 2 to 4 mm) and bubble-like enclosed voids (< 2 mm) visible on the surface to the naked eye at a working distance of approximately 150 mm. Only the defects in the area of the preparated abutments were included in the assessment. The number of defects on each specimen were ranked as follows: type 0 (no defects), type 1 (1 or 2 enclosed voids), type 2 (> 2 enclosed voids) and type 3 (presence of open voids). In order to evaluate the differences between the frequency of the defects in the considered materials, the not-parametric data were analyzed using Fisher exact test on contingency tables. To explore any significance between the type of defect, ANOVA test was performed. The obtained results were considered significant setting a p value < 0.05.
Results: The frequency of defects ranged from 95% of the impressions in the vinyl-siloxanether and vinyl-polysiloxane groups to 30% with the polyether impressions materials. The most frequent type of defect found with vinyl-siloxanether and vinyl-polysiloxane impression materials was type 3, while the most frequent type of defect found with polyether impression material was type 1. No statistical differences were seeen between the impression materials, although there were numerically fewer impressions with defects with the polyether. The polyether impression material had the greatest accuracy, with fewer defects than with either of the impression materials.
Conclusions: Polyether material showed better accuracy of the reproduction of surface details of dental impressions compared to vinyl-polysiloxane and vinyl-siloxanether impression materials, although the other two impression materials also constitute a valid alternative for making a precision impression..

3D printing review: innovative devices for dental applications and digital dentistry

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Aim: 3D printing is increasingly used by dentists and dental labs as a complement of existing dental fabrication tools. Several different applications of 3D printing have been developed. Uses of 3D printing include the production of drill guides for dental implants, the production of physical models for prosthodontics, orthodontics and surgery, the manufacture of dental, craniomaxillofacial and orthopaedic implants, and the fabrication of copings and frameworks for implant and dental restorations. This paper reviews 3D printing various applications in dentistry and in maxillofacial surgery. The DSD Planning Centre has been a pioneer in using 3D printed technology for the benefit of dentistry, by assisting

dentists in the planning of their patient's treatments. DSD started years ago, with the creation of 3D printed digital models that represent the desired future state of the patient's teeth after complete dental treatment. 3D digital impression can be taken with an intra-oral scanner, a camera that can create a 3D rendering of the teeth and gums in a digital file.
Methods: A comprehensive review of the current literature was conducted according to the PRISMA guidelines by accessing the NCBI PubMed database. Authors conducted the search of articles in English language published from 2008 to 2020. The first analysis with filters recorded about 34 manuscript accordingly with the selected keywords. Finally a number of 25 appropiate published papers were comprehended in the review.
Results: this review shows the great capabilities of 3D printing technology in many fields like the following. Digital orthodontics: the most common applications of 3D printing in dentistry are transparent aligners and night guards. Aligners, which serve as alternatives to braces, have become especially popular because of their invisibility. The Invisalign, system digitally realigns the patient's teeth to make a series of 3D printed models for the manufacture of 'aligners', which progressively reposition the teeth over a period of months/years. Crowns: when you break a tooth, the dentist creates a crown to replace the broken part. Surgical Guides: oral surgeries need to be very precise, and dental 3D printing has made precision easy. A 3D printed guide designed to fit perfectly in a patient's mouth is an indispensable asset for a dentist.Models: doctors can print a model of the patient's mouth and verify that their implant, crown or aligner will fit with precision.
Conclusions: While dental 3D printing has already been established as a successful industry, development continues to move forward. New applications are constantly emerging, each hoping to fill a different niche of the industry. 3D imaging and modelling and CAD technologies are hugely impacting on all aspects of dentistry. 3D printing makes it possible to accurately make one-off, complex geometrical forms from digital data, in a variety of materials, locally or in industrial centers. Cost effective, simpler workflow, high-quality parts, short turnarounds, improved patient experience, easing trial and error and the flexibility of accomplishments are the main advantages of 3D printing and 3D scanning for the dental industry. As in all thing, in contrast to the many benefits there are also limitations typical of 3D printing; like: Demand for exact accuracy and precision, skilled training and the dental 3D printer price.

Functional foods: green tea and oral health

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Aim: The definition of "functional foods" is: "healthful foods or food ingredients that have a potential health benefit beyond their nutrient content when consumed regularly in typical quantities as part of a varied diet". Aim of this study was to evaluate the health-promoting effects of green tea on oral health.
Methods: This review was conducted according to the PRISMA statement. In vivo studies on dentate humans were included without restriction on language and year of publication. Literature searches were performed using MedLine (PubMed), Scholar and Scopus. The following characteristics were collected :study year, type and setting; age, size and recruitment sample; case and control interventions; pre-treatment and co-intervention; vehicle, daily dose and the total dose; consumption frequency and length; wash out period in RCTs with cross-over design; follow-up, drop-out and sample size at follow-up.
Results: Ten studies were included in this review. All the included studies were published in the last ten years. The vehicle products for green tea were: mouth rinse, chewing gum, toothpaste, drinking tea, strips. The Jadad-scale for RCTs evaluated the included studies with high quality. The health-promoting effects of green tea are due to its polyphenol components (catechins). Moreover, the polyphenol concentration in green tea is higher than in black tea, with a greater antioxidant and anti-inflammatory effects, and antibacterial, antiviral, antimutagenic and anti-aging properties.The preventive role of green tea in the development and progression of oral diseases has been shown in chronic periodontitis within effects on periodontopathogens and on host immune reactions.
Conclusion: In conclusion, there is a growing number of clinical trials investigating the use of green tea as an adjunct to the prevention and treatment of oral diseases. Further studies are needed to validate its use in comparison with the standard of care.

SEM evaluation of stainless steel archwire structural modification during orthodontic treatment: an ex-vivo study

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Aim: The aim of this study is to demonstrate that the intraoral use of stainless steel orthodontic archwires causes a deterioration in archwire mechanical properties due to the accumulation of surface deposits and increased roughness. To investigate the modification in the archwire structures requires an analysis of how the oral environment alters the properties of stainless steel during routine orthodontic tooth movement.
Methods: The variations produced on the archwire surfaces during orthodontic treatment were evaluated with an analysis of the amount of debris and roughness before and after clinical use. Thirty patients receiving orthodontic treatment were selected for the study. The primary inclusion criteria for these patients was the need for first premolar extraction as a treatment protocol and good overall oral hygiene. Sixty rectangular 0.019'' x 0.025'' stainless steel archwires were used. The amount of debris and roughness were evaluated on the as-received archwires (T0) and after two months of clinical use during the final archwire sequence of levelling and alignment (T1). The archwire portion analysed is the segment between the premolar bracket and molar tube, because these buccal inter-bracket wire segments are more exposed to saliva, plaque, food and sliding of the archwire through the molar tube during space closure.
Results: The comparison between the as-received archwires and the wire segments after sixty days of clinical use in the oral cavity was conducted using a Scanning Electron Microscope and a rugosimeter and a significant increase in the amount of debris and average roughness (Ra) were detected. It is possible that these changes observed on the archwire surfaces lead to increased frictional forces between the archwire-brackets interfaces which would considerably reduce normal orthodontic forces.
Conclusions: The study highlights the need for more technological research into the improvement of orthodontic archwires in order to develop materials with properties that can reduce the accumulation of debris and the onset of superficial roughness. These phenomena reduce the smoothness of the wires and could therefore prolong the duration of orthodontic treatment.

Hydrophilicity of titanium dental implants controls blood plasma proteins adsorption modulating early cell response

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Aim: In vitro studies have consistently shown that titanium implant surface characteristics affect the response of osteoprogenitors. However, the underlying mechanism is still poorly understood. Surface conditioning by blood components initiates within milliseconds after insertion. Therefore, it is reasonable to hypothesize that the amount and the type of proteins adsorbed at the interface may influence the interaction of the titanium with the cells. The aim of the present study is to determine whether titanium implant surface characteristics affect competitive adsorption of human serum proteins and, consequently, early cell response.
Methods: Titanium discs with smooth (P), hydrophilic smooth (modP), microrough (SLA) and hydrophilic microrough (modSLA) were provided by Institute Straumann AG (Basel, Switzerland) and conditioned with human serum albumin (HSA), fibronectin (HFN) or their binary mixture at relative serum concentrations (200:1). Protein adsorption onto surfaces was monitored by Bradford assay for 60min, while the contribution of HSA and HFN in forming the microfilm layer at the interface was studied by Western Blot. Previously conditioned surfaces were then used to culture murine C2C12 cells and to study their capacity to adhere and spread after 3h by confocal and scanning electron microscopy. Also, osteogenic commitment was assessed after 3 days by qPCR.
Results: Under competitive adsorption conditions, hydrophilicity significantly promoted the adsorption of HFN regardless of the surface microtopography. As a consequence of selective HFN adsorption, cells displayed enhanced capacity to adhere and spread, showing a closer intimate relationship with the underlying titanium surface, a thinner cell soma and a better distribution of the focal adhesions. On the other hand, the expression of the osteogenic marker Col1a1, Runx2 and Alp was shown to correlate with the surface microtopography rather than with the surface conditioning as a consequence of wettability.
Conclusions: The selective adsorption of HFN, as a consequence of titanium surface hydrophilicity,

accounts for early cell response amelioration, in terms of adhesion and spreading. Therefore, it can be concluded that titanium surface hydrophilicity may contribute to the clinical success of dental implants by selectively controlling protein adsorption at the interface, with consequent promotion of the early phases of cell response.

Flexural strength and elastic modulus evaluation of structures made by conventional PMMA and PMMA reinforced with graphene

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Aim: The aim of this study was to compare both the elastic modulus (EM) and the flexural strength (FS) of two materials used in dental prosthesis, namely polymethylmethacrylate (PMMA) and polymethylmethacrylate reinforced with graphene (G-PMMA). The results of such comparison enabled us to evaluate the differences in the mechanical properties of both materials.
Methods: The study was conducted in collaboration with the Department of Astronautical, Electrical, and Energy Engineering of Sapienza University of Rome (Rome, Italy). Fourty rectangular samples were fabricated using a Computer-Aided Design/ Computer-Aided Manufacturing (CAD/CAM) system with a milling technique. More specifically, G-PMMA specimens were obtained by milling "G-CAM" polymeric discs (98.5 mm in diameter and 22 mm in thickness), produced by Graphenano Dental Company (Valencia, Spain). Specimens had a rectangular shape (62 mm length, 10 mm wide and 2.5 mm thick) in accordance with the American Dental Association (ADA) Specification n°12 for denture base polymers.
The samples were divided into two groups (n=20/ group): Group 1, PMMA; Group 2, G-PMMA, and subjected to a three-point bending test conducted in the elastic range to evaluate EM. A similar test was protracted until fracture to evaluate FS. The mechanical test was conducted using a Instron® testing machine, model 3366. During a three-point bending test, a gradual load is applied to the samples by a rounded wedge called "nose". The FS test was performed using a 10 kN load cell. After a pre-load of about 2 N, the nose started applying the load at 1.0 mm/min crosshead speed and the specimen was deflected until rupture. A 500 N load cell was used for the evaluation of EM. A deflectometer was mounted underneath the sample and it was connected to an extensometer to register any minimum deformation during the test. The latter was performed with a progressive loading at the 1 mm/min speed and it was stopped when the sample has reached the deformation of 0.5% in order to maintain it in the elastic phase. In both tests data processing was done using the Bluehill 3® software. Data on EM and FS were statistically analyzed with independent-samples t-test in order to compare the two groups. Moreover, a scanning electron microscope (SEM) (5.00 kx and 1.00 kx magnification) was used to evaluate the morphology of sample's fracture.
Results: Compared to PMMA samples, each G-PMMA sample showed significantly higher values of FS ($p < 0.001$) and EM ($p < 0.001$). SEM images analysis showed an inhomogeneous fracture morphology in G-PMMA samples.
Conclusions: The results show that G-PMMA is a promising material to be used for prosthetic purposes. This is demonstrated by a significant increase in both peak load and bending stiffness, resulting from the bending test performed on G-PMMA samples. Furthermore, the latter exhibit greater homogeneity in their mechanical behavior, supporting the potential value of this material in dental prosthesis.

Exposure to acidic drink of different composite resins and GIC: solubility's changes

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Aim: The aim of the present in vitro study is the evaluation of the solubility and the consequent percentage weight loss of different composite resins (Enamel Plus HRi Bio Function, Micerium S.p.A, Avegno, Genova, Italy; Asteria, Tokuyama Dental, Tokyo, Japan; Essentia, GC Corporation, Tokyo, Japan; Filtek Supreme XTE, 3M ESPE, St. Paul, Minnesota, USA; Ceram.X Universal, Dentsply De Trey, Konstanz, Germany; Enamel Plus HRi flow, Micerium S.p.A, Avegno, Genova, Italy; SDR flow, Dentsply Sirona, York, Pennsylvania USA) and glass ionomer cements (IonoStar Plus, Voco GmbH, Cuxhaven, Germany; Equia Forte, GC Corporation, Tokyo, Japan; Ketac Universal Aplicap, 3M ESPE, St. Paul, Minnesota, USA; Fuji TRIAGE, GC Corporation, Tokyo, Japan; ChemFil Rock, Dentsply Sirona, York, Pennsylvania, USA) after immersion in acidic drink (Coca-Cola Company, Milano, Italy; pH 2.52).
Methods: Twenty samples for each tested composite resin and glass ionomer cement (GIC) were prepared identical in size (height 2 mm, internal diameter 6 mm, external diameter 8 mm). For two of the tested glass ionomer cements (GICs) was applied the respective

protective coat material (Ionostar Easy Glaze, Voco GmbH, Cuxhaven, Germany; Equia Forte Coat, GC Corporation, Tokyo, Japan) in order to assess also the behaviour in acidic medium of coated GICs and to compare it with the behaviour of non-coated materials. The samples were divided in four groups of five: Group 1 (baseline; T0), Group 2 (one day in acidic drink; T1), Group 3 (three days in acidic drink; T3), Group 4 (seven days in acidic drink; T7). The weight of each sample, before the immersion in Coca-Cola (T0), was registered using a Mattler-Toledo precision balance, model AE1633 (Mettler-Toledo S.P.A, Novate Milanese, Milan, Italy; Metering Accuracy 0.01 mg). This procedure was repeated at T1, T3 and T7 and data were collected.

Results: Data collected by analyzing composite resins samples during the sperimentation showed that all these materials well resisted in acidic medium: Coca-Cola has not caused a significative weight loss of composite resins after 1, 3 and 7 days. Non-relevant differences between data collected from flow and no flow composite resins were registered.Concerning GICs samples, a material loss caused by chemical dissolution induced by Coca-Cola was observed. The acidic drink leaded a time-dependent degradation of these materials, which reached the highest values at T7, even if not all the samples had same reactions. In addition, GICs protected by coat materials have proved to be more efficient against the dissolution caused by progressive exposure in acidic medium than the respective not coated.

Conclusions: In the present study, composite resins have proved to be well resistant to the acidic medium: they well resisted against the chemical dissolution after long-term exposure to Coca-Cola. Data confirm the evolution in the last few years of these restoration materials. Contrary, for their different microstructure, GICs have proved to be more subjected to the chemical dissolution after long-term exposure in acidic medium. However, an increase in resistance if protected using coat materials was registered.

A spectroscopical investigation on the effect of a sodium fluoride-releasing rubber cup on human enamel

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Aim: The demineralization of dental hard tissue still represents a growing problem and appears to be the main responsible for dentinal hypersensitivity and dental caries insurgence. Fluoride application is an important strategy to reduce demineralization and enhance remineralization in human teeth. This study aimed to evaluate the effect on enamel hydroxyapatite (HA) crystallinity (C) of a sodium fluoride-releasing rubber cup compared to a non-fluoride rubber cup, using Fourier Transformed Mid Infrared Spectroscopy (FTMIR) analysis.

Methods: Ten sound third molars were collected and washed in an ultrasonic bath with distilled water for 2 minutes in order to remove blood and biological remains. The exclusion criteria consist in the presence of lesions and decays, including hypoplastic defects and cracks. Afterwards, the samples were stored in artificial saliva. On each sample, a class I cavity was created and restored using a nanohybrid resin-composite. Subsequently, teeth were divided into the following two groups (n=5): Control group (CG): teeth polished for 10 s, using a non-fluoride rubber cup, with the same shape of the ones used in the tested group. Test group (TG): teeth polished for 10 s, using a fluoride-releasing rubber cup. The rubber cup was used with a slow-speed handpiece at 6000 rounds/min, one for each sample. Samples were then washed with distilled water, dried and analyzed in order to evaluate the C of HA in enamel, using FTMIR spectroscopy. Samples were scraped off on the treated surfaces with abrasive paper, transparent in the infrared, and analyzed using a Perkin Elmer Spectrum GX1 spectrometer, equipped with a Universal attenuated Total Reflectance (U-ATR) accessory. The spectra were acquired in the range of 4000-500 cm-1, 64 scans and 4 cm-1 spectral resolution, and each spectrum represented the average of 5 measurements.

Results: Phosphate vibration at 604 cm-1 was used to analyze C: the full width at half maximum of CG was lower than the one of TG; thus, sodium fluoride, contained in the rubber cup, increased C. The absorption at 1090 cm-1 can be considered an additional marker of C, indeed the peak of TG was higher than the one of HA and CG, thus suggesting increasing and stabilizing of the enamel C.

Conclusion: These in vitro findings demonstrate that a fluoride-releasing rubber cup may chemically improve HA structure. Indeed, this polishing system allows to simultaneously polish the restored tooth surface and increase C of enamel HA, without using an additional prophylaxis paste, by quickly bonding the fluoride for stabilizing the C of HA. Therefore, it can be suggested that the tested rubber cups are an effective way for clinicians to polish the teeth after restorative procedures, because they enhance enamel structure strength, being more advantageous, in term of caries prevention, than traditional non-fluoride releasing rubber cups.

Digital Dentistry

Three-dimensional evaluation of condylar volume and ramus height in JIA patients with unilateral and bilateral tmj involvement: a cross-sectional study

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Aim: The aim of the present study is to analyze the volumetric differences of the condyles volumes in patients with diagnosis of unilateral and bilateral JIA and to compare the results with condylar volumes of healthy subjects.
Methods: A cross-sectional study was performed analyzing CBCT of patients affected by JIA and comparing them with healthy controls. The CBCT scans of temporomandibular joints (TMJs) were selected from the records archived at the Department of Biomedical Surgical and Dental Sciences, University of Milan, Italy. 19 CBCT images were analyzed for all patients affected by JIA, 15 females and 4 males (mean age 10.8 ±4.2) with TMJ involvement (8 unilaterally, mean age 10.9±4.5; 15 bilaterally, mean age 10.7±4.5), and 20 CBCT of subjects without diagnosis of JIA were selected as controls mean age 10.8 ±4.2 years. In case of unilateral JIA, condyles volume and ramus lengths were compared with healthy condyle and with the compromised one. In case of bilateral JIA, condyles volume and ramus lengths were compared with healthy one. The Shapiro-Wilk test was used to assess whether the data was normally distributed. Paired T test was applied to compare affected and non-affected condyle in the same patients.Independent samples 2-tailed T-test was used to evaluate whether the difference between the groups were comparable or significantly different. A P value <0.05 was considered as statistically significant.
Results: For the unilateral JIA group, significant differences comparing affected and non-affected condyles were found. A statistically significant reduction of the volume of the head, neck and ramus was found in the affected side ($p<0.01$).
For the bilateral JIA group, statistically significant differences have been found considering the condylar head and neck, the whole condylar volume and the ramus length compared with the control group ($p<0.05$).
Conclusions: Subjects with unilateral JIA have condyles volumetrically smaller than those of the unaffected side and those found in healthy patients. A considerable decrease of the volume of all the anatomical structures considered in the patients with bilateral JIA was found compared with control group. We can conclude that the study presents the effects of JIA on mandibular structures highlighting their dimensional changes, whose sequelae are irreversible if not diagnosed and treated early.

Magnetic mandibular advance device (M-MAD): digital workflow design and case report presentation

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Aim: According to the definition of the Ministry of Health, Obstructive Sleep Apnea Syndrome(OSAS) is a respiratory sleep disorder characterized by repeated episodes of complete or partial upper airway obstruction with signs and symptoms that may lead to the onset of important systemic dysfunctions, resulting in a pathological impairment. The OSAS is a common disorder affecting at least 2% to 4% of the adult populationand accounts for 95% of all apneas. The aim of the present Case Report is to show a digital work flow for the creation of a device for mandibular advancement in adult male patient affected by obstructive sleep apnea that uses magnetic force.
Methods: An accurate anamnesis, physical and polysomnographic examinations were carried out on the selected patient. After collecting all the necessary information, impressions of the dental arches and the registration bitewax were taken in a "head-to-head" incisal relationship, bringing lower jaw into a protruded position. Plaster models were obtained and digitized with extra-oral scanner (Maestro Dental Scanner 400 AGE Solutions S.r.l., Pontedera, Pisa, Italy). The plaster models were scanned individually and in the bitewax mandibular protruded relationship, this last scan was used to define the maxilla-mandibular spatial relationship. The digital arch models were imported in 3SHAPE appliance device software. Virtual copies of the magnets have been imported into the software.The magnets were integrated into the appliance in order to promote and maintain mandibular advancement during patient usage. Thus, the designed devices were 3D printed with certified resin. Subsequently, the digital models, the mandibular advance device with magnetic housing and the real magnets have been assembled and thermoformed with 1mm of thickness through thermoplastic material ERKODUR-S 1,0mm Diam.120 (Erkodent Erich Kopp GmbH). The device was delivered to the patient and it was tested its advancement mandibular efficiency. It was ask the patient to wear the device every night. The following parameters were evaluated every 3 months: AHI (Apnea-Hypoapnea Index), ODI (Oxin desaturation Index).
Results: The digital workflow showed to be a valid method to design a magnetic mandibular advance device. The patients showed the following parameters before treatment: AHI 24,8 and ODI 27,3. Three after the beginning of treatment the considered indexes were: AHI 11,0 and 10,6. Six months after the beginning of treatment the values of evaluated outcomes were: AHI 8,1 and ODI 9,7.
Conclusion: The magnetic mandibular advancement device seems efficient in improving sleep apneas in patients with severe osas. Moreover, the use of magnetic forces could provide more comfort to the patient allowing a certain range of motion and reducing the extension of intra-oral device.

Full-arch digital impressions and tridimensional print accuracy: an in vitro study

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Aim: New technologies in the dental field are nowadays becoming more and more widespread in clinical practice, intraoral scanners and three-dimensional printing techniques can represent a solution to overcome the limits that emerge in the conventional workflow. However, the possibilities of using these digital systems in the acquisition of complete arches are still to be correctly defined. The purposes of the following in vitro study are to define the accuracy values of four different intraoral scanners and two different three-dimensional printing techniques, through a digital analysis of linear measurements of a complete maxillary arch.
Methods: In this in vitro study an anatomical model (ANA-4 Frasaco) of a complete upper dental arch was used, eight spheres of polyethylene with cylindrical metal insert were placed on 8 dental elements. The model was scanned with a laboratory scanner to create a digital reference model and four scans were then made using the following intraoral scanners: Carestream 3600, CEREC Omnicam; True Definition Scanner; Trios 3Shape. From each STL file obtained, a digital model has been created. Using DentalCAD 2.2 Valletta dental software to identify the most coronal points of each individual metal insert of the spheres, 28 linear measurements have been traced, which were divided into the following four categories, in order of distance between the reference points: 3-element mesiodistal, 5-element mesiodistal, diagonal and contralateral measurements. The digital reference values of the measurements were then compared with the values obtained from the scans to analize the accuracy of the intraoral scanners. Starting from the four digital models, eight physical dental models were then created, using two different three-dimensional printing techniques, SLA using the Form 2 printer, representing a chairside wokflow, and DLP using the Promaker LD10 printer, representing a milling center reported workflow. The eight printed models were then scanned with the laboratory scanned and the linear measurements were again traced, to value the difference from the original corresponding dental model.
Results: The ANOVA performed did not show statistically significant differences between the measurements of the digital scans obtained with IOS systems, for all the measurements groups tested: Mesio-Distal Measurements (3 elements) = F (3.24) = 1.192; p =

0.334; Mesio-Distal Measurements (5 elements) = F (3.20) = 0.336; p = 0.799; Contralateral measurements = F (3.8) = 0.843; p = 0.508; Diagonal measurements = F (3.44) = 0.282; p = 0.838. The Mann-Whitney U test showed a statistically significant difference between the measurements performed on 3D prints in all groups: Mesio-Distal Measurements (3 elements): U = 179; z = -3.491, p <0.001; Mesio-Distal Measurements (5 elements): U = 171; z = -2.413; p = 0.016; Contralateral measurements: U = 32; z = -2.310; p = 0.021; Diagonal Measurements: U = 454; z = - 5.111; p <0.001.

Conclusions: There is no statistically significant difference between the four intraoral scanners Carestream 3600, Cerec Omnicam, True Definition Scanner 3M and Trios 3Shape in the analysis of the trueness of impressions of a complete dental arch. The comparison between the different measurement categories has shown that, as the extension of the scanned surface increases, there is an increase in the distortion of the impression. The comparison between the models created with the Promaker LD 10 and Form 2 threedimensional printer has shown how the accuracy levels of a workflow referred to the Milling Center are higher, in a statistically significant way, compared to the levels of a Chairside workflow.

Three-dimensional face scan: comparison between truedepth mobile technology and stereophotogrammetry

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Aim: Conventional methods of facial analysis include two-dimensional (2D) photographic measurements, Vernier caliper and goniometer, to measure distances and 2D projection angles. Technological progress in recent decades made it possible to replace classical direct anthropometry and 2D photography with the non-invasive 3D surface imaging system. One of the most common techniques for the 3D image of the facial surface today is digital stereophotogrammetry. Despite this, the current stereophotogrammetry systems have some limitations, the most important of which is represented by the large size of the equipment, integrated by the entire system with multiple cameras. Consequently, these devices cannot be easily moved to other locations and their transfer is therefore limited. In addition, stereophotogrammetry devices are expensive and require frequent calibrations. This study intends to compare traditional photogrammetry methods with new technologies through the use of the smartphone. Therefore, the aim of the study is to evaluate the possibility of using smartphone in clinical practice maintaining an acceptable level of clinical accuracy and reliability, comparable to stereophotogrammetry.

Methods: Twenty adult volunteer subjects (twelve females and eight males) between 23 and 32 years of age were recruited for the study. The exclusion criteria were pathologies and deformations that could influence the facial morphology. Men with beards longer than 1 mm were also excluded. Each volunteer was subjected to the acquisition of facial scanning using stereophotogrammetry (3dMDtrio System, 3dMD, Atlanta, GA, USA) and facial scanning using smartphone (iPhone XS, Apple Store, Cupertino, CA, USA) carried out with the app Capture (Capture, version 1.2.5, Standard Cyborg, Inc. San Francisco, CA, USA). All the images were then processed through Geomagic Control 2014 software (Geomagic; Morrisville, USA). First, the scans were cut out keeping only the face and removing all confounding elements, such as hair, ears, neck and shoulders. The images of the same subject, obtained from the two different systems, are then superimposed by selecting the entire surface on the two scans and applying the optimized alignment function. Once the alignment was obtained, the 3D comparison was carried out.

Results: The medial region of the face was superimposable between the two scans (3dMD and Capture) with values of difference less than 0.5 mm. On the other hand, In the lateral regions of the face the surfaces were less superimposable, with average difference values between 0.5 mm and 1.5 mm.

Conclusions: The central region of the face is a frequently studied and analyzed area in orthodontic practice for a correct evaluation of the clinical case, while the lateral regions of the face are used to a lesser extent. Photogrammetry remains the gold standard in 3D face scan, as described in the literature, but the analysis of the patient's face by scanning with a smartphone, thanks to the help of the Capture app, represents a viable alternative that is more easily accessible and usable in daily practice, aware of the limits that the technique itself demonstrates. Further studies are deemed necessary and it would be advisable to increase the reference sample.

Comparison between conventional indirect bonding and digital indirect bonding

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Aim: Conventional Indirect bonding (CIDB) was

introduced in 1972 by Silverman et al. The advantages of this technique were better visualization in placing brackets, reduced chair time, less likely need for repositioning of brackets, reduced physical and mental stress, and more comfort for the patient. However, literature has underline different disadvantages such as technique sensitive, additional set of impression needed, increased lab time, cost of additional materials. In order to overcome these disadvantages, recently conventional stone or plaster study models are being replaced with the digital 3D models (Digital Indirect Bonding, DIDB). The aim of this study is to evaluate confidence of inexperienced operators in CIDB compared to DIDB.
Methods: 5 students from Catholic University of the Sacred Heart of the two last years of dental school experimented a CIDB on 10 dental casts from different patients. Then, they used the DIDB on 3D virtual models of the same patients, obtained by Trios Intraoral Scanner. The first procedure (CIDB) followed these passages: Obtain dental casts with type IV dental stone; Draw bracket positioning guidelines on the previously obtained cast determining the long axis and the projection of mesial and distal marginal ridges on the buccal surface; Apply orthodontic light-curable adhesive to the bracket base and position it over the cast surface using a bracket placement marker gauge; Once all brackets were placed and positions were checked, use a light-curing unit to cure the adhesive according to manufacturer's instructions. The second one (DIDB) was made according to these steps: Export of the 3D Scan from Trios software and import on Ortho Analyzer Software (3Shape, Copenhagen, Denmark); Models Setting: occlusal plane, sagittal plane and models squaring; Segmentation of dental elements in mandibular and maxillary arches; Detection of the long axis of the tooth and the Facial Axis Point; Selection of the brackets and tubes from the library and positioning on the model as suggested by the software; Customization of the bracket position according to the single case features. After each operator has completed the 10 IDB procedures, were considered: simplicity and fluency of use, learning curve, need for computer skills, request of additional laboratory materials, possibility to improve the manual ability, ease in visualizing and correcting the position of the brackets and in evaluating the occlusal set up.
Results: All operators considered DIDB procedure easier and more fluent in execution than CIDB for an inexperienced clinician and the learning curve was shorter. The DIDB technique has resulted much faster than CIDB, above all thank to computer ability of the students. Other advantages were better and easier correction of brackets position, no additional materials needed, less measurements errors and better visualization in placing brackets on model. A crucial aspect in the digital procedure was the possibility to evaluate the virtual occlusal set up obtained from the digital 3D model in a much easier and faster way than the conventional technique. Regarding disadvantages of DIDB, this technique leads to no improvement in manual skills and requires more expensive instruments and software. Moreover, digital procedure could create issues for clinicians with poor computer abilities.
Conclusion: Analyzing the advantages and disadvantages of the two techniques, the operators enrolled recommend the use of digital technique in clinical practice for those who are familiar with the use of digital technology, especially for inexperienced operators.

Functional and aesthetic rehabilitation of the fragile patient with virtual prosthetic planning and guided implantology

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Aim: the advantages of digital implantology are validated by many studies, and include the reduction of the number of sessions, the lower morbidity and the possibility to plan implants in accordance with a prosthetic project. Our work has been dedicated to patients who are disabled or who have already undergone invasive medical and surgical therapies. The aim of the study is to point out how, in the selected cases, the digital workflow allows to rehabilitate with fixed prostheses fragile patients, otherwise destined for edentulism or compromise prostheses.
Methods: Five patients were selected. Three patients had undergone resective and reconstructive surgical treatment for oncological pathology, two patients had a moderate disability of syndromic origin. Three patients had completely edentulous arches, two partially edentulous. The data acquired with the initial CT were coupled with the scans of the initial models using specific software (DTX Studio Implant); a diagnostic wax-up of the final prosthetic project was performed and this too was digitized. Based on the data collected, 29 implants were planned virtually. From the virtual project, surgical templates were created to place the implants with a minimally invasive technique. After implants insertion, two prostheses were immediately loaded, the other three after six months.
Results: All implants, one year after loading, support fixed prostheses, without surgical or prosthetic complications.
Conclusions: prosthetic rehabilitation of fragile patient should provide the best possible recovery of

masticatory and phonatory function; nevertheless, a pleasant aesthetic is important, so as to also allow psycho-social reintegration. This is not always possible with mobile prostheses, due to the healing of tissues after cancer surgery and because of supportive therapies, such as radiotherapy. Likewise, the uncooperative patient is often not inclined to the long sessions necessary to make the prosthesis; moreover, mobile prostheses are often not tolerated, and the disabled patient ends up not using them. Computerized surgery allows to create a prosthesis according to a virtual prosthetic project (Digital Workflow), minimizing morbidity and complications related to the insertion of implants. It also proves to be a valuable aid in prosthetic rehabilitation of post cancer patients who have undergone invasive surgery in the cervico-facial area, where it is difficult to make adequate mobile prostheses. Finally, this method facilitates and considerably reduces the number of surgical-prosthetic sessions in uncooperative disabled patients.

Bite force measurement devices

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Aim: Bite force is an indicator of proper functioning of anatomical structures composing the masticatory system. Interest in the study of this force began more than 300 years ago, when Borelli first decided to obtain an evaluation of masticatory system using a device called Gnathodynamometer. Historically, G.V. Black built the first intraoral devices to measure bite force and they consisted of a lever, a spring and a manometer, or splints places over the teeth with a steel stud impinges. Different devices are now available to measure the bite force; they allow to analyze and prevent dysfunctions of masticatory system. The purpose of this study is to review new devices providing some important indications for clinicians.
Methods: This review was identified through electronic databases such as PUBMED and Research Gate. The articles were written in a period between 1968 and 2020 and evaluated by titles, abstracts and full texts.
Results: Several devices recording bite force are able to evaluate masticatory efficiency and its implication in therapeutic effectiveness. Studies about masticatory system are now oriented to new devices, less expensive, easier to use and fitted out with electronic components; the latest ones can record up to 1000 N and thanks to different types of sensors they are able to convert bite force into a series of detectable and recordable data. The most widely used and modern devices are based on force transducers (also known as load cells) which convert force into electrical energy; this is made possible by piezoelectricity, pressure and strain of composing material. Piezoelectric transducers use piezoelectricity to convert mechanical stresses exerted on the surface of crystalline materials into electrical charges. These kinds of transducers can be useful in subjects with reduced jaw opening. Strain gauge transducers emit a proportional electrical potential depending on the deformation induced in metal plates or forks; this transduction could be useful in edentulous patients, where lacking teeth make difficult to record in maximal intercuspal occlusion. Pressure transducers generate a signal generated by the pressure exerted in a chamber containing fluid or air. Moreover, a novel in vivo methodology using an optical fiber-based Bite force measurement device (BFMD) converts the variations of a metal plate - induced by the force exerted on the occlusal surfaces – using an optical fiber sensor called fiber Bragg grating (FBG). Another system uses a wireless connection to share informations from a splinted passive force sensor to an active external unit. Bite force influencing factors are previous prosthetic or orthodontic treatments, coexisting malocclusions, current periodontal health of teeth, the age, the gender, craniofacial form, detection site along the dental arch and the number of teeth; all these variables have been studied in clinical research not only to intercept symptoms or predisposing factors for temporomandibular joint dysfunction (TMD) - paradigm of the multifactorial disease – but also to monitor variation in bite force across a prosthetic treatment and to analyze differences between patients with normal occlusion and patients with Angle's malocclusion.
Conclusion: By analyzing influencing factors on measurement of bite force, it is possible to provide some important indications for clinician about detection methods (and bite force recording devices), with both the aims of early diagnosis of masticatory disfunctions and evaluation of treatment efficacy.

Incidental findings detected through CBCT in the orofacial district: prevalence in a prospective cohort of 3432 patients

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Aim: Incidental findings are previously undiagnosed

medical conditions that are discovered unintentionally and during evaluation for a medical condition. Such findings may occur in a variety of settings, including medical imaging. The present study aimed to assess the prevalence of incidental findings, detected through cone-beam computed tomography (CBCT) of the maxillofacial region.

Methods: CBCT of the maxillofacial region performed between February 2018 and September 2019 were prospectively collected. All of the patients had CBCT scan upon request from dental practitioners to get diagnostic information in the presence of bone lesions, or in order to plan surgical extraction of impacted teeth or implant surgery or bone grafting. CBCT scans were not performed just to collect prevalence data for the present study. At radiological reporting, all incidental findings were recorded. Prevalence and nature of the incidental findings were assessed in the light of demographic data and of the reason the patient needed the CBCT scan.

Results: A total of 3432 CBCT scans, belonging to 3432 patients, were analyzed. Patients were 1497 males (43,62%) and 1935 females (56,38%), with a male/female ratio of 1:1.29, ranging in age from 6 to 89 years (mean age 54 years). Most of CBCT scans were ordered to plan the placement of dental implants or to determine possible bone grafting/sinus lift treatments (55.4%) and almost one third aimed at evaluation of impacted teeth (33.5%). Quite infrequently scans were performed to improve the diagnosis of radiolucent not better-defined alterations previously observed in orthopantomography (7.8%) or bone/odontogenic known diseases (3.4%). One hundred nine incidental findings (3.2%) were observed, belonging to paranasal sinuses (68.8%), odontogenic diseases (20.2%), neoformations (8.3%) and other findings (2.75%). Reasons to order CBCT scans were significantly related to the prevalence and kind of incidental findings. The lowest prevalence was observed in CBCT scans ordered to evaluate impacted teeth (10.1%; $p < 0.0001$). All the neoformations were observed in CBCT scans ordered to assess impacted teeth ($p < 0.0001$). Most of the incidental findings came from CBCT scans performed prior to placement of dental implants or to determine possible bone grafting/sinus lift treatments. These scans revealed 82.7% of paranasal sinuses diseases and 54.5% of odontogenic diseases.

Conclusion: Patients referred for dental treatment, may harbour a not negligible prevalence of incidental findings from CBCT scans of the maxillofacial region. Radiologists must be aware of this issue and carefully report incidental findings in order to advise clinicians to properly address them. Even in the absence of a complete report highlighting the presence of incidental findings, dental practitioners are required to correctly assess imaging and detect incidental findings. This is even more important when CBCT scans are performed in dental clinics in the absence of radiological reporting.

Evaluation of facial asymmetry in dysfunctional patients by facial scanner and surface to surface method

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Aim: The recent explosion of digital technology, in terms of software, scanner and production capacity of digital artifacts, has brought a real revolution and a shift of paradigms in all aspects of dentistry. The digitization of diagnostic and treatment tools has become a reality at the disposal of a growing number of professionals. The aim of this contribution is to evaluate and quantify asymmetry in dysfunctional patients compared to healthy patients through the use of Bellus 3D Dental Pro facial scanner (Campbell, CA) and consider its introduction into clinical practice as a simple and non-invasive method.

Methods: The study was performed on 7 dysfunctional patients, aged 19-54 and 7 apparently healthy control subjects, aged 25-32. A face scan was done using Bellus 3D Dental Pro, to allow the identification of 3 unequal and median anatomical points (glabella, the tip of the nose and subnasal point), via Meshmixer (Autodesk, San Francisco, California, USA). Then the facial scans were divided into two hemi-scans according to the plane of symmetry passing through the 3 unequal and median points of the face prespecified. The two halves of the face scan obtained were superimposed via Geomagic Control X 64 (3D Systems, Morrisville, North Carolina, USA), through a preliminary horizontal mirror transformation of the left scan. This procedure allowed us to highlight the degree of asymmetry between the two halves of the patient face. Finally, the degree of asymmetry was compared between the group of dysfunctional patients and the group of non-dysfunctional subjects.

Results: Once the analysis for each individual patient was completed, the values, obtained by overlapping the right half and the reflected left half, were grouped and analyzed, in order to evaluate any significant differences. The descriptive analysis of the values reported the following parameters: average value, minimum value, maximum value and standard deviation. The Shapiro-Wilk test confirmed the normal distribution of data. Levene's test confirmed

the homogeneity of the variances in the two groups. In light of this preliminary analysis, parametric tests were used to perform the comparison between the two groups, dysfunctional and non-dysfunctional). In this regards, the unpaired t-student test showed the significance of the study, resulting in <0.05. Finally, we evaluated the methodological error, through the Dahlberg formula and the ICC, and the average quantitative difference of the asymmetry between healthy controls and dysfunctional patients, whose absolute value, expressed in mm, was 2.698.
Conclusions: This study, for the first time in literature, allows, through the use of a facial scanner, to quantitatively evaluate the degree of asymmetry in dysfunctional patients. Asymmetry is a condition present in all individuals, even healthy subjects. Dysfunctional patients have a statistically and clinically significant grater degree of asymmetry than non-dysfunctional subjects, in details, dysfunctional subjects show 6 times grater asymmetry compared to healthy subjects. The evaluation of this facial asymmetry can be adequately assessed through the use of a facial scanner in a simple and non-invasive way.

Minimally invasive rehabilitation of a patient with multiple agenesis and gummy smile: a case report

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Aim: The reported clinical case describes the implant-prosthetic rehabilitation of a 35-year-old female patient affected by multiple agenesis of teeth #12-13-22-23-32-42 and gummy smile. The patient's desire is the restoration of her own oral health and the improvement of the aesthetics of her smile, working on the upper frontal teeth.
Methods: The first diagnosis was made with digital impressions, facial scan and CBCT. These diagnostic exams detected a reduced bone width both mesio-distal and vestibular-palatal (IV class of Cawood and Howell). For this reason the treatment plan developed was the extraction of canines #53-63, followed by two dental implants. Instead, the team decided to preserve the deciduous lateral incisors #52-62, planning a whitening in order to position two lithium disilicate veneers. The first rehabilitation phase was focused on the treatment of the Altered Passive Eruption (APE). The patient was affected by APE 1B, characterized by an excessive gingival margin overlap on the crown, an important keratinized gum thickness and a less-than-1,5-2 mm distance between the bone crest and the cementoenamel junction. Therefore, the bone crest lies very close to, or even at the same level as the cementoenamel junction. To solve this clinical condition, periodontal surgery was performed, particularly an apical repositioning flap followed by osteotomy. Four months later, the Computer-Aided implants planning was done, using the intraoral scanner for digital impressions, the CBCT and the facial scanner. Finally, a virtual 2D mock-up was performed using the Digital Smile System (DSS) software. The implants planning was followed by surgery, in which the implants were placed. The team decided to perform immediate implants with immediate loading, particularly iRes iMax 3.2x10 mm. The implants site was prepared with the split-crest technique E.R.E (Bruschi, Scipioni, Calesini) using an osteotome and the first drill was inserted with computer-guided technology. Six months later, the team took definitive impressions of #13-23 implants. The final prosthetic rehabilitation of canines and lateral incisors was performed in two steps: firstly the crowns on #13-23 were placed, then the veneers on #52-62.
Results: The end result fully satisfied both the patient and the operative team. One year later, a check-up was done and no complications emerged; solely an imperfection in frontal and lateral view was solved.
Conclusion: Computer-aided implant surgery is useful to avoid complications resulting from implant placement in bones with a reduced mesio-distal width. Furthermore, the use of digital technology allows to achieve both functional and aesthetic excellent results.

Comparison between sla and dlp printing materials in dentistry: a review

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Aim: A technology represents a new clinical alternative to realize prosthetic artefacts. This technology brings together a number of different methods that have in common a layer-by-layer building up process; between these technologies, the most widespread is stereolithography (SLA). The main characteristic of SLA is the use of a light source for layers polymerization. An alternative, belonging to the same group as SLA, is digital light processing (DLP), which uses a projector as polymerization source. The aim of this review is to elucidate about the features, the similarities and the differences between this two technologies and analysed the materials available.
Methods: To carry out this review, articles among the most influential dental journals were analysed using PubMed as search engine. The key words used were "Rapid prototyping technology" "3D printing dental materials".

Results: The main advantages of SLA and DLP printers over subtractive techniques are low percentage of wasted raw material; passivity: AM technologies during manufacturing phases do not produce noise or heat that may cause structural damages; no bur wear: it is an additional cost of millers maintenance; resolution: the least detail possible for a miller depends on bur diameter. Regarding the production method of the artefacts SLA consists of a basin full of uncured liquid into which a building platform is placed. An UV-laser polymerizes on the surface a first layer and then the platform descends a predetermined distance to allow the polymerization of a second layer. The procedure continues until the object is completed. Digital Light Processing (DLP) technology instead, consists of using a projector, placed under the basin, as a source for resin polymerization; therefore, the object is pulled up from the resin. The mainly used materials for DLP printers are composite resins. These resins are commonly used for the realization of provisional, and regarding long-term rehabilitations, few studies analysed mechanical and biological characteristics of these resins. Regarding SLA printer new studies investigate features like flexural strength or accuracy of artefacts realize in ceramics or zirconia.
Conclusion: SLA and DLP present favorable and unfavorable elements. DLP printer allows a faster realization of the manufacts with good accuracy. However, both the surface characteristics (staircase effect) and the lower resolution can lead to a more limited use for the creation of defined definitive artifacts. SLA printing is more precise and accurate, with the possibility of making products in different materials. However, the production times are longer since the polymerization occurs for single points. Therefore the choice of which of the two technologies to rely on is guided by the needs of the user.

Chairside digital workflow of multiple partial restorations: case report

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Aim: This study was conducted in order to show and describe the use of the modern "Cerec" technique in a case report consisted in multiple partial restorations of both upper and lower dental arches to demonstrate the several advantages this technique provides.
Methods: The procedures were carried out starting from a digital impression obtained from an intraoral scanner, subsequently transformed into digital information transferred to a computer using CAD/CAM programs, thus getting the images displayed on the screen, ensuring a previsualization of the finished work, thanks to the Cerec software. This software is directly connected to the Cerec milling and grinding unit, speeding up work times and also guaranteeing minimally invasive restorations due to the materials used, the Vita Enamic, a hybrid ceramic with dual reticular structure, offering the possibility of milling minimum thicknesses. After the milling and grinding procedures, the restorations were directly cemented with light-curing cement, but only once that all the excesses have been removed. The contralateral hemiarches have been treated with simple direct restorations, using "Enamel Plus" composites introduced for the first time by Lorenzo Vanini in 1995. The color choice was made using a "VITA" shade guide to get a tapering as eucromic as possible with the natural substrate of the patient's teeth.
Results: One of the most important advantages offered by the digital chairside workflow, is time: this technique allows the clinician to bypass the step, otherwise necessary, of the temporary crowns, finishing the examined work in only one session. Moreover the digital impression, thanks to the real time visualization of the preparation on the screen, makes it possible to produce the necessary corrections in order to obtain the cavity drawing as retentive as possible. One possible negative aspect is that the preparation must be appropriate to the capacity of the milling unit.
Conclusion: Digital chairside workflow allows the clinician to obtain highly aesthetic works in the shortest time, using highly performing and long lasting materials. As in the specific case analyzed, the work was carried out completely on the chair, not including intermediate steps involving the technician in the workflow. All this translates into an extremely satisfying job for the patient, but also for the clinician himself, capable, using only the Cerec system, to create prosthetic restorations directly in his office. Despite the increase in working times, the traditional technique remains a valid technique since all the steps are gradually checked and corrected, if needed.

To be effective: how to teach aesthetic dentistry in engaging ways

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Aim: Nowadays video tutorials are available on the web for any topic. Students frequently use this tool to deepen their knowledge or solve any doubts. But how effective is the video tutorial as opposed to the traditional frontal lesson? The purpose of this work is to assess the effectiveness of a video tutorial used to

teach aesthetical digital dentistry in 75 undergraduate students of Dental School of Verona of University of Verona.
Methods: A course to assess competencies and skills of students was formulated as follows: (i) digital management of dental patient, (ii) aesthetic analysis of a clinical case and (iii) digital previewing of the result. A sample of 75 students from 3rd to 6th year were randomly divided into two groups, each one with a different teaching method: 38 students in Group 1 attending Frontal lesson and 37 students in Group 2 attending Video Tutorial. The course was administered on the same day to both groups. At the end of each lesson, students had to perform an exercise and a "satisfaction survey". Authors defined the parameters useful for the analysis: to evaluate esthetic analysis, we used (i) time and (ii) mistakes on 'Esthetic form'; to evaluate digital preview, we used (i) time, (ii) position of new teeth and (iii) 'Dimension and Symmetry' of new teeth. An experienced user collected all the material and carried out the evaluations.
Results: No differences were found between two groups in terms of usefulness of the course and interest in topic(Mann-Whitney test p = 0.996 and p=0.119). Differences were highlighted about adequacy of the teaching method and the tools used (Mann-Whitney test p = 0.002 and p=0.000). Students hypothesized that the "other teaching method would have been more useful"(Chi-square test p=0.000). No differences in terms of capability to perform aesthetic analysis and digital preview were found (Student T-Test).
Conclusion: Both teaching methods could be effective to teach this topic, however it could be advisable to take into consideration of using the video-tutorial form to achieve more engagement of students and to provide an easy-to-use tool that they can use to do their practice.

Intraoral scanner: in vivo reliability of full maxilla repeated scans

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Aim: In dentistry, the current generation of intraoral scanner (IOS) seems to be even more precise than traditional impression techniques on single and multiple crown rehabilitation on natural teeth. The aim of this research is to evaluate the trueness and the accuracy between repeated scans of the same full maxilla.
Methods: The IOS Medit i500 was used in this study. The scanner was calibrated before each scan. The scanning strategy followed the instruction of the manufacturer using a 3 travels scanning strategy. It started from the right occlusal to the left occlusal side, then with an inclination to 45 degrees from the occlusal plan to obtain the vestibular area in left to right direction and finally with and inclination to 45 degrees from the occlusal plan to obtain the palatal area in the right to left direction. The scanner software creates a reliability map that using a color scale from red to green showed if any area does not have sufficient reliable data. The operator was trained to have full green color scale impression. One experienced operator performed 10 subsequent scan of the same DMFT=0 (Decayed, Missing, Filled,Teeth) maxilla senza problem di allineamento dentale. The scans were exported in a standard .stl format and analyzed using an Iterative Closest Point (ICP) algorithm. The alignment and deviation analysis have been performed by means of an open source software (Cloud compare). The software convert the .stl file into a point cloud of 1000000 points for the subsequent comparison. The algorithm allows to align the scans and to highlight the difference in terms of deviations, by using a color map, in order to test the repeatability of the measures. The root mean squared error of the Euclidean distance between is a good performance indicator of the similarity of the point clouds.
Results: The point clouds have been assessed and, for each couple of scans, have been reported the minimum, maximum, average deviations and the relative standard deviations. It has been observed that that on average, 60% of the points have a deviation of less 0.1 millimeter, and 90% of the points have a deviation of less than 1.0 millimeter.
Conclusion: The used algorithm has proved to be a very useful and powerful tool. The results have shown not only the repeatability of the measures but also allows to evaluate the expected error that the dentist have to take into account with this kind of technology.
The results are consistent with the technical specification of the instrument.

Integrated pre-surgical diagnostics: artificial intelligence at the service of computer-assisted implant-prosthetic planning

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Aim: Describe a new automated procedure based on artificial intelligence for matching the DICOM (Digital

Imaging and Communications in Medicine) file data obtained from the cone beam computed tomography (CBCT) and the STL (Standard Triangulation Language) file data from the intraoral scan to produce a stereolithographic model and surgical guide. The method proposed in this paper has as its objective to match the two types of files, without the use of radiological templates,to reduce the risk of making errors, to improve accuracy and to reduce execution time. The goal is to create a virtual patient on which to plan the entire implant-prosthetic rehabilitation, then translated in vivo with a surgical template.
Methods: The new procedure for matching the 2 data-sets, DICOM file data obtained from the CBCT and STL file data obtained from digital impressions using an intraoral laser scanner, uses the advances in 3-dimensional (3D) CT imaging and computer-based interactive software programs which have greatly assisted the computerized matching of data files. With the previous technique it was necessary to use the radiological template to allow to match these 2 data-sets; this additional phase involved possible errors, a longer execution time anda result that could be less precise than that obtained with this new matching technique to fabricate a stereolithographic model of the jaws and surgical guide.
Results: The software automatically overlays hundreds of points between the DICOM file data obtained from CBCT scan images merged with STL file format obtained from digital impression. Therefore, automatic file matching allows to avoid the use of the radiological template and metallic fiducial markers. Therefore, this new procedure is associated to a reduction of the risk of incurring errors, reduction of the execution time, digitalization of the procedures, better precision and simplification of matching.
Conclusions: The need to overlap different formats derives from the need to investigate the characteristics of the patient's bone, obtained from CBCT, together with the characteristics of the soft tissues adjacent to the area to be rehabilitated, obtained from the scan. In this way we can planning the best implant position but also the emergency point of the prosthetic abutment and its best design in respect of the surrounding soft tissues.Artificial intelligence is applied in dentistry to improve DICOM and STL file matching system. This improvement consists in eliminating an essential step in the previous matching procedure: the CBCT with the radiological guide and the metallic fiducial markers. Artificial intelligence, via automated software, allows reducing the risk of errors, increasing accuracy, reducing time and having a digital workflow. This new matching technology is considered more accurate than the technique based on the use of metallic fiduciary markers and the use of radiological guides (prepared by the dental technician).

A new digital method to evaluate leukoplakia of the dorsal tongue with image analysis

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Aim: The aim of this study was to evaluate a new digital method to measure the area of potentially malignant white lesions found on the dorsal tongue, as well as their texture. We implemented ImageJ's digital software to measure the area of the lesions instead of their diameter. Moreover, we also calculated the color distribution inside the lesions.
Methods: We recruited consecutive patients with clinical evidence of white lesions on the dorsal tongue, with a clinical diagnosis of leukoplakia or erythroleukoplakia. For each patient, we put a 5mm diameter sterile circular piece of graph paper next to the lesion, which acts as a reference scale. Then, a picture was taken with a smartphone camera. ImageJ (https://imagej.nih.gov/ij/), a freeware program for photo analysis, was used to evaluate the pictures. We marked the lesions' margins by using the provided free-hand selection tool. The program calculated the selected area in mm^2, thanks to the scale set on the piece of graph paper that was included in the picture. We also measured the diameter of the lesion. We calculated the largest area that the lesion could possibly take up, which was equal to a circle. We calculated the amount of the largest area possible that was actually occupied by the lesion, as a percentage. This value explained by how much using the diameter only was over-estimating the area by assuming a circular lesion, or under-estimating by assuming a linear lesion.
We checked the RGB histograms within the selected area, and in particular we analyzed the intensity of each pixel in the red channel. We chose to analyze red since it is typically more represented in the oral mucosa. We knew that as the Standard Deviation of the red channel histogram went lower, the lesion's color was more homogeneous, and vice-versa. We used an area of healthy mucosa as control and then put these values in relation with the maximum Standard Deviation possible in an RGB histogram. The result was a percentage which let us evaluate if and by how much the Red color was spread differently in the lesion versus healthy mucosa.
Results: We have applied this method to a white lesion of the dorsal tongue, classified as homogenous leukoplakia and the results were as follows. Area of the lesion: 102,708 mm^2, which was 29,02% of the largest possible area. This indicated that assuming a circular area for the lesion would have heavily overestimated its size. StdDev of the Red Histogram of the lesion: 15,536, which was 12.19% of the largest possible StdDev. StdDev of the Red Histogram of healthy mucosa: 17,950, which was 14.08% of the largest possible StdDev. This indicated that the Red

color spread in the lesion area was even, and that was coherent with the clinical diagnosis of homogeneous leukoplakia.
Conclusion: Our method shows that clinicians can perform additional non-invasive analysis on clinically visible leukoplakia or erythro-leukoplakia of dorsal tongue by taking pictures with a smartphone camera. Taking note of the area and color distribution results in time can help for lesions follow-up during therapy, or monitoring potentially malignant diseases. In the future, a smartphone application may be developed to perform area and color distribution analysis at the moment the picture is taken. Image learning and neural networks may be included to develop automated marking and evaluation of the lesions.

Use of artificial intelligence in the automatic segmentation of dicom files from CBCT for virtual avulsion of dental elements

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Aim: The objective of the study is to validate the technique of automatic segmentation of DICOM (Digital Imaging and Communications in Medicine) data using CBCT (Cone Beam Computed Tomography) images by the application of artificial intelligence. The process of segmentation of CBCT images is used to select anatomical structures of interest extrapolated from the background or from other structures. The segmentation process can be performed using manual methods, partially automatic methods and fully automatics methods. Segmentation is an essential procedure in generating useful 3D models in the diagnostic phase, treatment plan and clinical practice.
Methods: The thesis analyzed the method of automatic segmentation performed through a specially designed software (3DIEMME Realguide 5, Italy) that processes DICOM data from CBCT for the segmentation of dental elements. The automatic segmentation differs to the manual one, which does differentiate the structures only through the gray scale, being able to recognize the type of element from the selection of the FOV (field of view) comparing the selected one with those present in the database previously acquired; the database is implemented during the analysis of new data. The study aims to verify the actual efficiency of the program in recognizing the type of element from the selection made in CBCT. Automatic segmentation has been used to perform pre-chirurgical virtual extractions and to evaluate the body movement of the elements before orthodontic treatment. Automatic segmentation reduces surgical invasiveness, helping a proper planning, and radiological invasiveness because post-extractive CBCT is not necessary for the evaluation of the extractive site.
Results: The advantage of automatic segmentation software is performing easy and precise pre-chirurgical virtual extractions, increasing the degree of prediction of the morphology of the post-extractive site, the real bone extension for a future immediate post-extractive implantation and the state of the surrounding soft tissues. Automatic method proved to be useful performing a correct pre-surgical virtual planning, diagnosis and treatment. In orthodontics automatic segmentation allows the evaluation of the movement, before the treatment, not only of the crown but also of the root; this analysis is useful for the planning of invisible orthodontic treatments. Unlike manual and partially automated segmentation methods, requiring longer manual processing and post-processing times for the elimination of artifacts, it's possible to reduce the timing by simply selecting the dental element of interest, allowing the program to recognize the type of element selected by comparing it with continuously learning database, highlighting the selection in 3D graphic isolated from the surrounding structure.
Conclusions: Automatic segmentation is simpler, more precise and more immediate than previous segmentation techniques, which are more susceptible to artifacts and user intervent. Automatic segmentation allows to carry out pre-chirurgical evaluations creating virtual pre-chirurgical or pre-treatment situations, reducing surgical and radiological invasiveness through the pre-visualization of the treatment result.

Comparison of accuracy between three different intraoral scanners using a 3D software

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Aim: The purpose of this study was to compare the accuracy (trueness) of three different intraoral scanners using a 3D software. Also, a comparison of the chair time and overall preference between conventional and digital techniques was made.
Methods: 27 subject were included in this study and 4 different virtual models were generated for each: virtual scans with Carestream 3600 (3.1, CS 3600®, Carestream, Rochester, NY, USA), Cerec Omnicam (4.6.1, Cerec Omnicam®, Dentsply Sirona, Germany), Trios 3Shape (1.18.2.6, Trios 3®, 3-Shape, Copenhagen, Denmark) and the ideal reference models obtained from conventional polyvinyl siloxane (PVS) impressions. The plaster model obtained from

PVS impressions were scanned by desktop scan R500 3Shape (3Shape, Copenhagen, Denmark). Surface matching software (Geomagic Control X, 3D System - version 2018 1.1, Geomagic, Morrisville, NC, USA) was used to superimpose all the data collected (.stl files) to determine the mean deviations in trueness (µm) between the PVS impressions and the digital scans ones. The arches transverse dimensions and the distances between the same points of single tooth were measured. A colour-coded was used to analysed 3D and 2D surfaces of the full arch. Times and preferences of each technique were recorded and compared. R Software was used to analyse the differences in term of accuracy between the conventional impression and the three intraoral scans ($P < 5\%$). Descriptive statistic was used to analyse the results of chair time and overall preference.

Results: Significant differences between the conventional impression and the three intraoral scans (mean of 100-200 µm) were recorded either on arches transverse dimensions and the distances between the same points of single tooth. Trios 3Shape showed the highest accuracy on the single tooth, whereas Carestream 3600 obtained the best values regarding on interarch distances. 3D and 2D analyses between conventional and digital impressions revealed a pattern of major deviations along molar regions. There were no significant differences in term of accuracy between each intraoral scan. Carestream 3600 and Trios 3Shape showed a significant inferior chair time compared to Cerec Omnicam and PVS impressions ones. All the patients preferred intraoral scanners because they were considered more comfortable.

Conclusions: The trueness of PVS impressions were slightly different from the three intraoral scanners compared; however, no significant differences were found between the intraoral scanners. The digital scans showed a different pattern of deviation in molar regions than the conventional impression. The digital workflow with intraoral scanners seems to be more time-efficient and preferred by patients than the established conventional pathway with PVS impressions.

Pediatric Dentistry

Mother-infant oral health: a survey of childbearing aged women

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Aim: Dental problems may occur during pregnancy and postnatally due to hormonal changes that affect the health of the stomatognathic apparatus. The blood concentration of estradiol and progesterone increases in the gestation period, causing an increase in the vascularization and swelling of the mucous membranes, which, in conjunction with decreased immune defenses, creates an environment conducive to the development of oral inflammatory diseases. In addition, general factors, such as the individual's health or eating habits, and local factors, such as any qualitative or quantitative changes in saliva or certain local irritants (plaque and tartar accumulation, malocclusions, incongruous restoration, or prostheses) play a major role. The most common consequences are gingivitis, enamel erosions, caries, epulis gravidarum, and chloasma gravidarum. Women who wish to get pregnant do not always undergo preventive dental visits, but rather present to the dentist with urgent clinical needs. This lack of information and education presents risks for the oral health of the pregnant woman as well as her unborn child. In the case of pregnancy, certain imbalances can lead to the manifestation of dental pathologies (thus prompting a doctor's visit), while in the case of the unborn child, the same lack of information can affect eating habits and home hygiene. This research aims to assess the oral hygiene habits of women in the perinatal period. The study also aims to ascertain the degree of awareness of mothers, or future mothers, about the importance of oral hygiene for themselves and their child.
Methods: Study design: epidemiological, observational, cross-sectional survey among a group of young women of childbearing age. They were mothers who were recruited from kindergartens and pregnant women who went to counseling centers or participated in courses prepared throughout Italy.
Results: The sample included 500 women from central-northern Italy and 263 from southern Italy for a total of 763 subjects. Most of them were Italian (87.9%) and just over 50% of them had at least one child (52.7%). The women's ages were greater than 35 in 40% of cases and between 25 and 35 in 52% of cases.
Conclusion: Young women too often underestimate the importance of oral hygiene even before pregnancy, and the impact of oral hygiene lasts throughout gestation and continues even after childbirth

Ultra-conservative aesthetic rehabilitation of a bigeminal upper lateral incisor with direct composite restoration

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Aim: To report minimally invasive dentistry approach for the aesthetic rehabilitation of a bigeminal upper lateral incisor formed by two peg-shaped elements in a 13 years old patient.
Methods: A.G., a 13 years old patient, was referred to the Department of Pediatric Dentistry for the evaluation of a bigeminal lateral incisor in the right upper arch.

The patient was in good general health. Intra-oral examination revealed the presence of two peg-shaped upper right laterals, called from here on 1.2 the mesial one and 1.2-bis the distal one, respectively. Other findings were the presence of late mixed dentition, lower midline shift of 1 mm towards the right, slight increased overjet, and ectopic position of 1.3 presented with distal rotation and infra-occlusion. In the orthopantomography, 1.2 and 1.2-bis have no root's deformity. An orthodontic check-up was scheduled to decide the best treatment plan. The cephalometric analysis revealed a relatively balanced dento-skeletal relationship. Model casts space analysis was conducted: the mesio-distal diameter of the 2.2 was 6.5mm, whereas the space from the mesial side of 1.3 to the distal side of 1.1 was 9.5mm revealing an excess of space of 3 mm on this side. An orthodontic treatment seemed the best choice for space closure, as it would have improved intra-arch symmetry and facilitate the following restorative rehabilitation. Both the patient and her mother refused any orthodontic approach. Therefore, a merely restorative treatment was proposed to make 1.2 similar to 2.2 and to shape 1.2-bis like 2.3. The wax up on the plaster model was made to check the final result and to produce a mock-up in composite resin. The mock-up was worn by the patient and checked. The clinician asked the dental technician to slightly decrease the convexity of 1.2-bis, and to reduce interproximal embrasure between 1.2 and 1.2-bis so that the interproximal contact would be moved apically toward the papilla. The clinician also decided to perform the restorations as a whole single bonded element, to allow better conditioning of interproximal papilla and make easier for the patients to floss.

Results: Direct composite resin restorations were performed both on 1.2 and 1.2-bis with the guidance of a matrix made from a PVS material with high shore hardness. Canine and incisor guidance were checked to avoid any occlusal interference. The final result was satisfactory: both dental and smile aesthetic improved significantly. A follow-up evaluation at 30 days was carried-out: the aesthetics was maintained and a good gingival adaptation in response to the restorative rehabilitation was noted. The interdental papilla appeared healthy and no black triangle were noted.

Conclusions: Minimally invasive dentistry is effective in the treatment of shape anomalies of maxillary lateral incisors and allows to treat such conditions in a single session, without any tooth preparation. This case showed the treatment of two peg-shaped upper right lateral incisors that had yielded an evident occlusal asymmetry. The patient refused to undergo any orthodontic therapy, so a camouflage microinvasive restorative treatment was performed. The 1.2 was made like 2.2 and 1.2-bis was made looks like a canine. Dental aesthetics improved, even though occlusal asymmetry relationships were not affected. The mock-up has been essential to properly plan dental shape and function rehabilitation. Moreover, it was extremely useful to check and review micro-aesthetics features regarding tooth and gum contouring. The interproximal contact between 1.2 and 1.2-bis was closed and this has made easier to restore both dental and gingival shape.

Dental finding associated with charge syndrome: a review of the literature and report of a case

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Aim: CHARGE is an acronym referring to the aspects of this rare syndromic condition. Patients with CHARGE association are today considered as subjects lacking in pathognomonic dental alterations. The low incidence of charge syndrome has made it difficult to define a correct and comprehensive dental picture.
The present study is aimed at adding to the body of evidence of cases reported in literature and continuous clinical research which show a clinical picture, in order to increase the diagnostics and interceptive phase, relative to patients afflicted by this syndrome.
Methods: We conducted a literature research about dental features associated with CHARGE, also considering the chewing and swallowing difficulties caused by malocclusion. We dealt with oral pathological conditions of a female patient affected by CHARGE syndrome with Skeletal class III (ANPg < -2,5°) , anterior cross bite and severe chewing and swallowing difficulties. The patient was treated with a protraction facemask, attached to hooks mounted on a fixed intraoral appliance for the interceptive treatment of Class III malocclusions.
Results: Most of literature deals with chewing and swallowing problems according with Charge and very few articles report dental features associated to this syndrome. The dental features linked to CHARGE syndrome are from case-reports, but without a degree of congruity that can lead to a definition of the dental condition typical of the CHARGE phenotype. CHARGE patients can have one or more congenital dental anomalies, such as taurodontism of the pulp chambers, hypodontia, ectopic eruption, submergence of primary molars, agenesis and supernumerary teeth. Agenesis, malformations and ectopic eruptions

of teeth of the frontal group lead to a wrong vocal in phonation, with a reduced tongue coordination. The protraction facemask was used to apply forward and downward traction on the upper jaw. After 22 months of treatment the facemask moved the upper maxilla forward fixing the anterior cross-bite. This treatment also improved her occlusal and chewing function as well as her tongue coordination.
Conclusion: The systemic problems affecting patients with Charge syndrome are predominant in compromising their quality of life resulting in the neglect of dental problems and intervention only in case of evident pathologies. The interceptive phase should have a central role in the oral clinical approach as you can have benefits in several fields like occlusion, swallowing, chewing, phonation and eating. It is essential for the dentist to make the right diagnosis and have an early therapeutic approach able to guarantee the young patients with CHARGE association a more predictable prognosis for the oral problems which may arise and a better quality of life.

Family pediatrician and oral health: a survey in a sample of healthcare in Lombardy

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Aim: Oral health is closely related to general health and affects the quality of life. The mouth has an important role for socializing, breathing, feeding and smiling, all essential functions for achieving a state of psycho-physical well-being. While parents consider routine examinations performed by the family pediatrician of a great importance to achieve and maintain good health for their child, they attribute less important to the first visit or regular check-ups by the pediatric dentist to achieve and maintain optimal oral health. The purpose of this study was to conduct a survey on oral health knowledge and behaviors in a sample of pediatricians, who carry out their professional activity in Lombardy, Italy.
Methods: An anonymous questionnaire was delivered to a sample of 112 pediatricians, including 12 items investigating different topics of great interest in the practice of the pediatric dentist: collaboration between pediatrician and pediatric dentist, first dental examination, use of fluoride toothpaste, seals of first permanent molars, trauma, alimentation, Early Childhood Caries (ECC), breastfeeding, use of pacifier and tooth grinding. The answers to the questions were first subjected to a descriptive statistical analysis and then to an analysis of variance (One-way ANOVA) to evaluate the association between the dependent variables (responses to each item) and the independent variable (years of clinical experience of the pediatrician, the only personal data collected). Pearson's correlation Index was used to evaluate the relationship between the score of the answers and the years of clinical experience of the pediatrician, analyzed in this case as a continuous variable. A p value <0.05 was considered statistically significant.
Results: The results obtained from the 112 questionnaires show that 82% of pediatricians manage dental trauma correctly, suggesting parents to keep the dental fragment or the avulsed tooth in saliva, milk or physiological solution and to contact as soon as possible a dentist or an emergency room. Sixty-nine percent of the interviewed pediatricians consider the pacifier use in a 4-year-old child an unacceptable habit. More than two-thirds of the sample (79.5%) agree that breastfeeding need to be discontinue no later than 24 months of age. The majority of the pediatricians (83.0%) considers their collaboration with the pediatric dentist a very important issue. On the contrary, 85.7% of pediatricians do not refer the child to the pediatric dentist for a visit within the first year of life. One-way ANOVA showed a statistically significant difference ($p=0.01$) only regarding the knowledge on dental sealants and the years of clinical experience of the pediatrician, with more exact answers coming from the pediatricians with ≥30 years of experience compared to those with less experience ($r=0.24$; $p=0.01$).
Conclusion: The results of this survey suggest the need of a continuous training for pediatricians on oral health issues and a greater collaboration between the two clinicians, pediatrician and pediatric dentist, that care of child health. The need to include a course on oral health topics in the pediatrician's curriculum emerges from the data of this survey.

Effects of hydroxyapatite containing toothpastes on plaque pH and cariogenic bacteria in children

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Aim: The purpose of this study was to evaluate caries clinical data and background factors from children enrolled and participating in a trial on the preventive

effect of a toothpaste enriched with complex hydroxyapatite compound and fluoride compared to a fluoride toothpaste. The clinical outcome was defined as the caries increment. More interim examination included the evaluation of the change of plaque-pH after sucrose challenge and the cariogenic bacteria concentration using the DNA-DNA checker-board analysis.

Methods: In total 610 schoolchildren were examined at baseline. At one-year follow-up 581 schoolchildren from the original sample were re-examined. The sample was dived in two age-groups: 4/5 years and 6/8 years; each subject was at baseline randomly allocated in one group (green 1 and green 2 for the younger group and red 1 and red 2 for the older group). At each time point several parameters were registered: caries status was registered using ICDAS II Scores, plaque-pH after a one-minute sucrose challenge during twenty minutes with measures every five minutes) using specific pH-strips (Merck, DE), microbiological plaque evaluation of the primary cariogenic bacteria (i.e. Streptococcus mutans, S. sobrinus) and secondary cariogenic bacteria (i.e. S. sanguinis, S. salivarius).

Results: No statistically significant differences were observed in caries data after one year excep for filled teeth. The number of restorations changed considerably (from 54 filled teeth at baseline to 94 filled teeth at the 12 months follow-up); this might be due to parents' awareness of the oral condition of their children after baseline examination. The minimum pH remains under the threshold value of 5.7 (enamel dissolution starting point) in all groups. The intra-group differences between the initial pH value before the acid attack and the minimum value achieved, decreases in the four groups. The difference in plaque pH between the baseline values and after 12 months is always statistically significant ($p=0.01$ green 1 group, $p=0.03$ green 2 group, 0.02 for red 1 group and 0.04 for red 2 group). Between the baseline and the 12 months examination, a statistically significant reduction of primary cariogenic bacteria was observed, as the reduced number of S. mutans from 3.11 ± 1.13 to 2.16 ± 0.46 ($p<0.01$), S. sobrinus from 1.86 ± 0.74 to 1.76 ± 0.70 ($p=0.03$), S. sanguinis from 2.47 ± 0.86 to 2.14 ± 0.82 ($p=0.04$) and S. salivarius from 2.56 ± 0.50 to 2.19 ± 0.61 ($p=0.04$).

Conclusions: No caries progression was observed in the experimental period. The one-year results show that plaque pH measurements after acid attack increased in all four experimental groups, highlighting that all subjects involved in the trial modified the ecological substrate of plaque. Data from the 12-month evaluation show that all primary cariogenic bacteria are statistically significantly reduced in different groups. All toothpastes have contributed to modify the oral microflora of children.

MIH, molar incisor hypomineralization, and HSPM, hypomineralization of the second primary molar: is there a correlation?

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Aim: Molar incisor hypomineralization (MIH) was first described in 2001 by Weerheijm et al. as a qualitative enamel defect that may occur on first permanent molars and frequently on permanent incisors. Recently, similar enamel hypomineralization was described on second primary molars and it was defined hypomineralization of the second primary molar (HSPM). The prevalence and etiology of MIH and HSPM remain uncertain due to the high heterogeneity between studies such as the sample size, the age cohort of participants, the index used for classification, the setting in which the examination took place, the selection of participants, the geographic location and the calibration of the researchers. The purpose of this observational study was to investigate the association between molar incisor hypomineralization (MIH) and hypomineralization of the second primary molar (HSPM), also evaluating their correlation with dental caries.

Method: The study was conducted at the University of Rome "Tor Vergata" on 315 children aged between 5,5 and 12 years-old. The EAPD classification standard and adapted to second primary molar were used to define MIH and HSPM. Dental caries was assessed using the decayed, missing or filled teeth (DMFT) index by the World Health Organization. The examination was performed by a calibrated researcher. First, all the patients received professional oral hygiene; the oral exam was performed using natural light to avoid artifacts due to artificial light. Mean, standard deviation and range were used to summarize continuous variables, while frequency and percentage were used for categorical ones. Associations were analyzed by Chi-square test and t-test for categorical variables and continuous variables, respectively (α= 0.05).

Results: The prevalence of MIH and HSPM was 31,1% and 22,5%, respectively. The mean DMFT was $2,88 \pm 3,04$. Children with HSPM were more frequently affected by MIH ($p<0,001$). Patients with MIH or HSPM presented a higher prevalence of dental caries associated with the defect when compared with healthy ones ($p<0,001$). Also, in children affected both by MIH and HSPM there was an increased prevalence of dental caries on MIH teeth when also the HSPM teeth were decayed.

Conclusions: The present study described the possible association between MIH and HSPM. Also, an association was found between MIH/HSPM and dental caries, with an increased risk to develop dental caries on MIH teeth in patients with decayed HSPM.

Surgical and orthodontic management of impacted maxillary canine, success rate, and cause of failure: a systematic review

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Aim: The aim of this systematic review was to assess the success rate and cause of failures of two surgical techniques adopted for the management of maxillary impacted canine: open and closed surgical approaches. In addition, the duration of treatment and the post-operative pain were compared between the two different surgical approaches.
Methods: A survey of articles published up to May 2019 about Surgical/Orthodontic Management of maxillary impacted canine was performed using four electronic database (MEDLINE, EMBASE, LILACS, Web of Science) with 1484 initial identified articles. Only randomized clinical trials and prospective controlled clinical trials were included, all the clinical studies were performed on human patients with at least one impacted canine, managed with open and/or closed surgical approach. Two authors independently accomplished study selection, data extraction, and risk of bias assessment. Cohen Kappa's statistics were used to evaluate the agreement between the two authors.
Results: In total, 8 articles were included. Four studies were RCT, four were CCT. Data from 231 patients were collected; 117 patients treated with closed technique and 114 treated with open technique. The complications in the group treated with the open technique were greater in percentage compared to the patients treated with the open air surgical technique. The closed technique (23.6 ± 11.8 months) required a slightly shorter treatment time than the open technique (23.8 ± 10.5 months) but the difference was not significant. The comparison of the post-operative pain between the two surgical approaches showed that patients treated with open surgical exposure experienced significantly more post-operative pain than the group treated with closed exposure. From the 3rd to the 5th day, pain after the surgery and the consumption of analgesics were significantly higher with open technique compared to the closed technique.
Conclusion: The results of this systematic review allow us to state that the failure rate of the open surgical technique was 11.9% than the closed technique 1.7%. The duration of treatment for the open surgical exposure technique of the included canines appears to be less to the closed exposure technique (30,9 vs 37,7 minuti). Patients treated with an open surgical approach experienced greater post-operative pain than patients treated with a closed approach. Further RCTs are needed to clarify whether an increase in the sample size can modify the results obtained and how these are influenced by the position of the included canine and its distance from the normal eruption site.

Experimental evaluation of a clinical decision support questionnaire for MIH diagnosis

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Aim: MIH (Molar Incisor Hypomineralization) is a common DDE (Development Defect of Enamel) first described in 2001 by Weerheijm et al. as "Hypomineralisation of systemic origin, presenting as demarcated, qualitative defects of enamel of one to four first permanent molars". Although its prevalence, MIH diagnosis is still lacking among dental professionals who are not familiar with DDE. This is matter of concern as MIH patients often need intensive preventive care and in the severe cases, they need restorative or surgical treatments. MIH should be diagnosed and managed as early as the permanent incisors and the first permanent molars erupt. A Clinical Decision Support (CDS) questionnaire could assist less experienced dental professionals or students. The aim of the study is to examine the impact of a CDS for the identification of MIH enamel defect in a randomized control trail using a digital questionnaire.
Methods: A sample of 141 students (dentists and dental hygienists) was randomly divided in two groups, case and control groups, and received a link to an anonymous digital questionnaire containing 5 DDE pictures: 2 MIH cases, 1 amelogenesis imperfecta, 1 fluorosis and 1 white spot lesion due to caries. Both groups were asked to diagnose and suggest a treatment or preventive plan for each of the cases. Students in the case group answered a 5 steps CDS yes/no questionnaire before expressing their own evaluation. The questions were the following: "Is the defect present in all the elements?", "Is the defect present in one or more permanent incisors and/or one or more first permanent molars?", "Is the defect white chalky/yellow-brown/brown?", "Is the defect

present in atypical caries zone? (such as vestibular surfaces or cusps)", "Do the surfaces with the defect/enamel breakdown present demarcated margins?". The control group instead performed the diagnosis without the CDS support.
Results: 117 subjects completed the questionnaire. Sensitivity, specificity and DOR were calculated for the two groups. The students using the CDS (cases) showed a sensitivity of 44.4%, significantly higher than the controls (24.6%) according to Fisher exact test (p-value = 0.0015). The specificity and DOR were 96.8% and 99.5% for the case group and 97.5% and 31.6 respectively for the control group.
Conclusion: Findings showed the potential of a Clinical Decision Support to ease MIH diagnosis for dental professionals who are not familiar with DDE. Although these findings support the use of a CDS as a support for DDE diagnosis, further studies with a higher number of subjects and/or including clinicians with different clinical experiences are needed to confirm these Result.

Premature loss of the deciduous teeth: spy of systemic pathologies

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Aim: Premature teeth loss of deciduous, not justified by a traumatic event, is a rare occurrence but possible spy of severe clinical situations and therefore requires immediate diagnostic evaluation. The causes include metabolic alterations, connective tissue pathologies, neoplasms and self-mutilations. Among the metabolic alterations, hypophosphatasia is a rare genetic disease that leads to mineralization defects of bones and teeth due to the deficiency of alkaline phosphatase activity. Clinical spectrum is extremely wide ranging from loss of deciduous teeth in the absence of skeletal signs (odontohypophosphatasia) to neonatal death. This pathology must always be investigated in case of loss of a deciduous teeth before the age of 18 months in absence of a dental trauma.
Methods: Twenty-two month-old male had a first access to the First Aid of IRCSS G. Gaslini for loss of tooth 51 attributed by the parent to a dental trauma (falling from bed?) with no other oral-facial signs; the deciduous dentition appears in the correct stage of development in relation to age. At 2.1 years, a second access to the First Aid for loss of element 61 was reported, attributed again by the parent to an accidental fall but without involvement of other extra-oral structures. At 2.2 years of age, a third access outpatient at the UOSD of Pediatric Dentistry and Orthodontics of the Istituto G. Gaslini happened: the parent showed the tooth 73 just loss with 2/3 formed root and reported the loss of other elements in the same conditions. Oral examination showed the lack of teeth 51-61-71-72-73-81- 82 in the dental arches; elements 75 and 85 were in eruption. A marked mobility of 52-53-62-63-83 was detected with exposure of the amelo-cement junction No carious and mucous lesions were observed. The diagnostic suspect was hypophosphatasia, also considering the short stature (10th percentile), the delay in the acquisition of the psychomotor stages and the typical walk of the child. In agreement with pediatricians, hematochemical, urinary, radiographic and genetic tests were scheduled to achieve reliable diagnosis.
Result: Hematochemical and urinary tests show: - markedly reduced activity of serum alkaline phosphatase (alkaline phosphatase 26IU / L); hypercalciuria (9.1mEq / l) with plenty presence of calcium oxalate crystals; high urinary excretion of phosphoethanolamine (PEA 1204umol / mmol) Radiological tests show: irregularity of the lateral profile of the neck of the right femur with interruption of the cortex; reduced density of the proximal metaphysis of the left fibula. The molecular testing of genomic DNA extracted from peripheral blood for the ALPL gene coding for serum alkaline phosphatase shows mutation heterozygosity.
Conclusion: Alterations to the deciduous teeth must always be properly investigated. The pediatric dentist has the task of sentinel and he/she needs to collaborate with a multidisciplinary team for the correct management of the patient. The challenge arises on the therapeutic decision where the possibility of enzyme replacement therapy, the necessity of which must be assessed in relation to the systemic compromise, must beassociated with psychomotor, logopedic and dental rehabilitation, which must ensure a physiological masticatory, phonatory and aesthetics function to allow a harmonious development of the jaws during the child growth.

Delayed teeth eruption and dental findings in a patient with Dandy-Walker Syndrome: a case report

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Aim: Tooth agenesis (TA) is one of the developmental disorders commonly occurring in children and one of the more common conditions within dental anomalies. It is known to be associated with both environmental and genetic factors and it can occur in association with many syndromes, like the Dandy-Walker Syndrome (DWS). DWS is a congenital disease characterized by brain malformations in which the cerebellar vermis does not fully form and the fourth ventricle and the posterior fossa are enlarged with cerebrospinal fluid. The main symptoms usually occur during childhood and they are: developmental delay, progressive increase in head circumference, signs related to cerebellar dysfunction (vomiting, irritability, convulsions). The effects of the syndrome on the cognitive skills in affected children are extremely variable. The syndrome occurs in one out of 30,000 newborns and has an unknown cause. However, a number of studies report that various chromosomal abnormalities are associated with DWS. Few studies have reported on dental manifestations in DWS: the purpose of this report is to present oral findings and dental management of a 10 years old boy with DWS.
Methods: C. G, is the primogenital son of Italian healthy parents. His little sister is healthy and no similar cases are reported in this family. The diagnosis of DWS was made during morphological ultrasound: the gynecologist saw the malformation of the cerebellum.
Results: During childhood, C. showed difficulty keeping attention, difficulty in managing emotions in a way appropriate to his age and organizing school work independently. The first time we examined the child, he was 8 years and 1 month old; at the intraoral examination, no permanent teeth were found, and all primary teeth were present. In addition, fused maxillary central and lateral incisor on the right side were found. All the teeth were stable and the patient had a good level of oral hygiene. An orthopantomography revealed that both the crowns and roots of the primary incisors were fused and two separate pulp chambers and root canals were present. In addition to this, we discovered the agenesis of 1.2, while all other permanent germs were in formation except those of wisdom teeth. We planned half-yearly visits to control eruption of permanent teeth. When C. G. was 9 years and 5 months old, 4.1 erupted in the mouth. At a further examination, when the child was 10 years and 2 months old, we extracted fused 5.1 and 5.2 to facilitate the eruption of 1.1. At the beginning of July 2020, a new orthopantomography showed that the wisdom teeth are in formation. Today he is 10 years and 7 months old and the teeth 1.1, 2.1, 3.1, 4.1, 1.6, 2.6, 3.6 and 4.6 are the only permanent teeth erupted. We are going to seal first molars' pits and fissures. When all the permanent teeth will erupt, an orthodontic therapy will be evaluated to manage the agenesis of 1.2.
Conclusions: Few studies have reported the dental manifestations of DWS. This report is the first report that describe delayed teeth eruption in patient with DWS. Our findings emphasize the importance of a multidisciplinary approach in the diagnosis and treatment of DWS.

22q11.2 Deletion syndrome: a literature review and a dental case report

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Aim: The 22q11.2 deletion syndrome is one of the most frequent syndromes with multiple anomalies. It has a worldwide incidence ranging from 1/2.000 to 1/4.000 live births. The clinical phenotype varies greatly from mild to severe depending on the type of deletion. As well, the clinical manifestation seems to be very heterogeneous. This study aimes to carry out a narrative review with a systematic search of the literature regarding the 22q11.2 deletion syndrome in the dental field. In addition, a case report compared with those resulting from the review is presented.
Methods: Firstly, a narrative review with a systematic literature search was performed. The search was run on three databases: PubMed, EMBASE and The Cochrane Library. Articles were considered eligible to be included when a close correlation between chromosome 22 deletion syndrome and dental aspects was reported and investigated. All types of study design were included (ie. Experimental and observational studies). For each study, data regarding clinical manifestations and assessed outcome (ie. Feeding problems, Hypoplasia, Agenesis, Enamel hypomineralization, etc) were extracted. Secondly, a clinical case was compared with those resulting from the review.
Results: The narrative review included 20 studies: 15 observational cases and 5 clinical cases. They were divided according to the outcome: 7 studies assessed hypoplasia and hypomineralization, 9 studies reported craniofacial morphology, 6 studies reported agenesis, 4 studies highlighted feeding problems, 1 dealt with the evaluation of salivation, 1 considered the

perspective of the parents and 1 the post-operative tachycardia. The comparison of our clinical case with those retrieved by the literature search showed a great heterogeneity of clinical manifestations.
Conclusion: The 22q11.2 deletion syndrome has been studied by few studies in the dental field with great variability of clinical outcomes. The observational studies found are not the first choice in the pyramid of evidence. However, in case of rare syndrome and diseases, these designs might be informative but justified by the difficulties associated with randomizing patients. Therefore, they can be considered an excellent starting point for future studies and research hypothesis. According to our results, the outcomes reported by studies underline a certain variability in assessment and management of these syndrome. Thus, these should be considered in the establishment of treatment protocols adapted to the the patient'sneeds. A customized treatment is therefore crucial for the patient with the 22q11.2 deletion syndrome: our clinical case confirmed how the management of the patient with special needs is complex and articulated. The great heterogeneity of the clinical manifestation of this syndrome and the absence of guidelines imply the duty to implement a highly patient-tailored treatment plan.

Postural evaluation and efficacy of a new elastic functional orthopaedic device in Class III malocclusion

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Aim: Despite the lack of scientific evidence about any correlation between occlusion and posture, orthodontics can treat malocclusions with an integrated approach during childhood. Our goal here is to describe a long-term treatment of a third-class malocclusion with an innovative elastic functional orthopaedic device, considering the overall improvement of the postural and footprint supports.
Methods: A five-and-a-half-year-old patient with Angle third-class malocclusion and anterior cross bite in deciduous dentition has been treated with a functional orthopaedic device (a customized appliance for class III) for 7 years. Postural evaluation was performed at the beginning of the orthodontic therapy, at nine and twelve years old. Pictures in standard postural position were taken on the plumb line with a laser light for vertical and horizontal referencesin frontal and side vision. A Digital camera and carpet with graphic references for patient positioning (350 cm x 100 cm)were adopted. The stabilometric and baropodometric evaluation of static and dynamic feet support are obtained by an electronic instrument. The stabilo-baro-podometric platform used for the analysis in this study was (Biopostural System® Stabilo-baropodometric [CE-0124]). The system consists of a platform of 40x40 cm (1600 strength sensors) with resistive technology for acquisition with high frequency. The software provides a three-dimensional clinical-postural evaluation of the patient. Furthermore, it is able to synthesize the correlation among "Type of Foot" and "Posture", by means of an inferential algorithm in static and dynamic phases. OrthoTP® Software for computerized Cephalometry is an orthodontic software which allows the cephalometric analysis of the patient starting from X-ray in the various projections (lateral, antero-posterior, postero-anterior, axial, panoramic, tomography of the jaw, postural), integrating more than 30 classical methods. The whole data of the body (the postural tone, the analysis on the Barrè line, the Postural Tests objectivity, Romberg (test with open/closed eyes) and Fukuda Tests [Fukuda, 1961]), and of the orthodontics parameters (cephalometric analysis, dental records and pictures of the mouth) were recorded and correlated with OrthoTP® software in a complete file in the three times. The customized device is an elastic orthopedic functional appliance made of resin and stainless steel parts. The resin body involves the superior and lower jaws and is built on a bite of construction on the casts according to Planas occlusal plane. The brace is modified on the basis of the occlusal changes during the therapy.
Results: The functional device produced the right inter-maxillary ratio, the adequate postural attitude was also enhanced. In particular, a significant reduction of the feet support discrepancy was obtained (At 5 y/o: 42.2% on the right foot and 57.8% on the left one. At the end of the therapy: 49.9% on the right foot and 50.1% on the left one).
Conclusions: A global approach to the patient can successfully address both the malocclusion and the postural alterations in the long term.

Bioactive materials in pediatric dentistry - Biodentine and Activa Bioactive

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Aim: The main objective of the modern approach in restorative pediatric dentistry is to promote the remineralization of the hard tissues of the tooth, in

particular of the hypomineralized carious dentine and, therefore, protect and preserve the pulp vitality. Today the treatment of the vital pulp through pulp capping, partial and complete pulpotomy is preferable. These protocols are developed in connection with the use of bioactive dental materials. The bioactivity is expressed through an active biological effect, inducing a specific mineral absorption in dentinal substrate in order to allow the remineralization of dentine through the formation of an inorganic matrix with a component similar to apatite. This study analyzes specifically the use in clinical practice of Biodentine and Activa Bioactive, which seems to be increasingly considered compared to calcium hydroxide and MTA.

Methods: PubMed database were searched through the use of key words such as "biodentine", "activa bioactive", "bioactivity", "biocompatibility", "pulp treatment", "remineralization" and were only included studies conducted until 2018. Another inclusion criteria for the studies was the comparison of the two bioactive materials with a control group treated with MTA and / or calcium hydroxide. Five in vivo and in vitro studies were considered: two on Activa Bioactive and three on the biodentine were conducted.

Results: From the studies performed on the Activa Bioactive, used only in cases of indirect pulp capping, it was found that this material did not have a better antimicrobial effect than MTA and calcium hydroxide, however it is showed to have better physical properties both through a greater fracture resistance and through a better handling. However, it has been seen that it always required the use of adhesive systems because it did not have self-adhesive properties. From the studies carried out on the biodentine, used in cases of direct and indirect pulp capping in deciduous and permanent dentition, it has been seen that the results are superimposable to those obtained in the cases treated with MTA. In fact, it has been shown that the long-term clinical and radiographic success rate is similar between the groups treated with Biodentine and those treated with MTA, in addition to the best mechanical and physical properties of Biodentine: this material, in fact, presented better handling and shorter setting times compared to MTA.

Conclusion: Through the combination of good physical properties, bioactivity and biocompatibility, that allow the repair and regeneration of the hard tissues of the tooth preserving pulp vitality, it was possible to conclude that the new generation bioactive materials such as Activa Bioactive and Biodentine, could represent a valid alternative to the MTA and calcium hydroxide in direct and indirect pulp capping treatments of deciduous and permanent dental elements. However, further studies and clinical trials with longer follow-up periods are required before any conclusive recommendations can be made need to be conducted.

Gender differences and role on dental aesthetics in adolescent and young population

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Aim: The aim of this study is to assess some aspects of oral health with possible repercussions in adolescence and youth, with particular reference to gender differences. The face, through the smile, manifests emotional tones that affect one's own and others' esteem. Dental aesthetics can therefore significantly affect the well-being of adolescents and young adults, influencing important factors such as body representation and self-esteem.

Methods: 190 subjects with female prevalence (F = 62,6%, M = 37%) and ages between 14 and 29 years old (Mean = 23,8; SD = 3,27) participated.Thisstudy included patients of various gender and age and it was conducted ah the Division of Pediatric Dentistry and Orthodontics AOU G. Martino, Messina. Evaluation was carried using standardized instruments such as: Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ), for the analysis of the quality of oral life; Oral Health Impact Profile (OHIP-14) focusing on the negative impact of oral conditionsand Rosenberg Self Esteem Scale which allows a global assessment of self-esteem. Correlational and difference analyses and linear regressions were performed.

Results: The results of this study highlight how dental aesthetics and oral health can affect the psychological well-being of adolescents and young adults. Significant gender differences were found in terms of gender, in reference to variables as self-confidence and convictions. Positive correlations emerged between psychological impact and social impact, aesthetic concern and social impact, convictions and self-confidence, oral health with psyco-social impact and aesthetic concern, self-esteem with oral health. Inverse correlations emerged among psycho-social impact and self-confidence, aesthetic concern and self-confidence, oral health and self-confidence. No significant differences were found in relation to age. Multivariate linear regression indicated relations among age and psychological impact, sex and self-confidence, crooked teeth and conviction.

Conclusions: The characteristics and appearance of the face play a crucial role for adolescents and young adults, with significant consequences on self-perception, self-esteem and quality of life. The data obtained from our research shows that Dental aesthetics has a greater influence on the psychological well-being of the female gender, with significant repercussions on the body image and adaptation.The impact of oral health on the

psychological well-being of young people is relevant. These factors, if considered within clinical practice, can improve the quality of life of the subject.

Correlation between caries, body mass index and occlusion in an Italian pediatric patients sample: a transverse observational study

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Aim: The growing attention towards the etiopathogenesis and the prevention of pathologies of the oral cavity has led to an increasingly accurate study of the risk factors involved in their onset.The aim of this study was to evaluate the correlation between caries, body mass index (BMI) and occlusion in a sample of pediatric patients.
Methods: The study group included 127 patients (72 female, 55 male) aged between 6 and 16 years (mean age 10.2) and selected between January and June 2019 at the Department of Pediatric Dentistry, University of Messina. The study included only healthy subjects, who do not present systemic diseases and pathologies in progress, who do not carry out daily pharmacological protocols, who have not previously performed dental and orthodontic treatments and who had erupted the first permanent molar in the arch in order to perform a correct evaluation of the molar ratio. Caries incidence was evaluated using the decayed, missing and filled teeth (DMFT) index. For epidemiological purposes, the index most frequently used to evaluate the intensity with which caries affects individuals is that relating to the number of decayed teeth, missing clogged, the so-called DMF INDEX (D = Decayed; M = Missing; F = Filled) of international literature. This index is easy to interpret and is not affected by factors directly dependent on therapy. During the clinical examination, the canine class and the molar or terminal plane class were assessed, based on the patient's dentition, and the overbite values. On the basis of BMI values, using a table adjusted for age and gender, patients were grouped into four categories (underweight, normal weight, risk of overweight, overweight).
Results: There was no significant correlation between BMI and DMFT in the whole sample. The study of the correlation between BMI and DMFT in patients with different types of malocclusion showed a significant inverse correlation for patients affected by II class and deepbite malocclusion. No significant correlation is shown for the other malocclusion classes and for the other types of overbite.
Conclusions: The incidence of caries does not seem to be significantly related to BMI and occlusal patterns, but it decreases with increasing age. Obesity and dental caries have common risk determinants and require a comprehensive multidisciplinary approach in pediatric patients by both medical and dental professionals. It is desirable to enroll a higher number of subjects, in order to increase the power of the study and obtain a greater probability of statistical significance to continue the research.

Efficacy to the visual pedagogy in dental care for children with autism spectrum disorders (ASD)

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Aim: Autism Spectrum Disorders (ASD) is a life-long heterogeneous psychiatric disorder, characterized by impaired social interaction and communication, and the presence of repetitive and stereotyped behaviors as well as restricted interests. These features have an impact on the oral health of these individuals: high risk of dental caries and poorer periodontal status are often described. Children with ASD often provide limited collaboration with medical procedures, particularly those considered invasive such as dental care. These features make it difficult for professionals to examine and treat children with ASD; general anesthesia often becomes the treatment of choice for patients with ASD who require extensive dental treatment. However, the parents of children with ASD ask for less invasive techniques in order to improve child cooperation to dental examination and treatment. The prevalence of ASD has been steadily increasing in the past two decades, therefore, children with ASD present a challenge for the dental community. Many evidence-based strategies can be considered to facilitate dental care for patients with ASD. Visual pedagogy is a non-traditional approach to behavior guidance that takes advantage of the ability of children with ASD to respond better to pictures rather than words. It involves the use of books with color photographs, social stories, or video modeling and can be combined with traditional behavior guidance techniques. The aim of this study is to evaluate the usefulness of visual pedagogy in dental menagment for the young patient with ASD.
Methods: Literature search was conducted through PubMed without any search limit using the following key words: Autism Spectrum Disorders, Visual Pedagogy, Visual Supports, Social Stories, Dentistry, Oral Hygiene and Dental Care. The key words were searched singularly or in combination each other. Clinical study and Clinical trial reporting data on the use of visual pedagogy in children with ASD in dental setting or used in order to teach or improve oral hygiene level were included.

Result: Twenty-seven studies were included, eighteen clinical trial, two case-report and seven literature review; between literature review there are six narrative review and one systematic review; among clinical trial only nine study have a control group; nine them based on the use of visual supports in order to obtain children collaboration to the dental examination or preventive treatment, nine to teach oral hygiene procedure. All studies show that social stories could improve the toothbrushing performance, increase the compliance during oral screening and assisted in the successful completion of the oral health care procedures. The tablet is an attractive and easy device for people with ASD to use; its use in a training program was efficient. Most of the parents/cargiver are expressed appreciation that the visual supports provided, the ability to practice before the exam and reduced the fear of the unknown. Unfortunately, like other behavior management techniques, visual pedagogy is not effective for every patient, though they are relatively inexpensive, simple to use, and can generate a positive result. The limit of many studies is given by the low number of subjects included in the sample and the absence of a control group.
Conclusion: Visual pedagogy can be used as a relatively simple, low cost, and effective tool that may assist families of children with ASD in order to prepare them for dental appointments and improve the toothbrushing performance. Further research should investigate the effectiveness of visual supports in improving patient behavior in the dental environment and focus on the optimum timing and frequency of use.

A unique case of a 10 year old gifted kid sujected to frequent cavities and mouth aftae, in whom genomic screen revealed homozigous gene MTHFR – mutation c677t together with a heterozigous il-10 single nucletotide polymorphism in -1082 g/a

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Aim: The purpose of this paper is to present a unique case of a Caucasian 10 years old boy that presented to doctor with some disturbance of personality and affected by frequent oral mucosa aftae, cavities and chronic periodontitis (CP).
Methods Genomic analysis was performed and revealed two main significative hitches that should be probably considered relevant to the current condition and prognosis of the young patients. The genomics' findings revealed a homozygous mutation of Methylen-tetrahydrofolate reductase gene (MTHFR gene, C677T) and a heterozygous single nucleotide polymorphism (SNPs) of IL-10 gene (-1082 G\A). The MTHFR is an enzyme involved in the transformation of 5-10 methylen-tetrahydrofolate (THF) in 5 methil-THF, the most abundant circulating form of folic acid, which serves as a methyl donor for methionin homocysteine remethylation, the reaction catalyzed by methionine synthase for which vitamin B12 is required. In particular, the metabolism of homocysteine (Hcy) binds the methionine cycle to that of folic acid (in which vitamin B2 riboflavin acts as a cofactor) and also Hcy can be metabolized through another way (transulfuration) in which the enzyme cystathionine beta synthase intervenes, which requires vitamin B6 (pyridoxal phosphate) as cofactor.
Results: Hyperhomocysteinemia was confirmed to have some role in personality disturbances and neurological disorder, condition which characterize the behavior of this young patient and, indirectly due to its relation with vitamin B and folic acid it could also have consequence on oral mucosa and teeth health. Similarly, the SNPs of IL-10 gene (-1082 G\A) may contribute in aggravating the bone decay and inflammatory status of patients, due to the well-known involvement of IL-10 as one of the most important anti-inflammatory and immune modulatory interleukins. In addition, the IL-10 gene (-1082 G\A) has been proved to play a fundamental role in chronic periodontitis (CP) and to exert a significant role in bone homeostasis through its relation with vitamin D receptor gene family (VDRs).
Conclusion: To the best of our knowledge, this is the first study to demonstrate an important association between polymorphisms in IL-10 (-1082 A\G) and MTHFR gene, in young patient that revealed either personality disturbances and CP and recurrent oral mucosa inflammatory processes with oral cavities.

Orthodontic treatment need in patients affected by autism spectrum disorder

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Aim: Autism is a neurodevelopmental disorder classified among the ones defined as "Pervasive Developmental Disorder". These are disturbs derived from an alteration in the development of the brain and the patients affected often show stereotyped and repetitive behaviours, problems in social interaction and communication, both verbal and non-verbal. Lately, the incidence of this condition is clearly increasing, also thanks to the early diagnosis and better social acceptance. According to a research of the National Observatory for the monitoring of Autism Spectrum Disorder, in Italy 1 child every 77, aged between 7 and 9, is affected by ASD, with higher prevalence in males, that are 4.4 times more affected than females. The goal of our study is to evaluate the possibility of carrying out treatments, even the complex ones like orthodontic ones, in patients affected by ASD, through a pedagogic approach.
Methods: Our work was based on a wide sample of patients affected by Autism Spectrum Disorder. Malocclusion characteristics and occlusal features have been analysed evaluating the outcome after the therapy with orthodontics appliances on short and long term. The protocol used was built on the following aspects: the specialized formation and preparation of the staff regarding the pedagogic approach; the first meeting with the parents to obtain information over the specific behaviour of the patient; the first visit, where a first interaction of the patient with the operator and the environment was created; the environment, arranged so that nothing can be source of distraction, danger or trigger for the child or the team, being the same each time to create familiarity and routine; the timing, gradually increasing from session to session, based on the behaviour and response of the patient; the approach through Augmentative and Alternative Communication (AAC), prepared and realized through logical and temporal sequences images on a rigid panel that can be used throughout the whole therapy, showing the reason of the visit, the instruments used and the duration of the visit.
Results: Over the total sample of 285 patients in the Operative Unit "Sorrisi Speciali" of the Pediatric Dentistry Department of Policlinico Umberto I, 169 have been visited and diagnosed as patients with orthodontic treatment need. Currently, 68 of them (40.2%) have started an orthodontic treatment in one or more phases, with selected appliances customised on their specific needs.
Conclusion: The treatment process featured the dental team and the family collaborating, using proper communication techniques with the patient, and taking care of their cooperation, response and level of tolerance in every step. This led us to conclude that, whereby specific characteristics subsist, Autistic patients can be successfully treated also on the orthodontic aspect.

Audiovisual distraction in children with special healthcare needs during dental restorations

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Aim: To evaluate the effect of audiovisual distraction using video eye-glasses on behavior and self-reported pain of children with special healthcare needs (SHCN) without intellectual disability during dental restorations and its influence on the operator stress.
Methods: Italian-speaking children from 5 to 10 year-old, with at least one major medical diagnosis (excluded intellectual disability, autism, history of seizures or convulsion disorders, nystagmus, vertigo, visual or hearing impairments); with two carious primary and/or permanent molars (excluded the presence of pain, swelling and the need for pulp therapy) and no history of restorative dental treatment or extraction were included. Patient with low cooperation during a dental profilaxis were excluded. The study population was randomized into two groups: the first group (G1) received the first restorative dental treatment wearing the video eyeglasses (group A) and the second treatment with conventional behavior management wearing protective glasses (group B). In the second group (G2) behavior management tecniques were inverted (group B before group A). The child choose the cartoon movie. The restorative dental treatment was done using topical and local anesthesia; rubber dam application and caries removal. During the dental treatment, an examiners, seated in the room and not actively involved in the dental procedure, objectively assessed the behavior of each child using the revised Face, Legs, Activity, Cry, and Consolability scale (r-FLACC; 0= relaxed and comfortable; 1–3= mild discomfort; 4–6= moderate pain; and 7–10= severe pain or discomfort or both). The patients were interviewed by one of the examiners to rate the amount of pain experienced during the dental treatment from 1 to 10, using the Faces Pain Scale – Revised (FPS-R). The operator stress was assessed using the visual analog scale (VAS). The VAS consists of a small, unmarked 100-mm ruler with endpoints labeled 'none' and 'as bad as it could be' with the instruction 'Indicate how stressed you feel on the small ruler'.
Results: The study included a total of 48 children (mean age: 7.3 ± 1.5 years old), 22 male (46%) and 26 female (54%). In group A (video eyeglasses), 102 restorations were performed and In group B (protective glasses),

99. Considering the r-FLACC score, there was no significant difference between group A and group B (paired t-test: p= 0.953). Instead, comparing G2 (0.9 ± 0.9) to G1 (0.4 ± 0.5), the improvement in child pain-related behavior was significantly higher using video eyeglasses during the second restoration (Student's t-test: p= 0.047). The mean FPS-R score in the group A was 2.4 ± 2.3 and in the control group 2.8 ± 2.2, with no significant difference (paired t-test: p= 0.118). The sequence of distraction exposure (AB vs BA) influenced the efficacy of the audiovisual distraction on child self-reported pain. Infact, in G2, the mean FPS-R score with the conventional distraction techniques was significantly higher than with the video eye-glasses (2.7 ± 2.2 vs 1.2 ± 1.4; paired t-test: P < 0.001); instead, in G1, no significant difference was found. The mean stress VAS score was significantly lower in group A than group B (20.2 ± 16.3 vs 38.4 ± 18.2; paired t-test: P < 0.001). Regarding children's satisfaction, the 83% enjoyed the video eyeglasses.
Conclusion: The use of audiovisual distraction, in a second clinical session, can reduce the self-reported pain and improve the child behavior. Furthermore, the results showed that the use of video eyeglasses during dental restorations in children with SHCN reduced the operator stress.

Oro-dental features of Pallister-Killian syndrome

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Aim: to describe the oro-dental features and the oral health status of 21 probands with Pallister-Killian Syndrome (PKS).
Methods: 21 probands (9 males and 12 females; mean age 9.2 ± 7.1 years old, range 2–33) with a documented cytogenetic diagnosis of PKS were examined during the First European Work-shop on PKS (September 2013, Bologna, Italy), organized by PKS Kids Italy Onlus, Italian Association of PKS. One parent, for each proband, filled in a dental anamnestic form (history of pain, swelling, dental trauma, previous dental treatments) and the "WHO Oral Health Questionnaire" regarding oral hygiene, fluoride intake, diet, oral habits and dental recalls. The Plaque Index (PI), the Gingival Index (GI) and the decay, missing, filled teeth Index in the primary dentition (dmft) and in the permanent dentition (DMFT) were recorded. The relationship between the upper and lower dental arch in the three planes of space (sagittal, vertical, transverse) was examined.
Results: Oral hygiene was carried out by the parents and caregivers. In 13 probands (62%), teeth were brushed at least once a day; in 3 (14%), several times per week; in 2 (6%), several per month; in 3 (14%), never. In 11 probands (57%), a fluoride toothpaste was used; in 2 (10%), dietary fluoride supplements were used; in 1 (5%), both; 7 (33%), never took fluoride. A history of pain and swelling due to dental caries was reported in 6 probands (29%). Twelve probands (57%) showed the absence of primary and/or permanent teeth in relation to the age. Two probands (10%) had a double tooth in primary dentition. The mean PI of the cohort was 1.6 ± 0.9; oral hygiene was rated as poor (PI 2–3) in 10 probands (48%), good (PI 0–1) in 6 (28%), fair (PI 1–2) in 5 (24%). The mean GI of the cohort was 1.5 ± 0.8; gingivitis varied from mild to severe in 18 probands (86%) and was absent in 3 young (2–3 years old) patients (14%). The mean dmft of the cohort was 0.2 ± 0.6 (d=0.2; m=0; f=0) (range 0–2), the mean DMFT was 3.5 ± 6.3 (D=2.1; M=1.1; F=0.3) (range 0–22). The number of caries-free probands decreased with age: 7 of 9 probands (78%) in primary dentition, 5 of 10 (50%) in mixed dentition and 0 of 2 in permanent dentition. In both primary and permanent dentition, the decay component was predominant. Three probands (14%) had affected primary teeth (mean per patient: 1.3) and 6 (29%) permanent teeth (mean per patient: 7). Three probands (14%) had missing permanent teeth extracted due to caries and 1 (5%) had 4 filled permanent molars. Parents reported that all the dental treatments were done under general anesthesia. One proband (5%) showed 22 severely compromised carious teeth. None of the probands had sealants. An orthodontic evaluation was made in 16 probands (76%); it was not possible for 5 probands due to the young age (2–4 years old). Fourteen probands (88%) showed a high-arched palate, 12 (75%) a mandibular prognathism, 11 (69%) an anterior crossbite, 10 (63%) a posterior crossbite and 10 (63%) an anterior openbite.
Conclusion: Pediatricians should encourage parents to seek dental care for periodic dental recalls early after the eruption of the first primary tooth. The early establishment of a dental home is necessary to prevent oral diseases or to diagnose them, including malocclusion, at an early stage, leading to minimal interventions provided in the traditional dental setting.

Self-induced soft-tissue injuries following dental anesthesia in children with and without intellectual disability

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Aim: To evaluate the frequency of self-induced soft-

tissue injuries (SSI) following dental anesthesia in children with and without intellectual disability.
Methods: 241 children underwent dental treatment, receiving 464 local injections. Group A included 159 children without intellectual disability (299 injections); group B 82 children with intellectual disability (165 injections). Each group was divided into subgroups according to the age (≤ 6 years-old; > 6 years-old), the injection technique (maxillary infiltration, mandibular infiltration, inferior alveolar nerve block) and the dental treatment (restorative/endodontic treatment, extraction, both during the same appointment). Mepivacaine 2% with 1:100,000 epinephrine (Septodont, France) was used for the IANB, articaine 4% with 1:100,000 epinephrine (Molteni Dental, Italy) for both maxillary and mandibular infiltrations. The amount of anesthetic solution used was based on the weight of the child. The caregivers were shown three pictures of SSI (one of the tongue, one of the upper lip and one of the lower lip) to stress the importance of a careful observation of the child during the numbness period and to describe the typical localization and the clinical features of these lesions, at the end of the dental procedure. Two days after the dental procedure, the same operator contacted the caregivers by a phone-call to ask if they could identify any soft tissue injury. SSI following accidental biting or chewing of the lip, the tongue or the cheek were identified as localized redness and/or swelling, edema and pain.
Results: In group A 28 SSI (9%) were reported, without any significant difference between genders ($p = 0.601$; Chi-square test). The frequency of SSI was 15% in the ≤6 years-old subgroup and 4% in the > 6 years-old subgroup ($p = 0.002$; Chi-square test). In group B 32 SSI (19%) were reported, without any significant difference between genders ($p = 0.738$; Chi-square test) and ages ($p = 0.228$; Chi-square test). Regarding the frequency of SSI, the difference between the two groups (A:9% vs B:19%) was statistically significant ($p = 0.002$; Chi-square test). According to the injection technique, the highest frequency of SSI occurred with IANB (in both group A, 15%, and group B, 35%), followed by mandibular infiltration (group A, 13%, and group B, 19%) and maxillary buccal infiltration (group A, 2%, and group B, 9%). The difference among the subgroups was statistically significant in group A ($p = 0.002$; Chi-square test) and B ($p < 0.001$; Chi-square test). Considering the dental treatments, the difference among the subgroups was not statistically significant in both groups.
Conclusion: SSI are possible and not-rare complications of the administration of dental anesthetics in both pediatric and special needs patients. Every possible effort should be made to reduce the risk of SSI. A close supervision is strictly recommended for the whole duration of the local anesthesia to prevent the child from biting lips, cheeks, and tongue. When treating young children or individuals with intellectual disability, it may be recommended the presence of at least two caregivers.

Operative dentistry in cleft lip and palate: a report

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Aim: Cleft lip and palate (CLP) is a congenital malformation due to a developmental anomaly of the bones of the maxillofacial skull district. Not only the skull-facial skeletal structures, but also the hard and soft tissues of the oral cavity are affected by this pathology. Pediatric patients with this pathology are characterized by both dental anomalies and oral health problems. The latter are associated not only with oral abnormalities, but also with the presence of scar results from interceptive surgery which interfere with adequate oral hygiene maneuvers and consequently increase the risk of gingivitis and caries. For this reason, the goal of this study is to understand what is the best clinical approach to address dental pathologies in pediatric patients with cleft lip and palate.
Methods: this study was divided into three parts, the first part of the research was carried out by examining the scientific articles in the literature that analyze the incidence of various oral diseases in children with cleft lip and palate. The second and third parts of the research were carried out by examining the articles in which the multidisciplinary approach and clinical management of the oral problems of the small patient suffering from cleft palate.
Results: Analysis of the literature has shown that patients with cleft lip and palate have higher plaque indexes, higher prevalence of dental caries and worse oral hygiene models compared to non-CLP subjects, therefore the need to identify standardized protocols and develop devices has been demonstrated specific for prevention and control of oral hygiene in the cleft area. It has also been shown that these patients are subject to enamel hypoplasia, whose clinical management seemed identical to that of subjects suffering from enamel hypoplasia, but not from CLP. This managment mainly based on the control of the diet, which must be low in carbohydrates, on motivating parents to apply home oral hygiene practices, and on providing adequate oral hygiene instructions. Topical fluoroprophylaxis and sealing of the furrows of the permanent molars will be provided and, finally, it will

be necessary to plane periodic follow-up checks on the state of dental health. A very high frequency of anomalies such as agenesis of the maxillary lateral incisors, supernumerary teeth, microdontia of the maxillary lateral incisors, rotation of the maxillary central incisor adjacent to the cleft and hypodontics was also found. In the latter case, the therapy mainly consists of a preventive approach that includes the early start of oral hygiene maneuvers, the planning of professional oral hygiene sessions and topical fluorophrophylaxis. Therefore, the main objective is the conservation of the intact deciduous dental arch and the maintenance of the length of the dental arch with the management of space through the use of orthodontic devices with the aim of preventing mesial migration of the adjacent dental element. Finally, in relation to the orthodontic problems associated with the period of deciduous and early mixed dentition in children with CLP, the literature reports a greater prevalence of monodental cross bites related to the abnormal position of the dental elements.

Conclusions: the management of these patients must be based on a close collaboration of a specialized team of doctors, in which the pediatric dentist also has a fundamental role on the clinical evaluation and on the treatment plan. Furthermore, the choice of therapeutic solutions must always be made on the basis of the severity of the cleft.

Management of MIHO (hypomineralization affecting at least one of the canines, premolars or 2nd molars and simultaneously including at least one first permanent molar) in an adolescent patient: a case report

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Aim: In this article, the interdisciplinary tratment approach for adolescent patient with MIHO(hypomineralization affecting at least one of the canines, premolars or second molars and simultaneously including at least one first oermanet molar) is discussed. It isn a qualitative hypomineralization of enamel an dentin causing esthetic and functional problems sometimes associated whith an altered eruption sequence.The aetiology is still unclear, the condition seems to be multifactorial and possible causes have been suggested like respiratoryinfections, perinatal complications,dioxins,low birth weight,calcium and phosfate metabolic disorders,antibiotics,genetic variation that may interact whit systemic factors. The ideal time to diagnose MIHO in when it is clinically apparent either in primary or permanet dentition.

Methods: We report a case of a 15-year old female patients presented a Mild(the demarcated opacities located at non-stress bearing areas,no caries associated whit the affected enamel,no hypersensivity and incisor involvement is usually mild if present) hypomineralization of dental elements 15,35,45, and a moderate (the demarcate opacities present on molarars and incisor,the posteruptive enamel breakdown limited to one or two surfaces whithout cuspal involvement atypical restorations con be needed and normal dental sensitivity)hypomineralization of dental elements 17, 27,47 according to the Mathu and Wringht classification, the dental element 37 was not erupted. The patient was at the final strage of orthodontic treatment of dental alignment. The patient underwent restorative treatment which included the removal of all hypomineralization affected dental hard tissues enamel and dentin prior to topical fluoride application and glass ionomer restorations.The dental element 37 was surgically exposed and orthodontically anchoredand at the same time has been subjected fluoride application because it presented Mild Hypomineralization.

Result: The patient obtained a masticatory and esthetic rehabilitation with : dental alignment by an ortthodontica treatment;eruption of dental element 37 by a surgical tretment;prevention of crown degradation,caries and pain by timely conservative treatment.

Conclusion: The oral rehabilitation of adolescent patient affected by MIHO is long laborious and involves a multidisciplinary approch to avoid pos eruptive degradation of dental crown,development of caries and pain and consequently invasive treatments such as endodontic treatments of root canal or dental extractions and to obtain functional and esthetic results.

Caries of the fissures: seal or varnish? Current preventive guidelines

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Aim: The aim of this paper is to describe and compare the two best known caries prevention methods used to prevent fissures lesions on the occlusal surface of permanent molars: sealants and fluoride varnishes. The mechanical preventive action of sealants both in resin and in glass ionomer cement has been widely described in the literature and has been known for some time, as well as the remineralizing effect of

fluoride varnishes; however, even today it is not clear which strategy is the most effective or preferable in the various clinical situations.
Methods: A bibliographic review was conducted using the Medline and Scopus databases. 130 papers were evaluated and out of these, only 7 in vivo studies were considered relevant for the purpose of the present paper.The following keywords were used for the research: "fluoride varnish", "caries prevention", "glass ionomer sealants", "resin-based sealants", "pit-fissure sealants".
Results: Many studies have compared sealants and fluoride varnishes, which are the two methods of prevention available nowadays to dentists in order to maintain the health of pits and fissures for as long as possible. Out of the 7 studies considered, 4 have shown a greater efficacy of sealants compared to fluoride varnishes (Bravo et al.; Raadal et al.; Florio et al,; Tagliaferro et al.), 2 studies did not find any significant difference (Ji et al.; Liu et al.) and only 1 has shown that the most efficient method results from the combination of the aforementioned prevention methods (Splieth et al.).
Conclusions: Both sealants and fluoride varnishes are effective prevention methods for occlusal caries lesions. The preventive action of sealants is mainly mechanical, since it forms a physical barrier on the surface that isolates the morals from the oral cavity by preventing the accumulation of organic remains and bacteria as well as by hindering the supply of nutrients to the already existing microorganisms; if fluorine release materials are used, the sealants also allow chemical control of the bacterial plaque. The preventive effectiveness is maximum if the sealants are placed properly on the occlusal surfaces of the permanent molars within 2 years after the eruption. Sealants achieve the best benefit-cost ratio when used to treat patients with high risk of caries, but only if an adequate prevention program is associated to their use. The preventive action of fluorine is mainly chemical. Fluoride promotes post-eruptive maturation of the enamel, inhibits demineralization, improves remineralization and reduces the cariogenic potential of the dental plaque, slowing down the bacterial metabolism. The need for fluorine is directly proportional to the risk of caries or to its activity, if already present. Sealants, according to the available studies, have shown to be more effective than fluoride varnish in preventing tooth decay, especially in high-risk patients. Preventive efficacy is likely to increase by combining the two treatments. In light of these findings, it is possible to state that there is not yet sufficient scientific evidence that confirms the superiority of one preventive protocol over another and therefore further high-quality clinical studies are needed. However, the risk of individual caries, the possibility of controlling the humidity of the operating field and the cooperation of the patient need to be taken into account in order to identify the most suitable prevention method.

Treatment of intrusive luxation in the child

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Aim: The second cause of urgency after caries is dental trauma, affecting a percentage of the population that varies between 15 and 30%. The first peak of incidence occurs in deciduous dentition in children between one and three years old. This is due to the fact that in early childhood the child has not developed a good motor coordination yet, he begins to move on his own, to explore the environment around him and to start the first moments of socialization, attending kindergartens and playground. Given the close relationship between the roots of the deciduous teeth and the permanent teeth being formed, many dental traumas, especially intrusive dislocations can create damage to the permanent teeth, therefore the goal of this systematic review is to provide evidence-based recommendations on the treatment of intrusive luxation in the pediatric patient.
Methods: A literature review was conducted using the Medline and Scopus databases. 50 scientific articles have been evaluated and only 20 were considered suitable for our research. The inclusion criteria were: peer-reviewed articles dating from 2005 to 2018 in English, published in impacted journals, regarding patients aged between 1 and 5 years old and including either systematic reviews, meta-analysis or clinical trials. The following keywords were used for the research: "traumatology guideline", "traumatic dental injuries", "dental trauma", "preventive strategies", "intrusive luxation".
Results: Various therapeutic approaches have been used in the literature for the management of intrusive luxations of the deciduous tooth. However, there is still controversy about which is the most favorable therapeutic approach to back the intruder tooth to its normal position without complications to the permanent tooth in formation. The suggested techniques are: observation of the spontaneous eruption and extraction. The treatment of choice seems to be that of waiting for the spontaneous eruption of the deciduous tooth to occur. This is because it has been found that within 60-90 days the tooth spontaneously regains a regular position in the dental arch, while only a smaller percentage remains infraocluded. Furthermore, regardless of the degree of tooth recovery, most of the teeth had a healthy pulp while only a small percentage of internal or

external reabsorption of the root and an even smaller percentage of pulp necrosis. Extractive therapy was taken into account when the following signs and symptoms were observed during the waiting time for the eruption of the affected tooth: swelling of the surrounding gum tissues, redness, pain, purulent exudate and systemic symptoms such as fever. In these cases, immediate extraction and antibiotic therapy were essential to prevent the spread of inflammation to the permanent germ.

Conclusions: Therapy depends on the degree of intrusion and consequently on the type of relationship that the intruding tooth incur with the permanent. Thus, a waiting therapy will be applied for intruding teeth that do not interfere with the germ of the permanent developing tooth and when the crown is visible. If the tooth does not spontaneously erupt again, the infraocclusion will occur (pseudoanchilosis) which will require tooth avulsion at the proper time, triggered by the possible obstacle that this element can create to the normal eruption of the counterpart permanent teeth. If the apex of the deciduous tooth is moved and is in close contact with the developing tooth or if the intrusion is such that the whole crown is held, the tooth must be extracted to minimize the damage caused to the nearby permanent tooth.

Late diagnosis of primary tooth trauma: dilaceration of 2.1

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Aim: Dilaceration refers to a dental deformity characterized by an angulation between crown and root causing impaction of the element. The definition of dilaceration varies, for example certain authors define dilaceration where the tilt of the root is equal to or exceeds 90 degrees in relation to tooth axis, others instead define dilaceration when the apical deviation is equal to or exceeds 20. This obviously translates in an impaction of the tooth which loses its axial vis-a-tergo. Andreasen et al., in 1971, defined dilaceration as the sharp deviation of the long axis of the crown or root portion of the tooth. There are two leading explanations regarding the triggers of dilaceration: The first suggestion proposes that an acute mechanical injury to the primary predecessor tooth reflecting onto the permanent tooth. If the child is injured at the critical age of 4-5, where the tooth germ of the permanent incisor is in direct relationship to the resorbing root of the primary tooth, the impact force will be more probable to cause complications. The second explanation proposes that idiopathic developmental disturbances lie at the cause of dilacerations.

Methods: A 7 years old girl arrived at our examination by "UOC di Odontoiatria Pediatrica, Dipartimento di Scienza Maxillo-Facciali ed Odontostomatologiche, Policlinico Umberto I, Roma" reporting an asymmetry in the development of the central upper incisors. During anamnesis, the mother reported a dental trauma which happened around two years back which interested the primary left upper incisor and was unable to offer any further information regarding the aftermath of the trauma. After having evaluated the orthopantomography, we requested further x-ray examination which highlighted the dilacerated 2.1 element. The root was tilted on the mesial axis behind the root of the 1.1 element. The only possible solution was the surgical extraction of the element. The surgical procedure was carried out in local anaesthesia with the incision of a para-marginal trapezoid flap and removal of the element. Suture points where then applied and removed at the 7th day. No complications were reported after the operation.

Results: Post-extraction the child is inserted into an orthodontic protocol which will consist in a mobile orthodontic appliance in order to apply an expansion of the palate and to keep the space between elements 1.1 and 2.2 unaltered. The orthodontic appliance will also be fitted with an aesthetic central resin element in order to fill for the missing tooth. Obviously, this will be a temporary solution to apply, further choices are to be evaluated in time.

Conclusions: Dilaceration appears to be quite rare but more frequent amongst permanent teeth as opposed to primary teeth, it is also a very delicate situation to resolve since all the possible solutions to offer are affected by the severity of the dilaceration. Various authors cite the percentage of dilacerations is between 0,3 – 1,03% amongst a population. Where possible surgical-orthodontic extrusion should be applied, in cases where it is not auspicial, extraction remains the only option with subsequent orthodontic or prosthetic treatment where needed.

Surgical treatment of abnormal lingual frenulum in 11-year-old patient: case report

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Aim: The lingual frenulum is defined as a thin fibro-

mucous tissue sheet which connects the lower surface of the tongue to the oral floor at the midline. The abnormal lingual frenulum, short and/or hypertrophic, is recognized as having the potential to limit tongue mobility, causing ankyloglossia. The latter can induce phonation disorders, atypical swallowing, predisposition to caries of the lower molars and periodontal problems. This case report describes the treatment of a 11-year-old patient with abnormal lingual frenulum. The purpose of this case report is to describe the operating protocol that has been adopted.

Methods: The lingual frenulum was observed through the clinical evaluation. Furthermore, the patient was unable to touch the palate with the tongue in the fully open position of the mouth and the protrusion of the tongue more than 1-2 cm beyond the lower incisors was difficult. These clinical factors confirm the diagnosis of abnormal lingual frenulum and the need for frenotomy. Bilateral anesthesia of the lingual nerve was first performed and the tongue was raised with a suture along the midline at 6 mm from the tip. Two hemostatic forceps are then used, one placed parallel to the lower surface of the tongue, the other parallel to the floor of the mouth, at right angles to the first, grasping the fibers of the frenulum at the point where they end. Without exerting traction on the hemostatic forceps, an incision was made with a bistoury bard-parker n°11 around the external surfaces of the two forceps until they were freed. Finally, the lateral margins of the wound were cleaned with surgical clippers and a suture with detached points was made with absorbable wire.

Results: The patient returned after 15 days and a good healing of the tongue was observed. After the complete healing, having the patient more than 5 years, phonetic re-education was advised with the help of the speech therapist.

Conclusion: The surgical treatment of abnormal lingual frenulum is very important to solve phonetic, periodontal and swallowing problems. Furthermore, it should be keep in mind that the frenotomy affects the areas of the oral floor, in which important anatomical structures run (submandibular duct, sublingual vessels, terminal branches of the lingual nerve). So the message to take home is that it is essential to be very careful, paying attention to these anatomical structures during this type of surgery.

Biomechanical behavior of anterior cantilever resin-bonded fixed dental prostheses fabricated with four different metal-free materials

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Aim: Resin-bonded fixed dental prostheses (RBFDPs) represent a highly aesthetic and conservative treatment option to replace a single tooth in younger patients. The aim of this study was to compare the biomechanical behavior of anterior cantilever RBFDPs made with four different metal-free materials.

Methods: Eighty extracted bovine mandibular incisive were embedded resin block, scanned to design one master model of RBFDP with a cantilevered single-retainer. Twenty cantilevered single-retainer RBFDPs were fabricated with 4 different materials: zirconia (ZR), lithium disilicate (LD), PMMA based material with ceramic fillers (PM), and PEEK-based polymer with ceramic fillers (PK). Static loading was performed using a universal testing machine.

Results: The mean failure strength for the RBFDPs was: 229.5 N (SD 36.6) for ZR; 189 N (SD 37.6) for LD; 133 N (SD 16.3) for PM and 270 N (SD 17.3) for PK. All the failures of RBFDPs in ZR were a fracture of the abutment tooth, the 80 % of failures of RBFDPs in LD and PM were a fracture of the connector, instead, all the failures of RBFDPs in PK were debonding.

Conclusion: The present study revealed different types of failure and mechanical behavior of RBFDPs made with different materials, however, the RBFDPs made of PK presented the best mechanical performance, however, clinical studied are necessary to confirm these results.

Use of the Luscher test in pediatric dentistry: perspective study on 100 non-collaborating patients

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Aim: Dental phobia, included in the International Classification of Disease among specific phobias, is inclusive of the concepts of anxiety and fear: dental anxiety is defined as a feeling of anguish, agitation and restlessness experienced by the patient, during the course of the dental treatments. In children, the presence of these emotions, often amplified by inadequate fantasies or previous experiences, leads to the development of uncooperative attitudes, making the dentist's job difficult and influencing future experiences. In order to identify and diagnose dental anxiety in children as objectively as possible, the Lüscher color test was administered. This test, widely used in the psycho-pedagogical and medical

fields, allowed to record and evaluate the degree of the anxiety-inducing component both before and after treatment, analyzing various factors potentially correlated with the increase or decrease in "anxious experience". In order to seek feedback between different diagnostic methodologies, patients underwent heart rate monitoring and the administration of a scale of specific facial expressions.
Methods: The sample studied included 100 children aged between 4 and 12 years from the Conscious Sedation department at the IRCCS Ca 'Granda Ospedale Maggiore Policlinico Foundation in Milan from October to December 2019. Inclusion criteria were: patients ASA I-II, from 4 to 12 years old included, absence of side effects at somministracion of nitrous oxide, patients who agreed to take part in the research, after filling in the informed consent form approved by both parents. The study design included the following steps: 1) pre-treatment evaluation of the anxiety through the administration of the Lüscher test and the Vfas scale; 2) the dental care phase in which the dentist performed the different treatments sometimes using nitrous oxide, always monitoring the heart rate; 3) finally, according to the pre-treatment modalities, post-treatment anxiety has been re-evaluated. After data collection, statistical analysis was conducted using the SPSS IBM Corporation software.
Results: Twenty patients were excluded because they did not meet the inclusion criteria; the remaining sample was described in relation to: sex, age, type of treatment, use of nitrous oxide, the different dentist who performed the treatment, dental and anxiety levels reported before and after the dental treatment. Spearman correlation index shows a statistically significant correlation between the percentage of reduction of the heart rate before and after treatment and the Lüscher score intended as the difference between the pre-operative and post-operative score ($r = 0.68$; $p < 0.01$). The Vfas scale was not statistically significant associated to the hard rate ($p>0.05$). A statistically significant association between the Lüscher score and the following independent variables was found: the age of the patient ($p = 0.006$), the type of treatment ($p = 0.002$) and the use or non-use of the nitrogen protoxide ($p = 0.000$). Logistic regression, on the other hand, showed that only the nitrous oxide treatment was found to be a significant variable ($P = 0.07$).
Conclusion: Although with the limits of interpretative complexity, the Lüscher test has proved to be a valid tool for "measuring" the emotions experienced by patients; a statistically significant association with heart rate values was found, while the Vfas scale failed to be associated to the objective variable. Age, type of treatment and use of nitrous oxide were all variables statistically significant associated to the values of the Lüscher test.

Developmental enamel defects are associated whith early childhood caries: a case control study

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Aim: Knowledge on the association between developmental defects of enamel (DDE) and early childhood caries (ECC) is important for drafting preventive measures. This study aimed to compare the frequency of ECC in children with and without DDE and verify their association with sociodemographic factors and oral hygiene and dietary habits.
Methods: This Case – Control Study was carried out on children aged one to five years of both genders enrolled in Ospedale Maggiore in Bologna and lasted 24 months with follow-ups every three months. At baseline, examinations were conducted for the diagnosis of DDE and dental caries; oral hygiene habits, sociodemographic data, eating habits (mostly sucking on pacifiers dipped in honey, syrup or anything sweet, sleeping with a bottle or using a bottle for long periods during the day, fruit juices drunk with bottles or straws, medicines taken long time) and systemic or topical fluoride use were investigated. DDE were classified in "diffuse opacity", "demarcated opacity", "enamel hypoplasia" and "hypoplasia–associated severe early childhood caries (HAS – ECC)". Three surfaces of each tooth were examined: buccal, occlusal/incisal and lingual/palatal. Diagnostic criteria were: a) a deciduous tooth was considered present when any portion of the crown erupted through the mucosa, b) each enamel defect in the erupted portion was recorded, c) defects less than 1 mm in diameter were not considered, d) surfaces with wide fractures or extensive restorations were excluded. Dental caries was valued using the dmft index, presence of dental plaque with the Silness – Loe Plaque Index. Sociodemographic data were collected by ISEE Certified. The participants were allocated in two groups according to the presence or absence of DDE . Children with DDE (n=100) were the "Case Group" (forty of them with hypoplasia – associated severe early childhood caries, HAS – ECC) and children without DDE (n=100) were the "Control Group". At the seven follow-up examinations, caries and child compliance to oral hygiene, eating and fluoride advices were evaluated.
Results: Diffuse opacities were the most common defects found (26.1%), followed by hypoplasia (19.9%) and demarcated opacities (14.0 %). The most affected teeth were the second molars (45.3%,), followed by the first molars (23.5%). Defects were observed more frequently in the upper arch (60.2%). The teeth most

affected by hypoplasia were upper second molars (22.2%), followed by lower second molars (17.4%), upper incisors (13.5%), upper canines (13.0%), upper first molars (12,1%), lower first molars (9.6%), lower canines (7.7%), lower incisors (4.5%). Hypoplasia was also more frequent in the upper (52.2%) than in the lower arch (47.8%). Among children with DDE, 70% developed caries in primary dentition. Only 10% of the teeth without DDE developed caries lesions, all belong to children with poor habits. Teeth with enamel hypoplasia had a greater risk of having dental caries. The risk of caries was greater in posterior teeth and maxillary teeth with DDE at T0. Caries lesions development at T1, T2, T3, T4, T5, T6 or T7 were associated with having DDE at T0. Early childhood caries was more prevalent among children with unsatisfactory oral hygiene, those from families with a low monthly household income, those who consumed frequently free sugars,those who did not use fluoride properly.

Conclusion: The occurrence of DDE, low socioeconomic indicators, poor oral hygiene, frequent sugar consumption and chronic use of medicines were predisposing factors for ECC development in the primary dentition.

A rare genetic disorder linked to SOX-3 mutation may interfere with development, retardation and bone decay: case from young caucasian teenager

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Aim: This gene is member of the SOX (SRY-related HMG-box) family and encodes a group of transcription factors crucial in the regulation of embryonic development, cell growth determination and cell apoptosis regulation. In general SOX family members, particularly SOX2, are involved in the pluripotency feature of mesenchymal stem cells (MSCs). In fact, induced expression of Sox factors, in combination with other synergistic genes such as OCT4, cMyc, and Klf4 have shown to reprogram adult somatic cells to pluripotent stem cells. Therefore and affection, mutation or dysregulation of Sox members has been further implicated in degenerative diseases including cancer.

Methods: We have reported case of a very rare disease due to a mutation of SOx-3 gene on 16 years old male boy. The analysis of molecular structure of the SOX3 gene revealed the presence of hemizygous with the variant of c.1077_1088del p. (Ala361_Ala364del). We have explained that mutations affecting this gene are associated with pan-pituitary condition characterized by reduced secretion of pituitary hormones such as the growth hormone (GH), body development and with cognitive impairment in variable degree (mild to moderate) with a transmission mode related to the X chromosome (X-linked). Males have only one copy of the X chromosome (hemizygotes), while females, who have two copies of the X chromosome are mostly asymptomatic carriers. In literature, however, heterozygous females with short stature in the absence of cognitive impairment have been described. Both duplications encompassing SOX3 and loss-of function mutations in SOX3 have been reported with a minor portion of X-linked isolated growth hormone deficiency (GHD) or combined pituitary hormone deficiency (CPHD) in patients with or without mental retardation. In this case, the identified variant was extremely difficult to interpret due to the rarity of the variant itself. In fact, despite never having been reported in the literature and is rare (it has been reported in only 4 individuals according to the GnomAD population database respectively in 3 heterozygous females and in 1 hemizygous male), the estimate of the allelic frequency may not be reliable. Furthermore, since the variant identified in Andrea causes the loss of 4 amino acids in a polyAlanine section of the transcription factor encoded by the SOX3 gene, we have explained that they have already been reported in the literature duplications and, more rarely deletions, associated with pan-pituitary or GH deficiency isolated with or without deficiency cognitive, although these alterations affected a different trait of poliAlanine of the same protein.

Result: The identified variant is not reported in the literature and has been identified in only 4 individuals in the gnomAD database (3 heterozygous females and 1 male hemizygous); however, the estimate of the allele frequency in gnomAD may not be reliable as it is reported that less than half of the exomes analyzed covers the region affected by the variant. The variant determines the deletion of 4 Alanines in one of the stretches of poliAlanine of the transcription factor encoded by SOX3. In literature there are variants (both expansions and deletions) in another polyAlanine trait of the protein, with limited and dated functional studies that they lay down for their pathogenicity.

Conclusion: At the moment the variant identified is to be considered of uncertain meaning; for a better interpretation is needed in the study of family segregation of the variant in the maternal nobleman. Polymorphisms and lees were not considered in the interpretation of the results rare variants considered not pathogenic at the reporting date. The classification

of variants may change over time later on to the acquisition of new knowledge.

Peripheral giant cell granuloma in an 8-year-old child: case-report

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Aim: Central giant cell granuloma (CGCG) is defined by the World Health Organization as an intraosseous lesion consisting of cellular fibrous tissue that contains multiple foci of haemorrhage, aggregations of multiple nucleated giant cells, and occasionally trabeculae of woven bone. Gigantocellular granuloma is a non-odontogenic tumor that is localized at the bone level of the jaws (central gigantocellular granuloma) or at the periosteum level (peripheral gigantocellular granuloma). The lesion looks like a slow-growing and asymptomatic tumor. The gigantocellular granuloma is mainly localized at the mandibular level in the incisor, canine and premolar region. The etiology is uncertain. Its origin could be determined by a traumatic or inflammatory event affecting the periodontal and the treatment is surgical. Enucleation must fall within healthy tissue margins and must provide for careful curettage of the underlying bone tissue. In the case of lesions with superficial osteolysis the lesion easily tends to recur. More conservative treatments such as in the case of epulis are not recommended due to the high percentage of recurrences.
Methods: An 8-year-old patient was presented to our observation, whose clinical history dates about 5 months ago before to the first visit: the mother reports having noticed the presence of a neoformation at site 3.3. The patient denied an algic symptomatology and had no need to resort to drug therapy; moreover, the mother reported that she has noticed a growth in the volume of the neoformation over the previous 5 months. The neoformation had chromatic variations, which sometimes presented an erythematous and pink coloration. The patient then hospitalized herself to follow the diagnostic-therapeutic process of the case. Upon observation of the RX O.P.T. there were no changes in the teeth or bone structures. Upon observation of the CT Dentalscan Rx of the lower arch, an area of bone rarefaction between elements 3.2 and 3.3 was highlighted. It could be observed the presence of a neoformation of non definable diagnosis located in 3.3 in the vestibular portion. The neoformation had a hard-elastic consistency and was not movable with respect to the superficial and deep planes; the viability test of elements 3.2 and 3.3 gave a negative result. The complexion was purplish and the lesion was not painful on palpation. Finally, there was no presence of carious processes. The patient showed a good clinical evolution. The site of interest of the peripheral giant cell granuloma did not show any alteration; the gums had a complexion and a healthy appearance and the elements 3.2 and 3.3 were vital.
Result: It was decided to perform the excisional biopsy. The patient was subjected to locoregional anesthesia with 2% mepivacaine. First, a full-thickness vestibular incision of the fibromucosa was performed with scalpel. Below the fibromucosa, the presence of a very friable granulomatous tissue was appreciated. Subsequently, the whole formation was removed. Finally, the curettage of the residual cable was carried out and suturing was performed with detached points. The histological examination was compatible with peripheral giant cell granuloma.
Conclusion: Given the tendency of such lesions to recurrence, the patient was subjected to periodic follow-ups: one week after the intervention, three months with radiographic support, six months and finally one year. Nowadays, all the checks carried out have found no recurrence clinically and radiographically; one-year follow-up with radiographic support is awaited.

Treatment of maxillary hypodontia with a fixed appliance in a paediatric patient: a case report

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Aim: The aim of this report is to describe the treatment of maxillary hypodontia with a fixed prosthetic appliance in a paediatric patient. The patient, a 9-year-old boy, presented an ectodermal-dysplasia related hypodontia: the orthopantomography showed that all anterior teeth and premolars were missing, except for element 2.1 and 1.4; permanent molars were instead present, apart from element 1.7. He complained chiefly of the lack of anterior teeth and the discomfort in the usage of removable prosthetic appliances, which had caused inflammation of the palatal mucosa and had negatively affected the growth of the maxilla, resulting in its transverse deficiency with a monolateral crossbite.
Methods: Considered the lack of a sufficient dental anchoring, the treatment included MARPE (Miniscrew-Assisted Rapid Palatal Expansion) and a fixed prosthetic appliance, supported by the same two palatal miniscrews. The insertion of the screws was digitally

planned, based on the patient's CBCT. Each screw was 9 mm long and placed in paramedian position, in relation to the midpalatal suture. A first phase of expansion was done to solve the transverse maxillary deficiency and crossbite of element 6.5, caused by the previous usage of a partial denture. 30 activations were done, following a semi-rapid protocol (1 activation of 0,25 mm per day), so 7.5 mm of expansion were achieved. At the end of the expansion, the prosthetic appliance was remade to fill up the central diastema and assure the best aesthetic outcome for the patient.
Result: The patient reported an instant improvement in comfort and wellbeing. The palatal mucosa healed within one week from the start of the treatment, apart from the area strictly surrounding the screws that required the application of a chlorhexidine gel for complete recovery. Maxillary constriction and crossbite were solved. Both the patient and his parents were satisfied at the end of the treatment, especially after the prosthesis was remade. They were so pleased they are considering a fixed appliance also for the lower arch (a tooth-borne prosthesis, with teeth welded to a lingual arch).
Conclusion: Palatal bone-borne prosthetic appliances can be a valid therapeutic alternative to partial dentures to solve the upper lack of teeth in children with hypodontia. Fixed appliances, indeed, increase comfort and patient's wellbeing and self-esteem; they do not affect the growth of the maxilla or irritate soft tissues like removable prosthetic appliances. Not to be omitted, they can be combined with MARPE, a procedure often needed in this group of young patients, since the maxilla is usually deficient and it is difficult to find a sufficient dental anchoring for the expansion procedure.

Review on the effectiveness of the treatment of carious lesions with ozone

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Aim: The aim of the study was to review the available literature to evaluate the effectiveness of ozone therapy treatment for carious lesions.
Methods: The research was carried out on the main electronic databases (PubMed, Embase, Web Of Science, Scopus and Cochrane Library). Keywords and the main MeSH terms used in the research were "Dental caries", "Tooth demineralisation", "Ozone", "Ozone therapy", "Caries arrest" and "Caries progression". The inclusion criterias were referred to clinical studies conducted in patients with good health, without maxillo-facial pathologies and who presented at least an active carious lesion, without pulp involvement, in the molar or premolar site. The studies had to analyze the effectiveness of ozone therapy treatment: the eventual remineralization of the treated element, the progression or the arrest of the carious lesion were a primary aim; bacterial reduction associated to the lesion could have been a secondary aim. The control group could involve conventional treatment, the application of Chlorexidin and treatments with flouride varnish or CVI. RCTs and longitudinal studies (retrospective and prospective) with a minimum follow up of 6 months were included.
Result: The research identified 150 papers for screening. Among these, 18 studies were selected and included in the review. Since the studies were very heterogeneous and different from each other, it was not possible to obtain univocal results. The studies reported variable follow up between 6 and 18 months. Several studies have reported that ozone therapy has a good preventive efficacy in non-cavitated lesions in patients with low or moderate risk of caries. Most studies have reported significant ozone antibacterial efficacy, sometimes compared to Chlorexidine when used in deep dentinal lesions or for indirect pulp therapy. Regarding the remineralization of the treated elements, the results are conflicting: some studies have investigated the remineralization of radicular caries, some studies approximal carious lesions while others class I lesions; the assessment of the effectiveness of the treatment was carried out with different methods in the various studies, so the results were not generalizable. The progression or the arrest of lesions should be further investigated.
Conclusion: The current review has classified most of the included RCTs at moderate risk of bias, due to the presence of confounding factors. However, ozone treatment can be considered as a biocompatible treatment, with an excellent antibacterial efficacy and well tolerated by patients. Its application could be useful especially for anxious patients or in special-needs patients and especially for the prevention phase. Further research based on RCTs with standardized protocols, long-term follow up is needed to provide more reliable evaluations of the remineralizing benefits of ozone treatments.

Effect of lactobacillus brevis CD2 on plaque-pH and cariogenic bacteria: a RCT in diabetic children

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Aim: The short-terms effect (60 days) of probiotic lozenges vs placebo on variables related to caries and gingivitis in type-1 diabetic children was evaluated. The Trial aimed to evaluate the effect of the probiotic strain Lactobacillus brevis CD2 on the oral microflora composition, on the bleeding scores and plaque pH measurements. The hypothesis was that probiotic intake would be useful to improve these oral health related variables.
Methods: 68 diabetics (4-14 yy) were assigned to probiotic or placebogroup, including 34 subjects per group. The probiotic lozenges contained 2,000,000,000 colonies of Lactobacillus brevis CD2. Each subject took 2 lozenges daily (morning, evening), dissolving them slowly in the mouth. Saliva, plaque pH samples and gingival status were assessed at baseline (t0), 30 days from baseline (t1), at the end of treatment (60 days from baseline, t2) and in the follow-up period (90 days from baseline, t3). Primary and not primary cariogenic bacteria using the checkerboard DNA-DNA hybridisation method were assessed. The signals were coded as 0 = no signal; 1 = signal lower <105 bacteria; 2 = 105 bacteria; 3 => 105 but <106 bacteria; 4 = 106 bacteria and 5 = higher than >106 bacteria. Differences between groups were evaluated by two-way ANOVA. Caries registration was realised using the International Caries Detection and Assessment System (0-6) without radiographs. The pH measurements were performed in interproximal spaces in maxillary arch using strips. The gingival status was calculated as the percentage of periodontal sites bleeding on probing.
Results: No side effects in the administration of probiotic lozenges were reported. In the probiotic group, allcariogenic bacteria considered, except Lactobacillus salivarius decreased: Streptococcus mutans dropped from 3.11±1.13 at baseline to 1.82±0.72 and to 2.06±0.56 at t2 and t3 respectively ($p \leq 0.01$). The microbiological findings showed statistically significant differences between the two groups. During the trial the placebogroup showed no significant change in bacterial concentrations. Ninety days from baseline these positive effects of the lozenges decreased.
Plaque pH was positively affected by the probiotic use. The lowest pH and the maximum pH fall increased significantly in the probiotic group changing from 5.37±0.41 at baseline to 5.49±0.24 at t3($p \leq 0.01$) and from 1.20±0.46 to 0.98±0.29 ($p \leq 0.05$) respectively. No inter-groups differences regarding pH were detected except for the lowest pH at t2. Bleeding score decreased significantly in both groups, but children using the probiotic showed a lower bleeding score at t2 compared to placebo group (25.6%, 95%CI 21.5-32.7 vs 29.5%, 95%CI 25.2-34.9, $p \leq 0.05$).
Conclusions: 60-day administration of Lactobacillus brevis CD2 (4 billion of colonies / die) has shown to improve variables related to caries and gingivitis in diabetic children. This probiotic might contribute to improve oral health in type 1 diabetic children. The probiotic lozenges produce a significant reduction of cariogenic microflora and lowering the bleeding score and increasing the plaque pH. Probiotic intake contributes to manage the oral and systemic health of young patients with Type-1 diabetes.

Analysis of inflammatory proteins concentration present in salivary fluid in patients with West syndrome, Noonan syndrome and control group

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Aim: The wide spectrum of substances present in saliva can provide useful information for clinical-diagnostic applications; moreover, saliva is a favourable biological matrix because its collection is not invasive and the collection process relatively stress-free, so multiple samples can be taken without creating too much discomfort for the donor. The aim of our study was to investigate, with the help of modern technologies, the concentration of the salivary inflammatory protein component in paediatric patients, comparing a group of children with West syndrome, another with Noonan syndrome and finally a control group of healthy children to highlight any qualitative or quantitative differences.
Methods: A total of 24 patients were enrolled in this study, divided as follows: eight (8) patients with West syndrome, eight (8) patients with Noonan syndrome and eight (8) healthy patients. They were matched by sex and age, and subsequently underwent salivary fluid withdrawals in a normal dental check-up session. In respect of the rights and protection of those involved in the work, prior, free and informed consent was obtained, obtained from parents for minors. As regards the collection of saliva, a specific protocol has been developed which provides for the direct collection of saliva from the floor of the mouth, before the lingual caruncles, by performing the collection with a sterile plastic Pasteur pipette. The saliva collected was immediately mixed with 0.2% TFA (trifluoracetic acid) in a 1: 1 ratio and centrifuged at 9000 rpm at 4 ° for 5 minutes. This acid treatment is aimed at inhibiting the enzymatic activity of the proteins

contained in the fluid, with the aim of stabilizing the original composition of the sample, but above all it has the purpose of inducing the precipitation of high molecular weight proteins (mucins, in particular, but also lactoferrin and albumin) to make the sample more suitable for chromatographic analysis: it appears to be enriched with the low molecular weight peptide and protein fraction soluble in an acidic environment, and less viscous. At the end of the treatment, the supernatant, separated from the precipitate, was analysed by top-down HPLC-ESI-MS technique and also stored at low temperature (-80 ° C).
Results: A preliminary analysis revealed a difference in the concentration of inflammatory state proteins in patients with West and Noonan syndrome compared to healthy subjects of the same sex and age.
Conclusions: The implementation of the notions related to saliva and the proteins present in it allows to have a clearer picture of its composition and, therefore, more information on the biological significance of proteomic variations found in pathological situations. The interest of the clinician is aimed at identifying specific biomarkers in body fluids that are able to provide diagnostic, prognostic information and on the efficacy of treatment in certain pathological conditions.

Ozone therapy and ART technique in pediatric dentistry: an effective therapy for caries treatment

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Aim: Ozone is a blue colored gas composed of three atoms of oxygen placed in a cyclic structure. It's present in abundance in the atmosphere and it absorbs harmful ultraviolet rays present in the specter of light of the sun. Ozone therapy is considered a natural therapy, it's a curative process obtained through the use of a mixture of oxygen and ozone. This systematic review aims to provide informations on the state of the art of caries treatment in primary denture thought the use of ozone therapy
Methods: The research is being conducted using Pubmed and Scopus. It was evaluated 38 scientific articles and of those 12 have been taken under consideration. There were considered these inclusion criteria: scientific articles with the publication date from 2000 to 2018; articles written in English or Italian language; articles that include the treatment with ozone in primary teeth; articles involving caries treatment with ozone therapy and ART technique.
Results: In literature, it has been widely highlighted that the mechanisms of action of ozone are multiple: antimicrobic action, immunostimulatory, analgesic, detoxifying, and anti hypoxic effect. Ozone, being a potent oxidizing agent, is capable of removing protein from carious lesions. The ozone therapy allows phosphate and calcium ions to penetrate inside the carious lesion and potentially allows the remineralization process. The ultra-conservative approach or partial removal of the lesion, involves the asportation of the majority of the affected dentine with rotating instruments and/or manual, and the immediate filling of the cavity. The assumption is that the cariogenic bacterias, sealed away from any sources of sustenance through the use of an adequate filling, will die or remain quiescent, and armless for the vitality of the dental pulp. For this capacity the ozone, applied as a gas using specialized equipment as a specific handpiece with single-use silicone cups, effectively sterilizes the carious lesion, removing the bacteria. Ozone treatment for caries lesion is: painless, fast, causal (eliminates the causes of the decay in 60 seconds by 99,9% of the agents responsible), and it's free of contraindications. By destroying bacteria, the ozone allows the restructuring of the enamel and the dentine affected. After the application, it begins the remineralization of the lesion through the deposit of calcium and phosphate ions from the saliva. In the majority of the cases, it only takes repeated weekly ozone applications(3-4) to block the evolution of caries. After the dispensation of ozone, it's utilized a glass ionomer cement for the filling with the ART technique. The ART approach is based on concepts of minimally invasive dentistry, atraumatic, and preventive and it represents an alternative but valid approach. After these procedures, it's advisable a quarterly check.
Conclusions: Ozone therapy in primary dentition is more successful if the pulp is not affected by caries, the protocol used by the authors has been effective in the treatment of deep carious lesions without the exposure of the pulp. The advantages of this type of therapy are: reduction of chair time, minimally invasive, and percentage of success at 12 months comparable to pulpotomy.

Prenatal oral health care and early childhood caries prevention

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Aim: Early Childhood Caries (ECC) is the single most prevalent chronic childhood disease worldwide. ECC negatively impacts on children's lives in both the short and long term, as a result of symptoms associated with untreated ECC such as pain and

discomfort. It can often lead to problems in everyday activities including eating, sleeping, learning, speech development and growth. ECC is a multifactorial bacterial disease, with Streptococcus mutans as the prime cariogenic bacterium, and strongly influenced by diet. Other factors could potentially play a role in ECC development: health behaviors and practices, biological and genetic endowment, physical and demographical attributes, frequency dental check-ups and parental education regarding oral health, socioeconomic status and parents schooling. Pregnancy is an ideal period to promote ECC prevention, given the profound influence of maternal oral health and behaviors on children's oral health outcomes. Oral health promotion during pregnancy was successfully used in reducing ECC. The present review aims to identify ECC prenatal risk factors and to verify if preventive programs carried-out during pregnancy and in the post-partum period might reduce the development of ECC in children.

Methods: Using PubMed, a literature search was performed with the following key words: "pregnancy", "Early Childhood Caries", "ECC prevention", "prenatal oral health care", "preventive dental programs offered to mothers". Filters of literature search were publications date within 10 years; classic articles, clinical studies, clinical trials, cross-sectional studies and reviews were the types of studies included. The research identified 55 documents, 17 papers were relevant and met the inclusion criteria.

Results: Eight studies considered only prenatal period, while the other nine considered both prenatal and postnatal period. The interventions focused on risk factors (n=7) and preventive programs and oral health education (n=10). The overall results of a Brazilian study (Pinto, 2017) showed a positive association between maternal oral clinical variables (decayed teeth and gingivitis) and the occurrence of caries in their children. Jamieson et al (2018) showed that the provision of dental care to mothers during pregnancy, associated with the application of fluoride varnish to children's teeth at ages 6, 12 and 18 months, resulted in improvements in the oral health of Australian children. The effect of prenatal oral health care intervention on the reduction of children's Streptococcus mutans carriage was assessed in the study of Nakai (2010). Cariogenic microflora can be transmitted from mother to child during the first 2 years of child's life, especially if mother and child engage in certain feeding practices. Maternal salivary bacterial challenge also predicts increased early childhood caries occurrence (Chaffee, 2014). Nakai also showed a significantly correlation between the use of xylitol gum until the 6 months of pregnancy and the low transmission of S. mutans from mother to child's mouth. A systematic review of Vamos (2015) examined the range, scope and impact of the few existing oral health promotion interventions during pregnancy. George et al (2019) showed an important role of non-dental professionals to promote maternal oral health and control ECC by providing oral health education, risk assessment and referrals.

Conclusion: The prenatal and postnatal periods are critical moments for behavioral changes that may impact both the mother and infant oral health. Improving oral health care and knowledge during pregnancy is a critical and promising step for ECC prevention. Educational and preventive programs during pregnancy and in the post-partum period have shown to produce a positive influence on the oral health of children reducing caries risk.

Retrospective analysis of the dental clinical procedures carried out on special needs patients in day-surgery service

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Aim: The management of dental care in special needs patients (fragile, non-collaborating and/or with special needs) does not present a common protocol, even though there are several articles and systematic reviews in the literature.

Methods: In this retrospective observational study, the rationale is to identify, analyze and catalog the following variables of patients who undergo dental care in Day-Surgery (DS) service: Age of the patient; Gender of the patient; Reason why the patient accesses DS service under general anesthesia (GA); Types of clinical procedures performed; Number (if any) of surgery rate in the GA by the same patient. The final objective of the study is to learn the surgery rate for a single patient in order to define which types of clinical procedures performed under the Day Surgery regime are more predictable in the long term. The study was carried out on records of the Fondazione Policlinico Agostino Gemelli IRCCS Database, with the prior informed consent of patients or parents/legal guardians. Enrolled subjects underwent oral cavity surgery between January 2013 and December 2019. The categories of patients included are: Fragile patients by age (up to 5 years); Patients with rare genetic anomalies and syndromic conditions; Patients with mild, moderate or severe psychomotor retardation; Patients with certified dental phobia; Patients undergoing oral cavity surgery with deep sedation or poly-functional monitoring performed in DS service were excluded and all patients who did not fall into the above categories.

Result: In 970 interventions, we have been able

to highlight: Average age of 23 years ± 15.7; 431 females and 539 males; 29 dental phobia patients, 85 frails for age patients and 712 patients with intellectual and/or physical disabilities; A) 152 cases of removing plaque and dental calculus, B) 363 cases of removing plaque and dental calculus associated with restorative therapy, C) 135 cases of removing plaque and dental calculus associated with teeth extractions, D) 250 cases of removing plaque and dental calculus associated with restorative therapy and teeth extractions, E) 70 cases of removing plaque and dental calculus associated with complex surgical procedures; 144 patients underwent at least two oral surgery in the period between 2013 and 2019. The re-intervention rate is therefore 17.6% in six years.
Conclusions: In special needs patients, the dental specialist visit is often experienced with anxiety and outpatient treatments are in most cases difficult or impossible. Thanks to the Day Surgery service, in one session, under general anesthesia, it is possible to solve and eliminate the causes of the infectious foci. In this study, it is highlighted that in most interventions it is necessary to carry out conservative treatments for deciduous and/or permanent dental elements. The lack of cooperation of these patients in the postoperative phase and in maintaining good oral hygiene can, however, affect the surgery rate that in our study it is estimated as 17.6% in six years. We believe that it is crucial in the early diagnosis phase to identify which dental elements can have a positive long-term prognosis and which ones could only increase the subsequent risk of re-intervention.

An unusual presentation of "x" shaped maxillary incisor in a patient affected by Cri-du-Chat syndrome: a case report

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Aim: Cri-du-Chat syndrome is a rare genetic condition caused by the deletion of genetic material on the p arm of chromosome 5. Actually, the cause of this rare chromosomal deletion is unknown. Although this syndrome is not associated with dental anomalies, the patient presents a left maxillary central incisor with a characteristic "X" shaped appearance when viewed occlusally.
Methods: A 17-year-old female patient affected by Cri-du-Chat syndrome has come to our attention at the Department of Pediatric Dentistry of the Fondazione Policlinico Agostino Gemelli IRCCS in Rome. The patient needed to be treated with restorative dental procedures, due to the presence of multiple cavities. All the clinical procedures were performed under the Day Surgery regime. During the visit it was detected the presence of a central incisor with a characteristic "X" shaped appearance when viewed occlusally. The tooth was vital, and it did not present any sign of decay.
Discussion: In literature currently only a few cases of this "X" shaped anomaly have been reported and two different type of aetiology have been proposed. In the first place, it has been described as a talon tooth with both labial and lingual talons.Talon cusp is a rare dental anomaly characterized by the development of a cusp-like projections located on the lingual or palatal surface of the affected tooth, which could also occur on the vestibular side. Talon cusp could be considered as an extra cusp and it occurs in either maxillary or mandibular anterior teeth in both the primary and permanent dentition. The anomaly can occur due to genetic and environmental factors, but the onset can be spontaneous. The cusp is often described as an hyperplasia of the cingulum of an anterior tooth and it may or may not contain an extension of the pulp. The term refers to the same condition as dens evaginatus, but the talon cusp is the manifestation of dens evaginatus on anterior teeth. However, the exact mechanism of the formation of dens eveginatus and talon cusp is unknown. In the second place, an alternative aetiology has been proposed. Since that the tooth had an intricate coronal morphology, perhaps we could speak of an incomplete gemination case. Gemination is an anomaly where a single tooth germ, which has attempted to divide during its development, determines a sort of bifid crown.
Conclusions: The objective of this study is to report a particular dental anomaly in a patient affected by a rare genetic syndrome. Since that there is no evidence that this two conditions are linked and that the tooth did not present any sign of damage or decay, no further procedures were performed.

Interceptive therapy of Class III malocclusion with a new elastodontic device

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Aim: Class III malocclusion has to be intercepted as soon as possible because of the different timing of maxillary and mandibular growth. The aim of early treatments is to remove the responsible factors and to guide a normal skeletal development, taking advantage of natural forces of growth. Thanks to an interceptive treatment with elastodontic functional devices it's

possible to eliminate these interferences and to obtain a balanced system of forces. The aim of this study is to assess the effectiveness of the Class III® device and to identify the correct therapeutic indications.
Methods: The Class III® is a preformed elastodontic device. It is suitable for primary dentition and it doesn't need dental casts. It works on both jaws, it is formed by two occlusal ruts, upper and lower, to accommodate the respective dental arches. It has a vestibular shield to prevent slippage and mandibular advancement, as far as possible. Superiorly the vestibular shield is absent to allow the advancement and development of the upper jaw. The intraoral component consists of a tongue slide and palatal tabs that induce proper positioning of the tongue and consequently a stimulation of sagittal and transverse growth of the upper jaw. This device has to be used as much as possible trying to keep the lips tightened.
Results: Class III® is a myofunctional regulator that exploits natural forces of growth and rebalances muscle forces properly, minimizing problems that may arise in adulthood. It also works at dentoalveolar level, transforming elastic forces into orthodontic forces. The tongue slide and palatal tabs are essential for proper positioning of the tongue. This function, therefore, induces proper tongue posture at rest and rehabilitation of swallowing and breathing. In this way the tongue exerts a force in postero-anterior sense on the upper jaw, which results in the development and growth in sagittal and transversal sense of the latter. The lower vestibular shield, on the other hand, prevents the jaw from slipping in functional Class III cases, distalizes the lower arch and prevents, as far as possible, jaw overdevelopment. In cases of skeletal malocclusion, the extent of jaw growth is genetically set, so it is possible to intervene early with this device as a pre-treatment followed by an orthopedic therapy. The device worn detaches the two jaws from each other and from any type of dental contact, thus having the ability to act on both components independently. Using this device, it's possible to get a correction of the anterior crossbite, an improvement of tongue posture and the resolution of some occlusal problems. These effects can be achieved in 6-12 months by avoiding or simplifying and making a possible second phase of treatment shorter.
Conclusion: Clinical observations, however, do not yet make a definitive assessment of the skeletal and dentoalveolar effects of the device due to the low sample size and the need of long-term follow-up. Based on the results obtained, this device is indicated in dental and functional Class III malocclusion, in children aged 3-5 years (6 years if still little collaboration for orthopedic treatment) with primary dentition and as skeletal Class III pretreatment. However, the above indications are susceptible to change, as long-term follow-up, periodic checks until the end of growth, and a case study encompassing a larger sample are required.

Use of the microscope in pediatric endodontics

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Aim: The aim of this study is to describe an endodontic treatment of a rare dental condition called dens in dente (also known as dens invaginatus, or tooth within a tooth). It is an anomaly that may occur during the tooth development and consists in the formation of a cavity, inside the dental element, lined with hard tissues. Its etiopathogenesis is not completely clear; it may be related to a trauma or to an infection during the tooth development, it may also be associated with other dental anomalies, changes in the form and dimension of the affected tooth or with syndromic pictures. Most times dens in dente is diagnozed thanks to occasional x-rays. The severity of this condition is variable: it may be limited to the crown, or may affect the root reaching, in the most severe cases, the apex and even the area beyond it. There is not a specific therapy, all depends on the tooth condition and morphology. When the tooth is healthy complications may be avoided by sealing the dental grooves. In our study the examined tooth was not vital.
Methods: An 11-year-old male patient presented for an oral hygiene session. During the examination a fistula was detected on dental element 4.4: the tooth was asymptomatic, the crown did not show any manifestations, yet there were no signs of vitality. An intraoral x-ray soon highlighted the invagination affecting most part of the root (type to Oehlers classification) and also the periapical lesion resulting from pulp necrosis. A cone-beam CT scan was carried out to get a tridimensional image of the root canal morphology; two confluent root canals with open apex were detected. In order to perform an optimal root canal therapy, a surgical microscope Leica (6.4x to 40x magnification) was used. The tooth shaping procedure was carried out with rotary instruments (Pro Taper Next systems); the employed irrigating solutions were Tubuliclean (10% EDTA) and Niclor (sodium hypochlorite). The following closure procedure was performed with MTA apical plug method. A new session was scheduled at a later time to carry out the esthetic restoration.
Results: Since dens invaginatus is a rare condition whose morphology may vary a lot, a therapeutic protocol is not available. Thanks to the use of a cone-beam CT scan it was possible to thoroughly examine

the anatomy of the root canal and apply a traditional endodontic therapy, which resulted in a clinical recovery.
Conclusions: Dens invaginatus is a condition whose morphology may vary considerably. Therefore, in order to better plan an effective treatment, it is essential that second level diagnostic tools (such as CBCT) and suitable magnifying instruments be used. Our case report shows that it is possible to treat dens invaginatus with standard endodontic techniques.

Complex odontoma in a pediatric patient: histomorphological profile and surgical management

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Aim: To evaluate the clinical protocol for the management of odontomas in pediatric patients with conventional surgery, analyzing clinical outcome and long-term clinical follow-up. Odontomas are relatively common benign hamartomatous malformations that are asymptomatic and often only diagnosed on routine radiological studies. Radiologically, odontomas usually appear unilocular and contain multiple radiopaque, miniature tooth-like structures known as denticles; alternatively, they may appear as a dense radiopaque mass surrounded by a thin radiotransparent rim. The lesions tend to be located between the roots of erupted teeth, or between the deciduous and permanent dentition.
Methods: A complex odontoma localized on the front upper jaw was diagnosed in 8 years old patients. The lesion had been detected on routine radiographs for disturbances of tooth eruption with the presence of retrained deciduous incisor and an impacted permanent upper canine. The histomorphological analysis were carried out with hematoxylin and eosin (H&E). The case was treated by conventional surgery. The procedure comprised raising a muco-periosteal flap, performing an osteotomy to reveal the lesion and resecting the odontoma. All surgical phases (mucosa incision, osteotomy, resection) were performed under local anesthesia, making an incision with a 15c scalpel blade and raising a full-thickness flap, after which an osteotomy was performed, and the lesion was then removed.
Results: the histopathological specimen has detected a complex odontoma with haphazardly arranged hard tissues of tooth-like dentin and globules of cementum-like material, primary or immature dentin as predominant component and enamel was also present. The lesion was closely associated with a retained deciduos tooth; both lesion and deciduous tooth were removed. Permanent incisors and canine were repositioned in the dental arch after orthodontic treatment. During surgical procedure filler material (bone mineral) was required to repair bony defects. At 1-year follow-up, there was no failure or relapse. Orthodontic treatment was carried out to return the impacted upper canine to the dental arch. Good occlusion was achieved 1 year after surgery without post-operative complications or relapse.
Conclusion: Alterations in physiologic tooth eruption are a common clinical finding, but significant deviations from physiologic pattern should alert the clinician to further investigate the patient's oral development. Clinical experience and the evidence-based literature suggest that an accurate radiographic examination should be performed for any pediatric patient who presents delayed permanent tooth eruption, or with displacement or retained teeth.

OSAS and ASD and ADHD: how can pediatric dental management help to highlight the benefits of OSAS dental treatment in children with ASD or ADHD?

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Aim: This work is conceived as a literature review, with the aim of highlighting not only the state of the art on the correlation between ASD (autism spectrum disorders) or attention deficit and hyperactivity disorder (ADHD) and OSAS in childhood, but also to underline the importance of how a multidisciplinary approach to OSAS, including early orthodontic therapy, can improve the general syndromic picture of pediatric patients suffering from neurological disorders especially when complicated social interactions and stereotyped behaviours prevail. In clinical practice there is, in fact, a daily and excessive lack of sleep that characterizes children suffering from ADHD and ASD. In particular, autism is associated with a high frequency of sleep disorders that concern not only insomnia, parasonnia, sleep/wake rhythm disorders but above all obstructive sleep apnea. These, on the whole, may be responsible for problems related to the behaviour of these children, especially in pre-school age (Hirata 2016).
Methods: Studies reported in literature (Tsai 2016) indicate that attention deficits and hyperactivity disorders (ADHD) affect about 5% of the pediatric population and sleep problems are common in

subjects suffering from these neurological disorders. It is interesting to note that a high incidence of OSAS has been reported among children and adolescents with ADHD and it appears to be included between 25 and 57%. In children with ASD (autism spectrum disorders) there is a prevalence of DRS ranging from 40% to 80% (Cortesi 2010, Herman 2016) compared to a prevalence of 9-50% in subjects with normal development (Richdale 2009).

Results: The relationship between Autism or Attention Deficit/Hyperactivity Deficit and Obstructive Sleep Apnea is highlighted by the positive feedback that is triggered in the relationship between sleep-related problems and behaviour disorders. As well as in the child with autism or attention deficit/hyperactivity deficiency, sleep-related problems can also occur in the healthy OSAS individuals which can suffer from behavioural problems due to lack of sleep.

Conclusions: In light of these data, it is of great interest to evaluate how a multidisciplinary therapeutic approach to OSAS (when ASD or ADHD and OSAS are both present) may improve one of those clinical signs that are unfortunately often undetected and that may conceal an obstructive sleep apnea, as it happens, for instance, when hyperactivity underpins OSAS. Therefore, since Sleep Disorders can have negative affect on the behaviour of autistic children, the therapeutic approach to OSAS in ASD and ADHD can only improve the syndromic picture of autism itself (Owens 2005 from Richdale 2009). Moreover, another significant aspect that is important to highlight is that, nowadays, many pediatric patients framed in the context of attention deficit/hyperactivity disorder (ADHD), could simply disguise an undiagnosed respiratory sleep disorder (DRS), which should be considered for the purpose of an early detection of OSAS.

Molar Incisor Hypomineralization (MIH) management: a review

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Aim: To investigate the more recent and evidence-based literature on treatment and management of teeth affected by Molar Incisor Hypomineralization (MIH).

Methods: Literature search was conducted through PubMed using the following key words: "Molar Incisor Hypomieralization", "MIH treatment". Studies were included if fulfilled the following eligibility criteria: to be published since 2009 to present; to be an Observational study, Randomized Controlled Trial, Meta-analysis, Systematic Review, Clinical Trial investigating different treatments and management for MIH. From 190 papers, after title and abstract evaluation, 28 were selected and obtained in the full-text format.

Results: From the 28 papers included, 3 investigated the use of arginine, 5 the use of fluoride, 3 the use of CPP-APC, 2 both fluoride and CPP-APC containing products to reduce MIH associated hypersensitivity, 5 studies focused on the efficacy of dental sealant in MIH teeth and 10 papers investigated the procedures and/or the materials for the restoration of MIH teeth. Bekes et al. proposed the application of an arginine paste on MIH teeth in order to reduce the associated hypersensitivity. Yang et al. performed a meta-analysis on the application of a paste containing arginine as a desensitizing agent and concluded that an 8-week use reduced dental hypersensitivity. The results are consistent with Bekes et al. Results suggest that arginine paste can be recommended as a desensitizing agent for MIH teeth. Restrepo et al. and Ozgul et al. have reported reduced dental hypersensitivity in MIH teeth after applying fluoride varnish. These results are similar to those found in patients without MIH. Results suggest that fluoride varnish can be recommended as a desensitizing agent for MIH teeth. Biondi et al., Ozgul et al., Bakkal et al., and Pasini et al. have reported positive results after applying CPP-APC pastes, its effectiveness as a desensitizing and remineralizing agent has been questioned and long-term clinical studies with large samples are needed to validate the results before recommendation. Fragelli et al. and Lygidakis et al. have suggested that fissure sealants may be an effective preventive treatment. Lygidakis et al. reported that fissure sealants applied using an adhesive system had a higher retention rate than those that had been applied without. Fragelli et al. assessed the success of glass ionomer restorations in MIH teeth, recording a success rate of 78.8% at 12 months. Using the ART protocol and a glass-filled hybrid restoration system, Grossi et al. reported a higher success rate (98.3%) at 12 months. Although the authors have reported positive results, patients need to be monitored because there is a lack of information on the effectiveness of the ART protocol in permanent teeth, particularly in MIH. Souza et al. assessed the clinical success of composite restorations and found a success rate at 18 months of 68.4% when the restorations were done with a self-etching adhesive and 54.6% when a base adhesive of ethyl alcohol was used. In addition, Sönmez and Saat restored the MIH teeth with a resin composite reporting that the complete removal of affected enamel significantly increased the success of the treatment compared to the non-invasive technique. The same authors found that the deproteinization of the affected enamel using 5% sodium hypochlorite, statistically significantly increase the bonding strength.

Conclusion: The revision is not conclusive. Further research is necessary to reach clear recommendation on the management of MIH teeth.

Early functionalization of replanted tooth treated with enamel matrix derivative after a traumatic dental injury: a case report

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Aim: The outcome of an avulsed and replanted tooth is still a matter of discussion. If the tooth is left outside of the socket for an extended time, the death of periodontal cells, the degeneration of fibers and cement often lead to an unfavorable result with ankylosis and root resorption. Factors capable of promoting periodontal ligament regeneration have been employed with the attempt of preserving and inducing cell progenitors to proliferate and maintain the integrity of periodontal ligament. This case report shows the treatment of traumatically avulsed tooth with Enamel Matrix Derivative (EMD) and the replantation in its original socket, followed by the early application of a light orthodontic force, to enhance physiological periodontal ligament regeneration and function.
Methods: A boy aged 13 and wearing a fixed orthodontic appliance, was injured by a bicycle accident. In the trauma, he lost his upper left lateral incisor, while the upper central was luxated. The avulsed tooth was immediately recovered and washed and stored with milk. The boy was conducted to the dental specialist after 4 hours. Being the extra-alveolar time crucial for PDL cells survival, a regenerative procedure with EMD was performed on the root. The root was not mechanically debrided. The tooth was extraorally endodontically treated and the root canal was filled with gutta-percha, avoiding any contact of the outer surface of the root by canal irrigants or cement and keeping the tooth hydrated with saline. Damaged oral soft tissues were sutured with a 5.0 ePTFE suture and the tooth was inserted in its clot-free socket after the application of EMD. The presence of orthodontic brackets allowed a rigid fixation of the central and lateral incisor, using two metallic wires; this fixation was kept till the suture removal at 14 days. The splinting was then progressively made more flexible.
One month after the trauma a light orthodontic force was applied and the orthodontic refinement completed. The patient entered a monthly follow-up program.
Result: A 26 months follow up is presented. Periapical radiographs show the maintenance of the root form of both the central and the lateral upper left incisors, with a physiologic periodontal space, the absence of root resorption or any sign of ankylosis. The luxated central incisor kept its vitality. Both teeth were asymptomatic, with a normal mobility, normal sound on percussion.
Conclusions: In conclusion, the application of a regenerative procedure with EMD and a progressive load to a replanted tooth, were able, in the medium term, to restore periodontal ligament to its health and function and to maintain the integrity of the child's smile.

Oral health in pediatric patients with celiac disease: a review

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Aim: the aim of the present review is to evaluate the prevalence of oral manifestations in celiac children and to explain the reason why these conditions appear in celiac patients. Celiac disease is a serious autoimmune disease that occurs in genetically predisposed subjects; the ingestion of gluten leads to damage in the small intestine. It is estimated the celiac disease affects 1 in 100 people worldwide. Apart from the systemic problems, other pathological findings within the oral cavity are reported, including Development Defect of Enamel (DDE) in primary and permanent teeth and oral ulcers.
Methods: A systematic review of the literature was carried out on PubMed database. Articles published in English between 2010 and 2020 were searched using the following keywords: "oral manifestation", "enamel defects", "aphthous stomatitis", "celiac disease". Only cross-sectional, case-control and cohort studies were considered. The main eligibility criteria adopted were the following: patients under 18 years of age, with serological diagnosis of celiac disease and absence of other systemic diseases.
Result: In total 189 papers were identified, and 12 studies, which refer to 2329 patients aged between 0 and 18 years, were selected. A statistically significant correlation was found between the onset of the celiac disease and two oral manifestations: recurrent aphthous stomatitis and enamel defects. Recurrent aphthous stomatitis was found in 30.1% of celiac patients and only in 13.7% of healthy controls. These mucosal lesions might be the result of genetic predisposition or autoimmune onset related to the celiac disease. On the other hand, enamel defects, and particularly enamel hypoplasia, were found in 30.5% of cases, and only in 13.1% of healthy controls. The etiopathogenetic mechanism that leads to these

defects is not fully clear. However, these defects may be related to the malabsorption produced by celiac disease, which consequently results in hypocalcemia. The latter affects permanent teeth, more specifically incisors and molars, and likewise canines and second molars in the primary dentition. Another etiological factor is linked to genetics: mutations of HLA-DR3 allele seem to be associated to a significant increase of enamel defects in celiac children. Less frequent oral manifestations are: atrophic glossitis, geographical tongue, caries and eruption delay. DMFT and DMFS index were analyzed by a few studies. However, reported caries data are difficult to interpret as discordant results were shown in different papers. On the one hand, some authors claim that a gluten-free diet would prevent caries lesions development. On the other hand, authors affirm that the presence of enamel defects is an increased risk factor in caries develop. However, these less frequent manifestations are not to be considered statistically significant in relation to celiac disease.

Conclusions: the main oral manifestations in celiac children are enamel defects and recurrent aphthous stomatitis. Both manifestations might indicate the presence of a celiac disease and lead the pediatric dentist to suggest further investigations, even in the absence of gastrointestinal symptoms.

Aneurysmal bone cyst in two homozygous twins: is the traumatic hypothesis still acceptable?

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Aim: Aneurysmal bone cyst (ABC) is a non-neoplastic disease with unknown etiology, appearing as an expansive intraosseous lesion formed by fibrous connective tissue, multinucleated giant cells and osteoid tissue. Many of the reported cases of aneurysmal bone cyst of the jaws show a poorly recognizable etiopathogenesis which may be attributed to another bone pathology (secondary ABC). The goal of this work is a comparative study of two clinical cases of ABC in two homozygous twins with the same anatomical , radiological and anatomopathological features. The aim is to investigate the relevance of a traumatic etiopathogenetic hypothesis, without overlooking any possible genetic implications that may derive from this case report.

Methods: Two homozygous male twins aged 16 presented at the U.O.S. Of Pediatric Maxillofacial Surgery of S.Anna Hospital – Como complaining of a painless mild swelling in the lower right third of the face. The patients' medical history did not reveal any significant pathologies and any facial trauma. In both cases the clinical examination showed a healthy completely erupted dental formula, except for the third molars. No particular dental conditions were detected. The radiological investigations (OPT) highlighted an extensive radiolucent uniloculated area with clear margins and radiopaque sclerotic rim, extending in the right mandibular body from 45 to 48, in close relationship with the neurovascular bundle, non clearly recognizable in the area itself. There were no signs of root resorption of dental elements 45,46,47. The second level investigations (CBCT) revealed a substantially overlapping radiographic image in both twins. To complete the diagnostic process and establish a therapeutic plan, both patients underwent incisional biopsy surgery of the osteolytic neoformation under general anesthesia. Accurate curettage of the lesion cavity was performed, and a histological intraoperative diagnosis of aneurysmal bone cyst was made. At a later time, a genetic survey was carried out through karyotype and FISH analysis, which did not detect the presence of genetic anomalies. Translocation TRE-17/USP-6 or mutation of USP-6, usually associated with the etiopathogenesis of aneurysmal bone cysts, were not found.

Result: To date, this represents the only study undertaken on two identical ABC cases present in two homozygous twins. Because of the relative rarity of the lesion in maxillary bones and the uniqueness of the twin picture, both patients underwent thorough investigations to determine the lesion nature and any causal or predisposing factors. Given the histological multiformity of the lesion and the similarity to other tumor-like forms, there could be the remote chance of a coexistence with other mesenchymal dysplastic forms; this would imply an anatomopathological hypothesis, plausible in the present case, but incorrect. If this hypothesis, following further research, should prove to be well-grounded, it would be advisable to repeat the genetic tests with a better defined focus and not corresponding to USP-6.

Conclusions: Our study into this subject has not provided univocally interpretable answers. Therefore, future surveys are necessary to better investigate the role of genetics in the development of similar lesions when confined to the facial massif: the indication of specific genetic markers is a very promising path in all congenital pathologies such as the condition examined in our study, even in the absence of conclusive evidence.

Orthodontic treatment in patients with special needs: confort assessment with VAS scale of intraoral scanner

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Aim: In patients with syndromic-pathological pictures associated with medium-severe mental retardation, the record of dental impressions for orthodontic purposes involves a high degree of difficulty. The poor compliance of these patients is due to the discomfort caused by silicone materials, the need to keep the patient in a still position and the prolonged time of these procedures. The growing diffusion of intraoral scanners seems to provide clinicians with a valid tool to solve these problems since this kind of procedure takes less time and the techniques applied are themselves. Furthermore, in case of need, the procedure can be interrupted several times, and the risk of having to repeat the impression is considerably reduced.
Methods: Four patients with moderate to severe retardation were selected, in whom it was impossible to take silicone dental impressions, were selected. Specifically, the four patients were affected by CHARGE syndrome, autism, achondroplasia The impressions of both dental arches were taken using an intraoral scanner (model: 3Shape Trios 3). At the end of the procedure, patients were asked to indicate on a VAS (Visual Analogue Scale) scale from one to six, the degree of discomfort of this procedure.
Results: At the end of procedure the patients were administrated a Visual Analogue Scale (VAS). Three of Them rated their discomfort one, while only one patient rated it three.
Conclusion: The use of intraoral scanners for the record of dental impressions in patients with medium-severe mental retardation represents a valid alternative to the analog impression technique with silicone materials. These devices allow less- time consulting procedures, reduce the patient's level of stress and ensure a higher degree of accuracy. Besides, shorter sessions and less invasive procedures imorove the quality of the patient's dental experience. Digital impression techniques also eliminate some variables like possibile contractions, expansions, air bubbles and breaks. To this must be added the advantages the use of a digital workflow entails.

Mydentist: how an accompaniment to prevention and dental care for patients with autism spectrum disorder influences the use of general anaesthesia

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Aim: The objective of the research is to assess whether a therapeutic care pathway for patients with autism spectrum disorder in dentistry is really effective in reducing general anaesthesia procedures for dental care.
Methods: We took into consideration a sample of 168 subjects with autism spectrum disorder (45 females and 123 males) attending the Pediatric Dentistry clinic of the Azienda Ospedaliera Universitaria Pisana and in particular the path dedicated exclusively to patients with autism. By means of an anamnestic evaluation of the medical record, we analysed whether patients had resorted to interventions under general anaesthesia before embarking on the path of prevention and treatment; in particular, we selected professional oral hygiene as a service. We then began the process of familiarisation and collaboration in dental procedures, personalised for each patient and accompanied by ad hoc multimedia support. We then analyzed how many patients who had carried out at least 5 outpatient sessions and then had to undergo general anesthesia in order to carry out the treatment.
Results: Within the sample of 168 subjects with autism, 36 patients (or 21.4%) had used general anaesthesia before embarking on the route. 100% of these subjects had done professional oral hygiene. We then analysed the patients belonging to the ambulatory having carried out a minimum of 5 sessions: 16 of them had to perform services under general anaesthesia (9.5%). Of these 16 patients, only 3 had to make professional oral hygiene (i.e. 18.75%).
Conclusion: A specific dental prevention and treatment programme for patients with autism spectrum disorder makes it possible to reduce the use of general anaesthesia for dental treatment, especially with regard to professional oral hygiene and conservative care. It is also important to point out that out of the total number of subjects belonging to the sample (168 patients), 103 of them or 61.3% had already undergone sessions of general anaesthesia for other specialist medical services (mainly for radiological examinations but also for surgery). It is therefore essential to minimize the use of narcosis for dental sessions, especially for people with autism spectrum disorder whose not always optimal collaboration increases the possibility of having to use general anesthesia for all other medical procedures.

Orthodontic management of pediatric cancer survivors: possibilities and limitations

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Aim: Over the past decades the rate of children who survived cancer has considerably improved. It can be explained by the progress in oncological treatment which may include chemotherapy, radiotherapy, surgery and supportive cares such as immunosuppressive therapy. Some cancer treatments can affect the development of cranial bones, cervical vertebral bodies and oral cavity structures including teeth and jaws. Common adverse effects of cancer therapy on dental development include arrested root, enamel disturbance, premature apical closure and aplasia. An increased number of these patients will attend for orthodontic consultation and possible treatment. The orthodontic management of patients after their cancer (which requires expertise and clinical experience) is still poor defined by professionals. Cancer survivors are at particular risk of complications during orthodontic treatment and knowledge of these risk factors is essential. The aim of this search is to individuate some guidelines for the orthodontic management of cancer survivors and to understand limitations and possibilities of orthodontic treatment in these patients.
Methods: The online databases selected for the literature search were PUBMED and Google Scholar. The keywords used were: "orthodontics", "pediatric cancer survivors", "oncological patients", "antineoplastic therapy", "childhood cancer". We selected published articles analysing orthodontic strategies in oncological patients.
Results: Before starting orthodontic treatment in a patient with a history of a neoplastic disease it is important to consult oncologist because the patient's health status and prognosis should be considered in his therapy. It is important to assess the rate of growth in the patient and to consider administering growth hormone to normalize the pattern of craniofacial bone growth. In the literature there can be found recommendations to start orthodontic treatment at least 2 years after cancer therapy has finished, when the patient's oncological disease is in a state of permanent remission. It is also recommended to use low force in order to minimize the risk of root resorption, to accept the compromised results of simple mechanical treatment and to complete orthodontic treatment earlier than usual or to treat only the upper dentition. To reduce the risk of atrophy and ulcerations of the oral mucosa, non-irritating orthodontic appliances should be considered. Moreover, it has been demonstrated that a two to three month break in treatment after the initial six months of active treatment could reduce the incidence of advanced root resorption. In patients who will probably need to have MRI test the use of aesthetic brackets without metal components has to be evaluated in order to reduce artifacts during imaging examinations. Finally, patients should be particularly motivated to mantain ideal dental hygiene because they are more prone to caries and infections due to a reduced saliva flow.
Conclusion: Cancer survivors deserve the same access to orthodontic care as healthy child but orthodontists may need special considerations in treatment planning. A comprehensive intervention strategy needs to be followed in order to anticipate adverse effects of orthodontic treatment in these patients.

Description of a protocol for miniscrews use in interceptive orthodontics

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Aim: The aim of this study is to describe the procedure and the advantages of a protocol for miniscrews insertion, as anchorage support of the REP in pediatric dentistry, in total safety and absence of risks. Clinical planning based on traditional radiographs, in fact, does not allow the correct real evaluation of the insertion site thus risking an incongruous miniscrews insertion and, consequently, causing damage to important structures. The virtual planning of miniscrews insertion and then the production of a surgical guide that guides the insertion so as to make it repeatable and absolutely safe are the fundamental steps of our protocol.
Methods: Our protocol foresees, initially, the taking of a CBCT which, providing a three-dimensional and accurate image of the site and of all radiopaque structures, allows the safe evaluation of each insertion phase and, subsequently, the import of the volume on Dolphin 3D module which is positioned considering the horizontal three-dimensional parameters. An STL file of the arch (one for each arch) is produced by a scanner system and TRIOS 3SHAPE OrthoAnalizer module software. At this point, the STL file of the teeth is positioned on the volume by overlapping the dental part, except for the soft tissue part, which will be used to produce the surgical guide. We then move on to

the selection of miniscrews type, shape, diameter and length (the software has a library of the most popular miniscrews) which will subsequently be positioned according to the desired biomechanical parameters. The next step involves the creation of the surgical guide and its realization in resin through prototyping machines. After an in situ evaluation of the guide, the anesthesia is infiltrated, the guide is applied, the miniscrews are inserted up to the stop and, finally, the force is applied to the miniscrews.

Results: The main advantage of this protocol is certainly to correctly evaluate the insertion site and, consequently, to make the insertion absolutely safe and repeatable, avoiding incurring iatrogenic complications. The disadvantages, however, concern the clinician's learning curve and the high costs. As in all operating techniques, it is necessary to practice to optimize the ergonomics of clinical procedures, gradually reduce the time of use and optimize the performance of digital instruments. The learning curve, therefore, is variable both according to the operator's experience and the number of cases treated.

Conclusion: From the examined literature review, this is a protocol that presents higher costs and a greater learning curve but certainly increases the precision in miniscrews application and, therefore, is a performing method for the dedicated purpose.

Inhalation conscious sedation with nitrous oxide and oxygen for dental treatments in uncooperative pediatric patients: an observational study

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Aim: Dental fear is usually observed among children who need clinical interventions. The child's fearful or uncooperative behavior may impede dental care and compromise the quality of treatment provided. Therefore, if patients are not properly managed, a vicious circle may be established. Patients avoid dental visits because of fear, which results in a worsening of dental problems, requiring potentially more traumatic treatment, which, then, strengthens or exacerbates the fear. Uncooperative children need a variety of patient management strategies to provide appropriate dental treatment such as inhalation conscious sedation with nitrous oxide and oxygen. The aim of this study is to evaluate the features of inhalation conscious sedation for dental treatments in uncooperative (both healthy/fearful and disabled) pediatric patients.

Methods: 42 uncooperative patients aged between 5 and 17 years were selected and submitted to dental treatment with the aid of inhalation conscious sedation with nitrous oxide and oxygen. At the beginning, 100% oxygen was delivered through the nasal mask for 5 minutes. Subsequently, 30% nitrous oxide was delivered in increments of 5-10% up to a maximum of 50% to obtain the desired level of sedation. After an induction period of 8 minutes, dental treatment was performed. At the end of dental treatment, 100% oxygen was delivered for 5 minutes. Collected data included: achievement of the treatments, adverse events, side effects, number of teeth treated, type of dental procedures performed and parents satisfaction, assessed through questionnaires filled after dental treatments.

Results: One working session was carried out in 29 patients, 2 working sessions were carried out in 6 patients and 3 working sessions were carried out in 7 patients (for a total of 62 working sessions).The procedures were successfully completed in 54 working sessions with a success rate of 87.1%. There was no statistically significant differences between success and gender and between success and health status, while there was a statistically significant correlation between success and age ($p=0.023$). No adverse events occurred. The side effects, however, occurred in 30.6% of cases and the most frequently encountered side effect was nausea (16.1%), nausea and vomiting (9.7%) and vomiting (4.8%). The Chi-Square test, in relation to the side effects, showed a statistically significant difference between patients aged 5-7 and patients aged 8-17 ($p=0.001$). 35 dental restorations, 37 extractions, 2 scaling and 24 surgical procedures were carried out. In relation to the questionnaires completed by the parents after dental treatments, 29.6% of the patients had pain, 22.2% vomited, 14.8% had headache, 18.5% experienced drowsiness, 29.6% failed to eating normally, 35.2% needed to take drugs. No patient cried, had a fever, exhibited irritability and excitability.

Conclusion: Inhalation conscious sedation is a safe, practical and effective procedure with minimal side effects for pediatric patients during dental treatments and it can be carried out by the dentist in complete autonomy. Furthermore, this procedure could reduce the number of pediatric patients referred to hospitals for general anesthesia.

Facilitated approach for impacted maxillary incisors management

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Aim: The aim of this preliminary clinical study is to propose a novel facilitated protocol for impacted maxillary incisors treatment.
Methods: Ten patients have been collected in early mixed dentition showing one or more impacted incisors with or without dilacerated root and with permanence of deciduous incisors. The mean age was 7,9y. All patients have been subjected to panoramic x-ray and CBCT at beginning (T1) and panoramic x-ray at the end of the treatment (T2). The treatment protocol consisted of three stages: Stage 1 - Rapid Maxillary Expansion phase performed even in absence of crossbite or constriction; Stage 2 - Realization of a palatal arch for de-impaction traction with one single extrusive vector or with two vectors (first horizontal then vertical) following severity of impaction; Stage 3 - Refinement of incisors position (extrusion and torque) by means of fixed orthodontic sectional appliance boded on the six anterior teeth. RME was performed in order to induce the R.A.P. effect. After 1 month from application, the expander has been removed and the construction of a palatal arch with an anterior arm finishing with an eyelet is planned. When the palatal arch is positioned, surgical exposure of the impacted tooth is performed possibly using a laser system in order to reduce bleeding and to induce a biological stimulation. A customizable metal mesh (from Leone), attached to a handmade metal chain crafted from 0.10 metallic ligature, is bonded directly to the incisor crown after its exposure. According to the severity of the impaction, the traction force can be applied through an elastic wire with a single vertical vector of force producing extrusion or in case of dilaceration the traction will follow the axis of the tooth so that the first force vector will be horizontal, parallel to the occlusal plane and the second will be vertical. Once the crown become visible in the oral cavity and need for vertical anchorage is reduced, the palatal arch can be removed and fixed orthodontic appliance can be placed in order to refine extrusion using essential arch wires sequence.
Results: This approach guaranteed disinclusion of incisors for all the patients in the group in an average treatment time of 12 months with full maintenance of adequate periodontal health and physiological root development.
Conclusion: Various factors that govern the successful outcome of such impacted teeth include: severity of the impacted tooth, extent of root formation, direction and angulation of dilaceration (in case of dilacerated root), amount of space available for aligning the impacted tooth, periodontal control, biomechanical strategy for anchorage. For these reason to simplify the overall treatment, an initial stage of rapid maxillary expansion could be considered a reliable approach generating molecular change in the bone (R.A.P.) that creates more favorable conditions for the followings orthodontic recovery steps. Moreover the RME stage, even in absence of transverse deficiency, could lead to wider space for de-impaction and promote all well known positive dente-alveolar and skeletal changes. The described facilitating approach, proved to be an efficient way to facilitate complex extrusion movement, to reduce the need for vertical anchorage and to reduce overall treatment time respecting periodontal conditions and proper torque expression.

Delayed dental reimplantation: a case report with a 12 months follow-up

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Aim: Tooth avulsion prevalence accounts from 1% to 15% of traumatic injuries in permanent dentition. Upper central incisors are the most common teeth to be involved with a male predilection (M:F 3:1) especially in the range age between 7 and 14 years. The recommended treatment for avulsed tooth is the immediate replantation; however, it's not always possible. The aim of this poster is to report the case of a child with dental trauma involving an avulsed central upper incisor, that was delayed re-implanted after 24 h from trauma. The follow-up findings at 1 year are present.
Methods: A 12 years-old male was referred to the Department of Paediatric Dentistry of the S. Paolo Hospital of the University of Milan, for a dental trauma happened 1 day before, in which the avulsion of the upper left central incisor occurred. The patient revealed a poor oral hygiene, many carious lesions and a tendency toward skeletal Class III with a bilateral posterior cross bite. After 24 hours of extraoral time stored in milk at room temperature, the tooth was taken to dental clinic. The avulsed tooth presented a distal carious lesion without any fracture; the root was completely formed. Since the extraoral time exceeded 2 h, it was decided to perform the root canal treatment before the re-implantation. In addition, the carious lesion was removed and filled with a composite resin material. Local anaesthesia was performed and the dental alveolus was gently

curetted to remove any coagulum and then irrigated with 0.2% chlorhexidine solution. Tooth was re-implanted into the alveolus using finger pressure. Once the tooth was properly seated, it was checked for alignment and occlusion and then splinted to the adjacent teeth with a vestibular stainless steel wire .018 and composite resin.
Result: After 7 days at the first check-up evaluation no signs or symptoms were observed. After 30 days the splint was removed and a physiological tooth mobility was notice. A periapical radiograph showed no signs of resorption or ankylosis. One year after the tooth re-implantation no signs of inflammations by radiograph or symptoms referred by the patient are present.
Conclusion: Immediate re-implantation of the avulsed teeth is widely accepted as the most appropriate treatment. However, this may not always be possible; in cases of delayed treatment, considering the benefits that may result form the therapy, reimplantation need to be considered. It can be concluded that the proper pre-treatment storage of the avulsed tooth might be the reason of the success in the short term (1 year) even if the re-plantation occurs after the suggested optimal period.

Dental management of a child with Zlotogora-Ogur syndrome: a case report

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Aim: Ectodermal Dysplasia (ED) is a heterogeneous group of congenital disorders affecting the development of two or more tissues derived from the ectoderm. Ectodermal Dysplasia syndromes may be observed in association with mid-facial defects, primarily cleft lip and/or palate (CL/P). Zlotogora-Ogur syndrome is an ED syndrome characterized by hair, skin and teeth abnormalities, facial dysmorphism with cleft lip and palate, cutaneous syndactyly and, in some cases, intellectual disability. The prevalence is unknown: less than 50 cases have been described in the literature. The disorder is frequent in Margarita Island (Venezuelan state of Nueva Esparta), due to a founder effect, that is the reduction in genetic variation that results when a small subset of a population is used to establish a new colony. Transmission is autosomal recessive. This rare syndrome results from PVRL1 (11q23-q24) gene mutations which encodes nectin-1, the principal receptor used by alpha-herpesviruses to mediate entry into human cells. The aim of this study is to present a case of a child with Zlotogora-Ogur syndrome.
Methods: This report shows the case of a child aged 11 years and 6 months with Zlotogora-Ogur syndrome. A.C. is the primogenital son of Pakistan consanguineous (first-cousins) healthy parents. At birth the baby presented cleft palate, surgically corrected in his country of origin at one year of age. The diagnosis of Zlotogora-Ogur syndrome was made some years later in Italy at the Ospedale Maggiore, Policlinico of Milan.
Results: At the clinical examination A.C. presents minor facial anomalies, lower limb anoma-lies and micrognathia. Cutaneous bilateral syndactyly, involving toes 2-3 and 4-5 is present. The child also shows anomalies of the vertebrae C2 and C3 and cryptorchidism. Due to a defi-cit in psychomotor development, the child exhibits problems in walking and speech; howev-er, he showed a collaborative attitude to the examination. At the intraoral examination, ab-normalities of the upper lateral incisors size and shape were observed. In addition, caries le-sions in primary teeth and gingival hypertrophy were also recorded. Hypodontia is always re-ferred in patient with ED syndromes. In this patient the radiographic examination allowed to exclude missing teeth. Due to the upper jaw contraction, the dental crowding and the hyper-divergent growth pattern, the patient is candidate for an orthodontic treatment. Dental and gingival therapy was planned to control caries and to reduce gingival inflammation. To im-prove the repositioning of the permanent teeth and reduce the crowding, an orthodontic therapy with Rapid Maxillary Expansion appliance will be performed.
Conclusion: The clinical manifestations of ectodermal dysplasia syndrome includes consid-erable problems in the orofacial area. Patients with ED syndrome need to be examined by the pediatric dentist as soon as possible in order to plan preventive strategies and face teeth, gum, abnormalities and orthodontic problem.

Coordination between the pedodontist, the orthodontist and the surgeon in the treatment of a patient affected by Apert syndrome: a case report

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Aim: We present the multidisciplinary treatment of a young patient affected by Apert Syndrome. Apert Syndrome is the second most common craniofacial synostosis syndrome. Craniofacial synostosis are syndromes linked with a genetical defect of the

fibroblast growth factor receptor, (FGFR) wich induce an early ossification of the sutures both of the cranium and of the midface. Typical stigmata of these patients are midfacial hypoplasia, exorbitism, class III malocclusion severe crowding in the upper arch often associated with ocular lesions and obstructive sleep apnea syndrome (OSAS) The patient we present at the age of 5 years, underwent a le Fort III osteotomy with distraction performed by the craniofacial surgery, team of San Gerardo Hospital, Monza, in order to treat his very severe sleep apnea syndrome (OSAS). The patient was still in deciduos dentition and a panoramic X-ray and a CT scan were prescribed at the age of six. The CT scan showed that the circum-maxillary sutures were already fused, therefore, the patient could not undergo any type of orthopedic treatment of the maxillary arch. Nevertheless the panoramic X-ray demonstrated severe crowding.
Methods: It was, therefore decided to procede with a serial extraction protocol. The serial extraction protocol requires a perfect coordination between the orthodontist and the pedodontist. Thus, the patient was sent to the pedodontist first to extract the deciduous canines. The year after, with the subsequent panoramic X-ray it was decided to extract the first deciduous molars to allow the eruption of the first permanent premolars. As soon as the first permanent premolars erupted they were extracted by the pedodontist in order to allow the eruption of the permanent canines.
Results: The space was still not enough for the eruption of the canines. Given the severe rotation and retroclination of the incisors. The subsequent step was to align the arches and create the space needed for the permanent canines with an Invisalign appliance.
Conclusion: During the treatment the canines erupted into the arches. Maxillary and mandibular arches were coordinated keeping in mind the future maxillary osteotomy which the patient will undergo at the age of eighteen years in order to close the open bite and correct the class III malocclusion.

The effect of dental treatment under general anesthesia on quality of life, growth and health status in uncooperative pediatric patients with compromised oral health

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Aim: The aim of this pilot study is to evaluate the impact of oral treatment under general anesthesia (GA) on oral health-related quality of life (OHRQoL) in uncooperative pediatric patients with severe dental caries and to assess the effect of dental treatment under general anesthesia on patients' weight, height, Body Mass Index (BMI) and health status through blood chemistry parameters.
Methods: Forty-three uncooperative 3-14 years old children were selected. The Early Childhood Oral Health Impact Scale (ECOHIS) questionnaire, which evaluates the OHRQoL in children under the age of 6, and the COHRQoL (Child Oral Health Related Quality of Life) questionnaire, which evaluates the OHRQoL in children between the ages of 6 and 14, were assessed at baseline and eight months after dental treatment under GA to evaluate the impact of oral health on OHRQoL. Weight, height, BMI and blood chemistry parameters (ferritin, ALP, triglycerides, cholesterol, PCR, VES, Vitamin D, Vitamin B12, folate and IGF-1) were measured at baseline and eight months after dental treatment under GA to evaluate the impact of oral health on growth and health status. All statistical procedures were performed using the Statistical Package for the Social Sciences 17.0. T student test was used to assess the effect of GA procedures on oral health quality of life.
Results: After eight months, the reductions for both the ECHOIS and the COHRQoL components were statistically significant ($P < 0.0001$). Children showed a significant improvement in relation to pain, eating, sleeping and behavioral problems. Also families showed a significant improvement in all areas assessed by questionnaires (parental and family activity, parental emotions, family conflicts, financial burden). At follow up, significant improvements were detected: regarding the anthropometric measures, 76.5% of children increased the percentile curves for weight, 68.6% for height and 51.4% the BMI value; regarding the blood chemistry parameters, ferritin improved in 68.6% of the sample, PCR in 65.7%, VES in 68.6%, Vitamin D in 68.6% and IGF-1 in 65.7%. For the other considered blood chemistry parameters (ALP, triglycerides, total cholesterol, vitamin B12 and Folate) a substantial variation was not observed in the entire sample.
Conclusions: Eight months after a complete treatment under GA, OHRQoL significantly increased. This study shows that, after a dental treatment under GA in uncooperative pediatric patients, for age or disability with impaired oral health, there is a significant improvement in the child growth, assessed through change in the weight, height and BMI percentiles and

by health status, assessed through blood chemistry parameters such as ferritin, VES, PCR, Vitamin D and IGF-1. Based on the results obtained in this pilot study, other studies, involving a greater number of patients, will be needed to confirm the positive results obtained.

Oligodontia: an early interdisciplinary approach between orthodontics, prosthodontics and restorative dentistry

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Aim: We present a clinical case of a 12-year-old patient, showing no systemic disease nor other clinical antecedents of interest, with familiar oligodontia. In a young patient, this condition can be a functional and social problem if the missing teeth are many. We want to point out the interdisciplinary approach and the management of this dental anomaly with a minimal-invasive treatment at a young age.
Methods: After the non-eruption of two deciduous teeth and because of the familiar history of hypodontia (his mum has 11 missing teeth) the patient underwent his first dental visit at 5 years old and the orthopantomography showed that 12 teeth (in addition to the four third molars) were missing. The patient's parents asked for the less invasive rehabilitation approach available for this condition. Since the first visit in our dental practice, the patient has consistently been followed by a multidisciplinary team consisting in orthodontist, prosthetist and restorative specialist. Before undertaking any treatment, we requested a genetic counselling in order to exclude that his hypodontia was related to other more complex clinical situations. After the case study made by the interdisciplinary team, as first step, the patient underwent an orthodontic treatment: the patient had his palate expanded with a RPE and after that he was asked to use a Delaire mask to improve the growth of the midface. Later, the patient underwent a fixed orthodontic treatment to align the upper incisors. After the orthodontic treatment we proceeded with the replacement of the missing teeth. A lower deciduous central incisor was extracted because it was mobile. The therapeutic decisions have been made considering all the options and, in agreement with the patient's parents, a rehabilitation with Maryland bridges was chosen to replace the lower extracted incisor and upper canines. Composite overlays were applied on the posterior teeth in order to have a stable occlusion. The case was finalized with the restorative stage: a camouflage with adhesive direct restoration was performed on the patient's frontal teeth to improve the aesthetics of the smile. The approach was very conservative: only the outer non-prismatic enamel layer was removed. The aesthetic evaluations were based upon the golden ratio, through the use of the golden compass comparing the mesio-distal diameter of the elements.
Results: The orthodontic treatment has successfully solved the patient's malocclusion and aligned the existing teeth, creating the right space to replace the missing dental elements. A stable functional occlusion was obtained by the application of composite onlays on existing posterior permanent teeth. The final aesthetic result was reached with the adhesive restorative treatment. The adopted interdisciplinary approach resulted in an aesthetic and functional improvement without invasive therapies.
Conclusion: An effective and successful treatment of hypodontia at a young age must involve the synergic efforts of different dental practitioners. The orthodontic treatment was essential not only to adjust the occlusion but also to obtain a favorable position of the present teeth. A valid non-invasive temporary replacement of the missing teeth can be achieved through the application of adhesive Maryland bridges. A minimally invasive preparation and a direct composite restoration is a functional, aesthetic and economic solution to finalize a global treatment when dental elements need shape corrections.

Pulpotomy agents for vital pulp therapy of deciduous teeth: a systematic review of the literature

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Aim: Vital pulp therapy (VPT) includes several treatments aiming at preserving the vitality of carious-affected deciduous or young permanent teeth with immature roots. Among others, pulpotomy represents a reliable and safe procedure that have provided clinically positive results over time. Different pulp dressing agents are proposed and applied, however, a gold standard material for pulpotomy has not been established yet. Thus, the aim of the present study was to systematically review the scientific literature in order to determine a preferred material to use.
Methods: An electronic search was carried out through MEDLINE database to identify scientific papers published up to October 2019, according to

established inclusion criteria. The PRISMA guidelines for Systematic Reviews were adopted to answer the following PICO question: is there a preferred material that performed better than others used in pulpotomy of vital carious-exposed primary molars? Papers comparing MTA, Biodentine, ferric sulphate and calcium hydroxide used in the pulpotomy of primary teeth with extensive caries involving vital pulp, with at least 12 months of follow-up, were screened. Moreover, assessment of methodological study quality and risk of bias was carried out.
Results: The search resulted in 4274 records; after removing duplicates, 990 papers were screened. A total of 915 studies were excluded after title and abstracts reading, then 75 papers underwent full-text evaluation. Finally, 41 articles were included in the present review according to the inclusion/exclusion criteria. The data extraction of the included studies provided a considerable heterogeneity between the assessed papers in terms of pulpotomy procedure, materials management, expertise of the clinician, restoration materials and outcome variables. Moreover, the assessment of methodological study quality resulted in an overall high risk of bias, mainly in blinding of participants and personnel, followed by blinding of outcome assessment. Clinically, MTA, Biodentine and ferric sulphate demonstrated favourable outcomes as pulpotomy agents. Specifically, MTA seemed to be the material of choice after pulpotomies and Biodentine provided promising results. Even though ferric sulphate showed slightly worse outcomes than MTA, it might be safely used as valid alternative when the pulpotomized primary molars are going to be replaced by permanent teeth. On the other hand, calcium hydroxide demonstrated the worst clinical outcomes and formocreosol should be avoided and replaced by other materials, since its potential cytotoxicity and carcinogenicity, although clinically successful.
Conclusion: Calcium silicate-based cements would represent promising agents for pulpotomy of primary molars; among them MTA seemed to be the gold standard material. However, further RCT studies with adequate sample size and long follow-up are needed to support these outcomes, since the high risk of bias and heterogeneity found in the included studies that could affect the interpretation of the reported results and make hard to draw consistent conclusions.

Foreign body reaction in oral cavity following a traumatic event in a pediatric patient: a case report

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Aim: Maxillofacial trauma is a significant cause of morbidity in the pediatric population. Its causes and its incidence vary widely as a result of social, cultural, and environmental factors. Children are uniquely susceptible to craniofacial trauma because of their greater cranial mass-to-body ratio. Accidental trauma, especially domestic accidents, represent the most frequent causes of maxillofacial injuries (40%). Others causes are car accidents and sports-related trauma. Skull vault fractures have been reported to be the most frequent in the young pediatric patient, whereas mandibular and midfacial fractures are predominantly seen in older children. Moreover, soft tissue injuries are more frequent than facial fractures and dentoalveolar trauma. Although the oral cavity represents only the 1% of the body surface, its involved in 5% of all accidents, up to 17% of cases in preschool children. Maxillofacial trauma can cause dentoalveolar injures, resulting in several aesthetic and functional alterations (e.g. dentoalveolar and / or dental fractures, colour alteration, dental mobility, tooth loss and pain). Moreover, in periodontal injured teeth, later complications (e.g pulp necrosis, pulp canal obliteration, root resorption and loss of marginal alveolar bone) are often seen. On pediatric age, the dynamism of developmental age determines a greater frequency of dental trauma, especially for the upper frontal teeth, essential for chewing, speech, aesthetics and relationship life. Therefore, a prompt diagnosis and treatment are required. We report a case of maxillofacial trauma in a pediatric patient, leading to oral soft tissue injures.
Methods: A 7-year-old girl was referred to the Department of Surgical Odontostomatology, Ancona General Hospital, complaining 3 months of hospitalization for soft tissue wound after an accidental trauma. Past medical history revealed the diagnosis of transposition of the great arteries.
Results: Parents describe an episode of accidental frontal fall, when their daughter was playing with a wooden broom. The broom handle pierced the labial vestibular mucosa, corresponding to the elements 6.3 and 6.4. Once dental and maxillofacial fractures were excluded, colleagues administered antibiotic and anti-inflammatory therapy. However, no improvements were seen and the wound continued to appear swollen and painful. The situation worsened up to the formation of a 1.5 cm granulomatous collection, protruding in the oral cavity aggravated by repeated abscesses despite the shifting of antibiotic therapy. Once sent to our Department, the cone beam computed tomography showed a no-definable slight radiopacity of the soft

tissues with well-define margins. We supposed the presence of foreign body, responsible of the chronic inflammatory state. It was considered appropriate to perform an exploratory flap under general anaesthesia considering the patient's age. After local anaesthesia with vasoconstrictor, the granulomatous collection was removed and the wound was medicated. Subsequently, a 0.8 cm foreign body in the deeper tissue layers was removed and a Vycril 3.0 suture was applied. One day after, the patient has been discharged. Currently, the follow-up showing an excellent healing.
Conclusion: Traumatic maxillofacial injuries are widespread in the pediatric population and are a serious dental public health problem among children. A prompt treatment constitutes an important strategy for promoting health that can significantly minimize the biological and social consequences. The pediatric dentistry can be decisive to establish a correct diagnosis and resolutive treatment in the shortest possible time.

Intravenous sedation in pediatric patients

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Aim: To provide high quality dental treatment to non-collaborative pediatric patients, pharmacological methods may be needed. The drug-techniques to induce a state of cooperation in an otherwise uncooperative conscious patient are commonly referred to as conscious sedation techniques. Monitored anesthesiologic assistance (MAC) is a specific form of treatment in which is provide a specific level of sedation / anesthesia. Intravenous sedation (IVS) is a drug-induced depression of consciousness during which patient can maintain the patency of the respiratory tract spontaneously. Therefore, respiratory and cardiocirculatory functions and protective airway reflexes are preserved. Intraoperative anesthesiologic assistance and an adequately equipped dental clinic (e.g monitor, defibrillator, ambu flask, gold-pharyngeal cannulae, laryngoscope etc.) are essential. Here we describe the protocol adopted by our Department of Surgical and Special Odontostomatology, Ancona.
Methods: IVS requires a preoperative visit for a detailed anamnestic collection and an objective examination as accurate as possible, through which the anesthetist and the dentist collaborate to frame the risk profile of each patient. Inclusion and exclusion criteria are identified to facilitate clinical practice. Patients ASA ≥ III and ASA I-II with concomitant cognitive and / or sensory deficits, recent severe allergic episode, alterations of coagulation, pathologies in the acute phase, anatomical anomalies predisposing to intubation difficulties, severe night apneas are MAC contraindications. The IVS is parenteral administered and its always combined with local anesthesia. Moreover, an oral premedication with benzodiazepines and paracetamol is always administered. Subsequently, the anesthesiologist provides to place the needle cannula and to administer the benzodiazepines. For very young patients, a parent is invited to lie down on the dental chair with his child. Sedation obtained, the dentist performs the local anesthesia of the affected anatomical quadrants. After the treatment, the patient is brought back to consciousness and usually discharged within 60 minutes. At the end of the dental procedure, postoperative anesthesiological management must guarantee the patient's cardiorespiratory stability until complete recovery from sedation in order to avoid delayed emergencies.
Results: In the three-year period 2016-2018, 140 children aged 4 to 15 were treated with this protocol at the Department of Surgical and Special Odontostomatology.
Conclusion: IVS has proven to be a very useful technique in a large number of dental treatments, which can be used in adequately equipped outpatient facilities.
From a psychological point of view, the patient does not undergo hospitalization trauma, is constantly accompanied by the presence of parents and the most common perioperative side effects such as nausea and vomiting are minimized. Moreover, the intravenous sedation can be a repeated even in the short term, if necessary. Other advantages are represented by rapid onset, repetitive administration, easy titration, and rapid recovery. However, some adverse events may occur, including deep sedation, hypoxia, cardiovascular depression, and venous irritation. Therefore, knowledge regarding the time, peak effect, and duration of action of each drug is essential. A dentist using conscious sedation should be able to manage deep sedation and its associated risks. Further, the dentist must attend to the patient until he meets the criteria for discharge and is discharged from the facility.

Direct pulp capping in primary teeth: a case report with 3-years follow up

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Aim: The aim of a direct pulp capping is to preserve the

vitality of the tooth in case of a deep carious lesion. In primary teeth, this kind of treatment is rarely used than in permanent teeth, since it is considered to be less successful than other treatment as pulpotomy or pulpectomy. Despite of this lower predictability, direct pulp capping in primary teeth should be investigated further, since it is a simple and fast treatment option. A lot of materials may be used as capping agent, mineral trioxide aggregate (MTA) shows the best outcomes in permanent teeth and has been suggested as a suitable material for pulpotomies in primary molars.
Methods: E.B was a 4 years old boy without any general disease reported. Following clinical and radiographical findings, he showed occlusal carious lesion interesting his first and second lower left primary molar (ICDAS 5). Interproximal lesions in the first lower left primary molar and lower left primary canine were recorded. Under local anaesthesia and rubber dam isolation, it was decided to restore these carious lesions. During these procedures the child felt asleep. Due to a sudden awakening, the child made an unexpected movement producing a limited pulp exposure in the first lower left primary molar. In order not to keep the child in dental unit for too long, it was decided to perform a direct pulp capping procedure. A moist cotton pellet (saline water) for 1 minute was kept on the pulp exposure; no bleeding was registered. The pulp was capped with MTA, covered with a light-curing glass ionomer cement. The restoration was then completed using a total etch three steps adhesive system, a layer of a flowable composite and a layer of a packable composite.
Result: Follow up at 6, 12, 18, 24, 30, 36 months revealed no clinical or radiographic pathological findings on the involved tooth. A dyschromia of the tooth was evident, probably due to chemical characteristics of MTA.
Conclusion: When an iatrogenic pulp exposure occurs without any uncontrolled bleeding, direct pulp capping could be considered as a "patient – oriented" clinical option due to the simplicity and the execution speed of the procedure. Due to the lack of a high quality evidence, further investigation is strongly recommended about the potential of MTA direct pulp capping in primary teeth in case of iatrogenic pulp exposure.

Behavioural analysis of autistic children undergoing dental treatment using a pedagogic approach

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Aim: Autism Spectrum Disorder (ASD) is characterized by deficit in social and communicative skills, such as the imitation aspect, the pragmatics of communication, but also by the presence of restricted, repetitive and stereotyped behaviour, interests, and activities. Providing proper oral treatment, to people with intellectual disabilities, requires a daily adaptation of the operator's competences. In these patients, anxiety towards the dental treatment often occurs; when dental environment and instruments are not familiar, they can represent a fearful stimulus bringing to uncooperative behaviour. In order to avoid it, it is necessary to use an educational sensory-based approach, flexible and customisable to each patient. Our goal is to demonstrate that through that, it is truly possible to obtain an objective evaluable improvement (through Frankl Scale) in the cooperation and behaviour of the autistic patient, getting to perform dental treatments on the dental chair without recurring to general anaesthesia.
Methods: Our study involved a group of autistic children of the Pediatric Dentistry Unit of Policlinico Umberto I Roma composed by 285 autistic children (214 males and 71 females), with their first access and following check-ups between June 2010 and November 2019. The inclusion criteria used for the trial were: diagnosis of autism, age between 2 and 18 years old, and given consent; patient not compliant with these criteria or affected by other systemic diseases known to influence the incidence of specific dental condition were excluded. Each patient received a complete oral and periodontal examination and a chart with anamnesis, behaviour evaluation was filled. The trial protocol used, consisted in a pedagogically specialized and prepared team and a non-verbal approach through Augmentative and Alternative Communication (AAC). The behaviour of each patient assessed by means of the Frankl scale (definitively negative [––], negative [–], positive [+] and definitively positive [++]) was recorded. A record was made during the first phase and another one was assessed during the last cycle of therapy performed, in order to evaluate the evolution of it.
Results: The percentage of patients with negative behaviour (--/-) considerably dropped from 64% to 11,58% comparing the first phase of approach and the last one performed; while the percentage of patients with positive behaviour, that was already quite good during the first phase (36%), remarkably rose to 66% with 10 of these patients with a [++] score. Another observation that has to be made is that, the 103 patients that showed a positive score [+] already in the first phase, maintained the score for the following phases, without any loss of collaboration.
Conclusion: The management of the paediatric patients affected by Autistic Spectrum Disorder, represents one of the most discussed and challenging problematics in dentistry. The results obtained by our team can outline

how the Alternative Augmentative Communication is effective and a pedagogic approach can be a revolutionary way in treating children affected by autism for minor dental treatments. In fact, the improvement of the conditions of trust, cooperation, compliance, and positive behaviour of these patients towards the dental environment and team, through the support of the families and a properly trained and synergic team was remarkable. One of the remarkable results of this trial is how the protocol approach has improved the evaluation of the behaviour on the Frankl scale, resulting in a better cooperation and relationship between the little patient and the operator.

Orthognathodontics

Nigth sleep apneas, dental and clinical aspects

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Aim: The Obstructive Sleep Apnea Syndrome (OSAS) is a social disease showed in 2-4% of adult population. Clinically, OSAS is defined by the occurrence of daytime sleepiness, loud snoring, witnessed breathing interruptions during the sleep. The diagnosis of OSAS in adults subject is confirmed by polysomnografy when the apnea/hypopnea index (AHI) exceeds the value of 5 events/hour. The apnea/hypopnea index (AHI) was defined as the total number of apnea-hypopnea events divided by the number of sleeping hours. According to the Adult Obstructive Sleep Apnea Task Force of the American Academy of Sleep Medicine define mild grade OSAS if 5<AHI<15, moderate if 15<AHI<30 and severe OSAS if AHI>30. The aim of this study is to group intraoral sign, literature recorded, that can be associated to clinic OSAS manifestation.
Methods: A sistematic review of articles was performed using different electronic databases (Pubmed, Ovid, Web of Science and Google Scholar). Search terms comprised ''OSAS'' ''ORAL INVESTIGATION''. The articles have been selected by title and abstract.It has been considered intraoral clinic signs of obstructive sleep apnea syndrome.
Results: It has been found 58 articles. Among this it has been selected five articles. Christian Guilleminault et al. in a retrospective study of 2016 refer that a short lingual frenulum left untreated at birth is associated with OSAS at later age. Also anatomical conditions have been associated to upper airway obstruction specially obesity and craniofacial abnormalities, such as retrognathia or micrognathia (Banno et al. 2007). Dental characteristics like protrusive upper incisors and facial morphology such as flat mandibular angles can occur obstructive sleep apnea (Zeliang Hao et al. 2015).Uvula and adenoids hypertrophy are correlated to OSAS for a reduction of pharyngeal cavity. The same alteration is caused by individual characteristic like palate collapse, macroglossia and genetic abnormalities (Balcerzac et al. 2005; Thulesius et al. 2004).
Conclusions: At the best of our knowledge the clinical signs that can diagnose the obstructive sleep apnea syndrome are: mandibular retrognathia, mandibular micrognathia, craniofacial dysmorphism, trasverse deficit of the upper jaw, short mandibular angle, short lingual frenum, macroglossia, reduction of the pharyngeal lumen due to genetic pathology, adenoid hypertrofy, lower velopendulus, enlarged uvula. The purpose of this study is to encourage clinical diagnosis of sleep disorder in order to help clinicians who deal of generic dentistry and to encourage the cooperation with specialist qualified (pulmologysts, otorhinolaryngoyatras, neurologists, cardiologists, dentists specialized in obstructive apneas).

Neurocentric ostepathic tests predictive to individual response in the treatment of the patient with maxillary canine included

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Aim: The upper maxillary canine is the most frequently included dental element after the third molar. The

collaboration between osteopathy and orthodontics is taking on an increasingly important value, it is however necessary to evaluate and validate the presence of statistically significant evidence that can justify the relationship between these two disciplines, in order to be able to consider osteopathy, in the future, as a tool to improve the concept of medical predictivity. Our study had the main purpose to elaborate a concept of medicine that was in the first instance predictive, then preventive and finally curative, differently from the past where it assumed a purely curative and preventive connotation leaving out the predictive aspect. To develop an osteopathic algorithm in order to classify the patients examined from a prognostic point of view, and compare the results with the orthodontic predictive parameters for canine disinclusion of the upper jaw already present in the literature. Correlate the rigidity of the lower and upper edge of the sickle with the inclusion site of the maxillary canine.

Methods: N=98 patients with an average age of 16 years have undergone an orthodontic study and a specific osteopathic evaluation. N=12 patients with at least one upper canine included were evaluated by osteopathic algorithm and specific osteopathic tests (sickle test) and for each of them the orthodontic predictive parameters were calculated (alpha angle-distance of "Ericson and Kurol" -sector overlapping of Baccetti). The collected data were examined with chi-square and McNemar statistical tests.

Results and conclusions: The osteopathic algorithm aims to highlight the patients' individual response capacity to the treatment by dividing them into Good, Marginal and Bad responders. The results obtained by comparing the orthodontic and osteopathic predictive values did not show statistically significant values. A statistical trend emerged (83.3%) of correlation between a distance d of less than 30 mm and Marginal Good Responder, (80%) of correlation between the rigid lower edge and the palatal seat of canine inclusion. A condition of rigidity affecting the lower edge of the sickle of the brain causes an excess pressure at the level of the cranial base, a reduced development in the antero-posterior direction of the skull with a greater possibility of having a maxillary canine included in the palatal site. The presence of the rigid lower edge of the sickle excludes upper rigidity and vice versa (p=0.001), a situation of concomitant rigidity of the upper edge and the lower edge of the sickle of the brain represents a dysfunction defined as Compression, a rare condition that can be consequent to trauma, to neurovegetative dysfunctions or present for genetic causes which was not found in our study. A larger sample will be the subject of further studies in order to obtain statistically inferential values and to validate the relationship of collaboration between osteopaths and orthodontists.

Orthodontic management of achondroplastic children

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Aim: Craniofacial features of achondroplasia include macrocephaly, prominent forehead, depressed nasal bridge, minor growth of the middle third of the skull with underdevelopment of the zygomatic arch, transverse palatal contraction, dysfunction of the otorhinolaryngological system and stenosis of the foramen magnum. Subjects with achondroplasia have anomalies of the foramen magnum which makes them more prone to spinal cord compression during uncontrolled movements of the neck. These features can lead to numerous complications, including hydrocephalus, apnea, airway obstruction, otitis media, sinusitis and dental malocclusion. To date, there is no specific therapy for oral cavity problems in patients with achondroplasia. Children with achondroplasia need orthognatodontic and dental therapy along their growth, and to be followed in specialized facilities by clinical geneticists and specialists who are familiar with the pathophysiology of the disease. Dentists and Orthodontists should be aware of and pay particular attention to the clinical features of achondroplasia and the systemic and dentofacial consequences that may result from this genetic disorder, such as the reduced growth of the middle third of the skull. The aim of this study was to evaluate ethiopathogenetic aspects and peculiarities and analysis of cranial facial growth in the child with achondroplasia; management, according to the guidelines, of children with achondroplasia by the Orthodontist and the Dentist; develop and promote specific orthognatodontic and research therapeutic solutions.

Methods: According to the "Clinical Recommendations in Odontostomatology", issued by the Ministry of Health during the year 2017, it is advisable that the first dental examination be performed around 18-24 months of age, regardless of the presence or absence of dental problems in a "child-friendly", non-anxious and calming operating environment. Dental hygiene education with appropriate preventive measures is fundamental and will have to be practiced by parental figures until the age of 3. After the child gradually acquires the skills to carry out these practices alone. We can start the orthodontic therapy after the age of 5 The main disorders that occur after the age of

6 consist in male eruption of the definitive elements both in shape and in numbers due to the peculiar morphological conformation of the skull.
Results: The children who are being treated in our selected group are having a good compliance with both oral and dental hygiene and orthodontic treatment.
Conclusions: Children with achondroplasia need orthognatodontic and dental therapy during their growth, and to be followed in specialized facilities by clinical geneticists and specialists who are familiar with the pathophysiology of the disease.

Direct vs indirect anchorage: effects of miniscrew implant on periodontal tissues

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Aim: Mini implants have become the most popular temporary skeletal anchorage devices used in orthodontics since the last decade. They can be screwed in such treatment-comfortable sites as alveolar process interdental spaces, althoug the risk of damaging surrounding structures is high in these locations. The aim is to demonstrate periodontal effects caused by the use of indirect and direct miniscrews implant.
Methods: The electronic databases Pubmed and Wiley Online Library were used to search original articles from 2015 to 2020. The keywords used for articles search were: "miniscrew", "anchorage", "direct", "indirect". All articles are in english language and the full version were reviewed.
Results: In literature appears that the loading of the compact bone in the proximity of the miniscrew was clearly greater with direct than it was with indirect anchorage. According to this theory Monga et al. prove that direct applied forces can cause high loads on peri implant bone, occasionaly leading to miniscrew loosening or even loss. MJ Ammoury in his article about the correction of distocclusions via direct anchorage and indirect anchorage demonstrates that in both distalization modalities, low or no significant correlations were found between stress values corresponding cortical bone thickness, whereas high significant correlations were observed at the first molar between stress amounts and cortical bone stiffness.Kaur's review of biomarkers in peri-miniscrew implant crevicular fluid (PMICF) highlights that the inflammation and remodeling associated with miniscrew implant insertion or loading are reflected through biomarkers in PMICF which is analogous to the gingival crevicular fluid: alterations in levels of IL-1β, IL-2, IL-6 and IL-8, TNFα and CS as well as RANK/OPG ratio was seen in PMICF on placement as well as on loading of miniscrew implant. Furthermore Chen's article concerning the citotoxicity of orthodontic temporary anchorage devices on human periodontal ligament proves that: both with direct anchorage and with indirect anchorage morphologically the cells in the TADs groups were similar to the cells in the negative control group. About possible damages caused by the use of miniscrew some papers reported root resorption, loss of pulp vitality, and perforation of the sinus membrane as possible complications after moving molars through a lowered maxillary sinus. However, it is well known that orthodontic tooth movement may also cause bone apposition at border structures, such as the sinus floor, as was demonstrated by Oh et al. in a nonhuman animal experiment it was shown that the sinus wall may maintain a consistent thickness.
Conclusions: Our review allows us to conclude that there are similar biological effects in direct and indirect anchorage. Indirect miniscrew anchorage is a reliable possibility to reduce the peri-implant loading of the bone and to reduce the risk of losing the miniscrew. Nevertheless in a study the anchorage loss values with indirect anchorage are nearly equivalent to those of direct anchorage. Regarding the bone the results suggested that variations in cortical bone stiffness represent the primary influence on tooth movement but generic preferences for direct or indirect distalization are not appropriate, because local morphologic individual characteristics may dictate one or the other in personalized treatment. Cytokines and RANK/OPG ratio showed alteration in PMICF levels upon loading of miniscrew implant as direct or indirect anchorage. Neither of them exhibited significant cytotoxicity, suggesting their safe clinical applications. The presence of biomarkers provides substantiation of bone and tissue remodeling process around miniscrew implant.

A multidisciplinary approach of the fusion between a maxillary lateral incisor and a supernumerary tooth: a case report

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Aim: Tooth fusion is defined as a union between the dentine and/or enamel of two or more separate developing teeth. Fused teeth are more common in primary dentition than in permanent dentition and the etiology is still unknown. These fused teeth can cause various problems, such as caries, periodontal disease, abnormal eruption, impaction, ectopic eruption, and esthetic problems, especially in anterior regions. From literature treatment options include extraction, separation of the two elements, the section of the fused element and the extraction of a part of it, and the reduction of the crown. For the decision of the most adequate treatment, an endodontic evaluation is fundamental, which allows, through a CBCT, to visualize possible pulp connections between the two elements and the presence of two separate channels or not. In this case report, the first evaluation suggests the presence of a unilateral fusion between the maxillary right lateral incisor and a supernumerary tooth in a 13 years old patient, associated with the canine ectopic eruption.
Methods: A 13 years old patient was evaluated at the Padua University Hospital Dental Clinic for an orthodontic evaluation. From the evaluation of the case, it turned out that the patient has an important crowding in the maxillary arch, a second class profile and an Angle first molar class and a second canine class. The crowding in the upper arch was caused by the presence of a fusion between the maxillary right lateral incisor and a supernumerary tooth associated with the canine ectopic eruption. The patient was evaluated with the use of CBCT that has defined a clear separation between the pulp chamber of the lateral incisor and supernumerary tooth and a fusion process involving only dentin. After this radiographic evaluation, the supernumerary tooth was surgically separated from the lateral incisor and extracted. Two months after surgery, orthodontic therapy was started in order to recover the ectopic canine.
Results: Vitality test was executed 3 months after surgical intervention with a positive result. The vitality of the tooth has been continuously monitored during orthodontic therapy. Intraoral radiography of the element was executed 6 months and one year after separation and extraction for evaluating the periodontal situation from which a vertical bone defect can be found in the distal part of the root of the element. The periodontal probing of the element performed after one year was found 5,5 mm distal and 3,5 mesial. From an orthodontic point of view, the ectopic canine was recovered with the resolution of the crowding of the upper arch.
Conclusion: Many different multidisciplinary approaches for the treatment of fused teeth have been required because of the consideration of the esthetic, orthodontic, periodontal and endodontic problems.

Orthodontic treatment in a patient with cleidocranial dysostosis: a case report

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Aim: Cleidocranial dysostosis (or dysplasia) is a genetic syndrome with autosomal dominant transmission, mainly characterized by alterations in the development of the skull including the delay in the welding of the cranial vault sutures and the absence or hypoplasia of the clavicles. The dentist is very important in the diagnosis of the syndrome as in some patients the disease mainly manifests itself at the craniofacial level. The most frequent dento-maxillofacial features are maxilla hypoplasia, retrognathia, delayed dental eruption, presence of supernumerary teeth, narrow palate. This poster aims to emphasize the importance of the dentist in the dysplasia diagnosis and to describe the possible orthodontic implications in a patient affected by cleidocranial dysostosis.
Methods: At the beginning of the treatment the patient, a 10 years old girl, presents: narrow palate with absence of posterior crossbite, delay in second dentition/tooth exchange (only the lower central incisors and the first molars of the permanent series are present) and the presence of three supernumerary in 1.2, 3.2, 4.2 area. The patient's anamnesis is negative. However, her father and sister also share the same oral anomalies. Based on the dento-maxillo-facial characteristics and the hereditary character of the alterations, we suspect the patient is affected by cleidocranial dysostosis and send the patient to a genetist to find out the real diagnosis. The cleido-cranial dysostosis is confirmed. First of all, she undergoes the extraction of the three supernumeraries. The first phase of orthodontic treatment involves the expansion of the palate by a rapid palatal expander (2 turns per day for a week) and the use an inferior Schwartz appliance with a central screw. At the age of 13, a second expansion of the maxilla is performed by a rapid maxillary expander and and a lingual arch is placed in the lower arch. In the same year, due to

the tipical delay of the second dentition, we proceed with the e+xtraction of the deciduous elements still present (5.2, 5.3, 6.3, 6.4, 7.3, 7.4, 7.5, 8.3, 8.4, 8.5). The extraction of the deciduous elements does not help the spontaneous eruption of the permanent teeth, therefore we decide to proceed with a surgical-orthodontic treatment. After placing braces according to the MBT prescription, the recovery of elements 1.2, 2.2, 2.4, 2.5, 3.2, 4.3, 4.4 is carried out by surgical exposure of the crown, application of orthodontic buttons and traction with inter-arch vertical elastics. After two years a second surgery was performed to recover the 1.3, 2.3, 3.3 using a transpalatal arch with pins (together with the braces) after the application of orthodontic buttons. In order to improve the molar class we use a mixed anchorage device (teeth and palate, a Pendulum like appliance), for the distalization of element 2.6 together with Class II elastics. The discrepancy between the upper and lower midlines has also been corrected.

Results: The combined orthodontic-surgical treatment has allowed the recovery of the included teeth with the restoration of good function and aesthetics.

Conclusions: The dentist has a crucial role in the diagnosis of cleidocranial dysostosis: through a detailed study of dento-maxillo-facial alterations it is possible to suspect the syndrome. As the literature reports, the most common intraoral anomalies that characterize patients affected by cleidocranial dysostosis are: presence of supernumeraries, delay in second dentition/tooth exchange, maxillary hypoplasia. Therefore, the treatment of these patients often requires a multidisciplinary surgical and orthodontic approach.

Basal and dental Class II with an increased overjet, associated with oral habits treated with functional bites PFB and PCFM: a case report

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Aim: This work reports a case of basal and dental Class II deep bite, associated with increased overjet, atypical deglutition, thumb sucking, lower lip interposition, treated first with functional bites PFB, secondly with PCFM of the Dental School of Turin. Several types of functional appliances, currently used for Class II treatment, attempt to improve dental and skeletal imbalances and soft-tissue harmony. In particular, their expected effects include an enhancement of the mandibular growth, an improvement of jaw's antero-posterior position, aiming to favor dental changes and soft tissue modifications. The PFB appliance is made up of a palatal button (with 2 mm of distance from the palate tissue), two metallic posterior bites (inclined to facilitate the sliding of the jaw forward), expansion coils, vestibular shields, and as accessories for Class II there are an upper vestibular arch and a lower lip bumper, that increases stimulation of the growth of the horizontal branch of the mandible. While the PCFM appliance consists in addition of metallic anterior bite to correct the deep bite.

Methods: The patient was an 8,4 years old female with mixed dentition. The following essential clinical data was collected: medical and dental history, clinical investigation, model casts, OPT, L-L and P-A teleradiography and subsequently cephalometric analysis, intra- and extraoral photos. The measurements of the cephalometric studies revealed the patient as hyperdivergent according to Cervera, with a dental and basal Class II (A:Po=9 mm). The patient was initially treated with Function Generating Bite (PFB). After 1 year of functional therapy, the tongue and lip's interference were no longer present, and the previous functional appliance was modified in a PCFM. This therapy adjustment was determined because of the permanence of the tendency to dental deep bite. The patient has been under treatment with PCFM for 6 months now and her therapy is not finished yet.

Results: After 1 year of functional therapy, Class II seems to be almost corrected. The mandible is positioned forward and we can observe a transversal increase of the jaw's diameter. Moreover, the patient has solved the problem of atypical deglutition attending myofunctional rehabilitation and the noxious oral habits, initially diagnosed, have been quit. The patient will continue to be properly monitored since stomatognathic system is still growing and the occlusion is not completely harmonious yet.

Conclusions: We must underline the importance of patient's compliance to achieve the success of myofunctional therapy, as well as the significance of the stop of noxious habits. The PFB and the PCFM (School of Turin), as we observed in this case, can cause a functional correction of malocclusion characterized by basal and dental Class II with an increased overjet, associated with bad oral habits and atypical deglutition, stimulating the mandibular advancement.

Orthodontic pain and jaw muscle activity during clear aligner therapy: results from a multi-centric study

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Aim: Patients undergoing Clear Aligners Therapy (CAT) may experience mild to moderate tooth pain and jaw muscles discomfort, often associated with wear on their aligners. The aim of this multi-centric study is to analyze tooth pain and masticatory muscles tenderness in patients undergoing CAT with Invisalign® and to measure its effects on the electromyographic activity (EMG) of the masseter muscle, to evaluate whether this type of therapy causes the onset of temporomandibular disorders (DTM).
Methods: Twenty-seven healthy patients undergoing treatment with Invisalign® were recruited from three universities: University of Torino, University of Western Ontario, and University of Toronto. Patients underwent DTM screening and filled out questionnaires about psychological traits, anxiety and stress. Pressure Pain Theresholds (PPT) were mesured before and after the research period using pressure algometer to assess somatosensory changes in trigeminal and extra-trigeminal locations. Tooth pain and muscle tenderness were reported by patients on Visual Analog Scales (VAS) each day over four weeks period: in the first week patients did not wear the aligners (baseline), in the second week patients wear dummy aligners without orthodontic moovements, in the third and fourth weeks patients wear active aligners impressing orthodontic forces. In the second part of the research were recruited twenty-four patients undergoing treatment with Invisalign®. The electromiographiyc activity of the right masseter muscle was recorded three days a week over four weeks period, with the same cadence of aligners as in the previous group.
Results: Every aligners resulted in a tooth pain increase, which was greater with the passive aligner than with the two active aligners ($p<0.001$). Mild jaw muscle tenderness was reported in both active and passive aligners ($p<0.001$). Stress variations during research period reported on VAS and anxiety were found to be related with the perception of jaw muscle tenderness. No significant differences were found with PPT measurements ($p>0.05$). CAT resulted in a significant increase of masseter muscle activity ($p<0.001$): the increase starts with the passive aligner, remains still with the first active aligner and decrease with the second active aligner.
Conclusions: In the short term, Clear Aligner Therapy produces mild tooth pain and masticatory muscles tenderness, while it does not result in any significant somatosensory changes. CAT produces a significant increase in masticatory muscle activity, which decreases over the first weeks of therapy. CAT does not cause onset of DTM or bruxism.

Anterior and bilateral posterior cross bite being treated with pfb: a case report

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Aim: Cross bite is a form of malocclusion which occurs when there is a transverse misalignment of the dental arches in one or more sites of the same. It can be caused by: a minus of the maxilla growth or by a plus growth mandibular; or also caused by a functional precontacts. Clinically this kind of malocclusion has a contracted palatine vault, hypertonicity of masseters and upper labial muscles, alteration of tongue posture and alteration of masticatory cycles. It could be anterior, posterior monolateral or bilateral (or generalized typical in III skeletal Class) and even only on a single tooth. The treatment has to restore miofunctional balance and dental alignment; this goal could be achieved choosing the correct orthodontic devices , according to malocclusion's features and also evaluating patient's age. This is a presentation about a case of anterior and bilateral posterior cross bite, treated with functional appliance PFB (School of Turin).

Methods: A 9,2 years old female patient, in mixed dentition, was chosen. We collected the essential clinical data: medical and dental history, clinical investigation, model casts, OPT, L-L and P-A teleradiography and subsequent cephalometric analysis, taken intra- and extraoral photos. A diagnostic evaluation was made based on all these clinical data. The patient is hyperdivergent (SpP^GoGn=28,1°), basal Class III (ANB =-2,7°). Was suspected maxillary first molars agenesis, so dental Class wasn't evaluable.We decided that patient will be treated with functional appliance PFB of III Class (School of Turin). This device is composed by following elements: lower vestibular arch of Class III which can be activated to contain the jaw, posterior bite for disclosure, superior lip bumper with two synthetic resin protections to oppose hypertonicity of orbicularis upper lip, "M" springs to stimulate premaxilla's growth, "E" springs for expansion of posterior area. This appliance has to be worn all day and all night, and it has to be removed during meals time. We explained to our patient how to speak wearing PFB. We managed one appointment per month to supervise and activate the springs, and to motivate the patient.
Results: After only 6 months of functional therapy with PFB Class III, we have obtained a significant increase of transverse diameter on maxillary arch. We have had the anterior cross bite's correction, and we have obtained a real improvement of the bilateral posterior cross bite but not complete resolution.
Conclusions: In 6 months functional therapy with PFB Class III, works on anterior cross bite, but the treatment still has to be continued. In this way we can achieve quickly the reinstatement of a correct relationship between maxillary and mandibular arches, stabilise the correction in the anterior zone and complete correction of bilateral posterior cross bite. To reach these purposes it is strictly necessary patient's collaboration.

Anterior open bite associated with atypical deglutition treated with function generating bite: a case report

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Aim: The open-bite can be defined as a vertical incompetence of the arches determined by a dental and/or skeletal malocclusion that does not allow the occlusion of some dental elements with their antagonists. It could be limited to its dento-alveolar component, or it can be referred to skeletal dysplasia. Clinically we can often see a combination of two features. Characteristics of individuals with an anterior open bite may be one or more of the following: increased gonian angle, flat mandibular and occlusal angle, small mandible, increased anterior lower facial height, decreased anterior upper facial height, retruded mandible, decreased and increased anterior facial height, Class II tendency, divergent cephalometric planes, steep anterior skull base and labial incompetence. One of the most important factors that causes this problem is certainly the habit of sucking (finger, lower lip, pacifier) or the lingual interposition during an atypical deglutition, that preventing the normal growth of premaxilla downward and thus producing an open bite. This is a presentation about a case of anterior open bite associated with atypical deglutition treated with Function Generating Bite of the Dental School, University of Turin.
Methods: The patient was a 7,3 years old female with mixed dentition. The following essential clinical data were collected: medical and dental history, clinical investigation, model casts, OPT, L-L and P-A teleradiography and subsequent cephalometric analysis, intra- and extraoral photos. At the cephalometric measurements, the patient resulted mesodivergent (SpP^GoGn=22,7°) with a dental and basal Class I (ANB=0.9°). The patient presented atypical deglutition.Unfortunately because of a lack of compliance, she did not practice myofunctional therapy with Speech Therapist. The functional orthodontic treatment used in this case report was a Function Generating Bite. This device is PFB for open bite, it is composed by a posterior bite for disclosure, a lingual crib to stop tongue and a vestibular upper arch. We schedule an appointment per month to activate the appliance and to support the patient to wear the device all day and all night. She has to remove it only during meal time.
Results: After 1 year of functional therapy with PFB, it was possible clinically observe a correction of the anterior open bite and the reshaping of the dental arches with eruption of permanent teeth in the proper locations.
Conclusions: Function Generating Bite (School of Turin) allowed in a short period of time, a clinical correction of anterior open bite, despite the association with atypical deglutition. However, the missing myofunctional therapy could affect the stability of

these clinical results over time, and causing relapse. That could happen because of the lingual defect: since this problem was not corrected, but only interrupted by the crib of PFB, this event could recur and nullify the functional therapy. Thus, follow up is strictly recommended and in that case, it has to be handled the recurrent rapidly.

Dental and skeletal features in patients with Williams-Beuren syndrome

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Aim: The aims of this study is to carry out a descriptive analysis of dental anomalies by use orthopantomography and clinical analysis and analysed skeletal features of WBS through a comparison between atlas cephalometric variables and Williams-Beuren Syndrme (WBS) patients cephalometric variables.
Methods: A group of 23 patients with WBS (aged 6 to 12), after prior informed consent, was selected for a prospective study at Special Needs Dentistry Unit of the Meyer Hospital (Florence). Each patient underwent follow-up every 6 months, prevention programme, motivation of oral domiciliary hygiene and dental treatments. Each patient, before starting treatments, had to carry out orthopantomography (OPT) and latero-lateral teleradiography (L-L TeleRx), but only 18 had managed to perform an OPT and 15 a L-L TeleRx. On the 18 patients who effected OPT, we calculated the prevalence of dental anomalies. On the group of 15 patients who effected L-L TeleRx we could do a cephalometric analysis by means of an in office computerized cephalometric analysis programme (Viewbox, version 3.0, dHAL Software, Kifissia, Greece). The statistical differences between the means of WBS variables and atlas variables were compared using Student's t-test for independent data. The level of statistical significance chosen was: $p<0.05$. Each values were preliminarily analysed with Kolmogorov-Smirnov test and all of statistic data were done with a specific software (SPSS ver.12, SPSS Inc. Chicago, Illinois, USA).
Results: In our descriptive analysis we've found that 52% of patients with WBS had a decay tooth in primary dentitions and/or in permanent dentitions; 39% had dental agenesia; 17% had crown volume anomalies; 13% had an abnormal tooth morphology called peg-shaped incisors; 13% had anomalies of reabsorption of dental root; 9% presented conoid incisors and, finally, anyone had molar taurodontism. From the cephalometric analysis results emerged that 60% presented with Angle's Class I of occlusion, 33% presented with skeletal Class II of occlusion due to upper basal protrusion and 7% presented with skeletal Class III of occlusion due to lower basal protrusion. Into 47% WBS patients were normodivergent and 53% were hyperdivergent.
Conclusions: The results of descriptive analysis emerged in our study were in agreement with those of international literature. The increased prevalence of carious pathology activity showed the importance of prevention in patients who demonstrate an as well as a deficit of collaboration for a variable mental retardation. The finding of an increased incidence of dental anomalies is important for an early diagnosis and interceptive therapy in WBS patients. Our study showed that facial dysmorphism, a fundamental diagnostic finding in WBS, could depend on peculiar craniofacial skeletal features, such as basal bi-protrusion and hyperdivergence. A higher incidence of upper basal protrusion could reflect the increase in the incidence of flawed habits and parafunctions in the patient with WBS as described in the literature.

Dental panoramic radiographs for the localization of impacted maxillary canines

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Aim: The purpose of this study is to identify a reliable protocol for the early diagnosis of the ectopic maxillary canines, using several parameters measurement: age, gender, alpha angle, sector and distance of the tooth from the occlusal plane. This method can help clinicians with the diagnosis and the inclusion prevision of the maxillary canine.
Methods: A sample of 50 people, 40% men and 60% women, has been selected among the patients of the Orthodontic Department of UOC Odontostomatology and Maxillo Facial Surgery, Fondazione IRCCSS Ca' Granda Ospedale Maggiore Policlinico, University of Milan. All the patients selected were in mixed dentition and with no syndrome. No patient had had a previous orthodontic treatment. All the patients underwent to two orthopantomography. The first radiographic exam has been taken when patients were between the ages of 6 and 12 years old. The second radiographic exam, taken as control parameter, had been done in the aged between 12 and 25 years old. The first radiographic exam analyzed several factors as the measurement of the alpha angle, the sector of

the tooth and the canine distance from the occlusal plane. The alpha angle is consisted by the long axis of the canine and by the midline of the upper incisors; the sector of the tooth describes the position of the canine, on the basis of its cusp; 5 sectors were marked. The second exam evaluated the inclusion of the canine or its spontaneous eruption.

Results: The alpha angle and the sector of the canine proved to be significant parameters. The second one has a value more prognostic than diagnostic. The gender turns out to be a parameter with no significance. The value of the distance of the canine from the occlusal plane has less significance than the measures of the alpha angle and the sector of the canine. Anyway, the distance from the occlusal plane is significant enough in the prevision of eruption of the upper canine.

Conclusions: The orthopantomography performed at the age of 9 years old, proved to be very useful exam for the diagnosis of the inclusion of the upper canine. The early diagnosis gives a better odd in the treatment of the impacted canine. The simultaneously evaluation of all parameters, that we can obtain from the orthopantomography, proved to be of great aid for the clinician.

Case report of impacted post-traumatic maxillary central incisor

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Aim: The aim of this paper is to provide clinicians useful information for the management of impacted central incisor due to early childhood trauma.

Methods: It was submitted a case of right maxillary central incisor impacted in an 8-years-old male patient who had an intrusive luxation trauma of primary tooth at the age of 4. Treatment plan of an impacted maxillary incisor needs a multidisciplinary approach; after a close radiographic examination, orthodontic, surgical, endodontic and periodontal considerations are essential for successful treatment. The surgical-orthodontic approach was chosen in order to relocate the impacted element in proper alignment and to create a complete anterior dentition and a functional occlusion, useful both to mastication, phonetic and esthetic. Therapy has been performed with the self-ligating appliance system. Quad helix appliance was applied to the upper arch as anchorage and in order to create arch expansion to regain the lost anterior space. Teeth from primary right canine to the left were bonded with Unitek 3M Smart Clip and hired using a 0.016" nickel-titanium wire for the initial alignment. An open coil spring was placed between the right lateral incisor and the left central incisor to create the correct space to receive the right central incisor. Surgical procedure was programmed to bond the impacted tooth incisor with a button linked to a metal chain. The metal chain was link to the archwire and gradually activated as long as the tooth erupts, to reposition the bracket since the initial bonding during the surgical procedure was less than ideal. When possible, a 0.012" NiTi wire hired directly every bracket, thanks to the self-ligating appliance system. Final root positioning was obtained like a non-impacted treatment.

Results: Through a multidisciplinary approach it was possible to move the impacted incisor in occlusal plane, respecting periodontal tissues and tooth endodontic vitality.

Conclusions: Traumatic dental injury in primary dentition can lead to problems even in permanent dentition, especially when an intrusive luxation comes. The close relationship between the apexes of the primary teeth and the developing permanent successor in turn can lead to multiple complications, which are greater when the permanent tooth is affected in the early stages of development. When a permanent tooth is impacted, the multidisciplinary approach of surgery and orthodontic treatment is the best way to lead suitable outcome in terms of periodontal frame, occlusal plane and esthetic.

Severe obstructive sleep apnea treated with mandibular advancement device: a case report

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Aim: The aim of this research is to report a successful therapy in 55 years old patient with severe OSAS using the mandibular advancement device (MAD), whom has already been treated with a occlusal splint and he wore removable dental prostethics for the upper and lower dental arch.

Methods: A 55 years old male patient was referred to the Orthodontic Department of UOC Odontostomatology and Maxillo Facial Surgery, Fondazione IRCCSS Ca' Granda Ospedale Maggiore Policlinico, University of Milan. His complaints were bad sleep, daily weakness

and he required a new rehabilitation of his dental arches partially edentulous, in order to replace his old partially removable prosthetics with a fixed solution.
Anamnesis was negative for OSA risk factors as cardiovascular diseases or diabetes. His BMI was 25.2, which indicated mild overweight (high 168 cm, weight 71 kg). The patient reported that he developed the symptoms since 2016; his general dentist suggested him to have a polysomnography (PSG) in order to investigate the problem. The first PSG performed at Gaetano Pini Hospital, Milan on 14th December 2016 and showed an AHI index of 46,6 events/h (apnea index=24,1; hypopnea index=22,5; longest apnea=54,7 s). He was treated with an unspecified occlusal splint but when he underwent to the second PSG exam (27th February 2018), the results were the same/slightly worsts than the first PSG and showed an AHI index of 36,8 events/h (apnea index=36,8; hypopnea index=0,0; longest apnea 81,4 s). After the second exam he was referred to the Orthodontic Department of UOC Odontostomatology and Maxillo Facial Surgery, Fondazione IRCCSS Ca' Granda Ospedale Maggiore Policlinico, University of Milan. The only request of the patient was to avoid the CPAP device, which has already proposed to him. For this reason, it was decided, by mutual agreement with the patient, to start a therapy with the mandibular advancement device (MAD), postponing the prosthetic rehabilitative treatment. The MAD therapy started in June 2019 and the patient underwent to his third polysomnography on 24th, July 2019.
Results: The first PSG showed an AHI index of 46,6 events/h (apnea index=24,1; hypopnea index=22,5; longest apnea=54,7 s). The mean of SpO2 was 93,1%, the minimum of SpO2 was 68,0%, and the percentage of time below 90% was 8,9%. The clear diagnosis was severe sleep apnea. The second PSG showed an AHI index of 36,8 events/h (apnea index=36,8; hypopnea index=0,0; longest apnea 81,4 s). The mean of SpO2 was 91,9%, the minimum of SpO2 was 70,0%, and the percentage of time below 90% was not registered because of the lack of connection with the oxygen saturimetry device for the most part of the exam. The diagnosis remained however severe OSAS with high number of obstructive apneas. The third PSG showed an AHI index of 1,8 events/h (apnea index=1,8; hypopnea index=0,0; longest apnea=23 s) which meant no sleep apnea. The patient reported the significant improvement of his sleep and of his performances during the day.
Conclusions: This case report shows that clinicians can assist patients with severe OSAS with relatively minimally invasive device. Even patients with dental arches partially edentulous and prosthetics can benefit from treatment with MAD.

Alt-RAMEC protocol associated to facemask in a skeletal Class III malocclusion: a case report with two years follow-up

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Aim: The alt-RAMEC protocol (Alternate Rapid Maxilary Expansion and Costriction, Liou and Tsal, 2005) allows to treat the skeletal Class III malocclusion by orthopedic therapy and maxillary advancement, above the age limit of classical treatment (RPE and traction with Delaire facemask). The aim of this poster is to show the effectiveness of the modified alt-RAMEC protocol, in association with Delaire's face mask (FM).
Methods: A 10-years old female patient, in good systemic conditions, showed at the beginning of the treatment a skeletal Class III malocclusion and a maxillary hypoplasia; the patient's father was also characterized by Class III malocclusion and he had undergone orthognathic surgery. The accomplished treatment, according to the alt-RAMEC protocol, included a first phase with a double hinged palatal expander characterized by: four bands on the first permanent molars and on the first permanent premolars, vestibular hooks extended to the canines, palatal arms rounded at the lateral incisors and at the central ones. The device was activated four times a day for seven weeks. The activations were performed alternating between one week in expansion and the following week in constriction. A lingual arch, with bands on the sixths and vestibular hooks up to the canines, was used to allow the use of intraoral elastics.The second phase of the treatment was carried out according to the method proposed by Yen in 2011, where orthopedic traction is accomplished by means of Class III elastics during day-time and with Delaire's FM during night-time, generating a force of 400g for each side (the original Liou protocol instead provides for the use of intraoral maxillary protraction springs). The orthopedic traction period according to Yen is longer than three months and three weeks as Liou reported and it is between 9 and 15 months. The actual period is decided for each case by clinically observing the changes in hard and soft tissue; in this particular situation it was 12 months in total. The longer duration of this protocol, compared to the one reported by Liou, can be attributed to the different type of applied traction: the action of the intraoral springs does not depend on patient compliance, whereas intraoral elastics and face mask do.

Results: At the end of the treatment, lasted 15 months, the patient was 11 years old. The results obtained from the application of the modified alt-RAMEC protocol were: maxillary protraction, increase in overjet, spontaneous closure of the interincisor diastema, improvement of the soft tissues with good aesthetics of the patient's profile.Now, after two years of follow-up the clinical situation remained stable.
Conclusions: This case shows the effectiveness of the modified alt-RAMEC protocol associated with face mask. The results obtained on the patient with skeletal III Class malocclusion are clinically good, as reported in the literature.

Multidisciplinary treatment of a patient with agenesis in the aesthetic zone

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Aim: The agenesis of a lateral incisor is very common in the 2% of the global population. The presence of this anomaly implies an important functional and aesthetic problem. The aim of this work is to highlight the importance of a correct multidisciplinary approach to solve the complex clinical case of a growing subject with an agenesis in the anterior sector.
Methods: An 8-year-old patient with insufficient transverse maxillary development, anterior open bite, agenesis of the maxillary left permanent lateral incisor and conoid maxillary right lateral incisor presented to our observation. Orthopantomography and latero-lateral projection teleradiography of the skull were required. The patient was followed and treated over the period 2004-2019, in the Department of Orthodontics, Institute for Care and Scientific Research Galeazzi, University of Milan. The treatment was started at an early age to solve the skeletal transverse problem using a Hyrax rapid palatal expander, obtaining the expansion of the upper arch and an improvement of the respiratory function. During the adolescent period of development, after the loss of the maxillary left deciduous lateral incisor, a provisional Maryland Bridge was applied and the conoid incisor was increased by direct reconstruction with composite resin to meet the patient's aesthetic and functional needs. The end of growth was established comparing two teleradiographs of the skull performed 12 months apart. At 21 years of age, it was possible to proceed with the definitive implant-prosthetic rehabilitation to replace the missing element. In order to obtain an optimal rehabilitation, the orthodontic preparation of arches using invisible aligners was necessary to improve teeth alignment and torque of upper incisors. Because of the limited space available a small-diameter implant was used. The result obtained was refined with invisible aligners.
Results: In the event of agenesis of a lateral incisor there are two different approaches: closure of the space and opening of the space. The use of a small-diameter implant allows benefits for both the orthodontist and the surgeon as it requires less mesiodistal space for its placement than traditional implants with a diameter of 3 mm. In the case of the patient treated by us, it was decided to maintain the edentulous space to replace the missing tooth with the implant-prosthetic rehabilitation in adulthood and, due to the small bone space, we chose to use a small-diameter implant. Therefore, the orthodontist played a key role in the initial phase of treatment for the resolution of skeletal problems, in the intermediate phase for the management of the space in the arch needed for the placement of the implant and in the final phase for the refinement of the result obtained.
Conclusions: In the diagnostic and therapeutic assessment of a complex clinical case, a close collaboration between orthodontist, implantologist and prosthetist is essential in all phases of planning and carrying out the treatment. This multidisciplinary approach allows us to respond comprehensively to the patient's functional and aesthetic needs throughout its growth path with the achievement of a satisfactory and stable result over time.

Evaluation of the cervical vertebral maturation method: comparison between visual and objective staging system

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Aim: While there is an abundant literature about the cervical vertebral maturation method through visual staging method, for the objective method it's not so. A comparison was therefore carried out to highlight if there is a good agreement between the two methods, in order to understand whether or not they can be interchangeable.
Methods: The examined sample for the study was obtained by selecting subjects from Fels, Iowa, Mathews, Oregon Growth Studies (from American Association of Orthodontists Foundation (AAOF) Craniofacial Growth Legacy Collection, www.aaoflegacycollection.org) and from Denver and Michigan Growth Study complete collections (after

having removed the 30 subjects that were used in the previous study by Baccetti et al, 2005). From a parent sample of 1151 subjects, we included in our study only 50 subjects (29 females and 21 males), after that inclusion and exclusion criteria were applied. Every subject was followed from 7/9 years to 16/20 years, each one with a series of at least 6 consecutives lateral cephalograms taken annually, with an interval between two consecutive radiographs between 6 and 18 months. Exclusion criteria were: low quality of the radiographs, lack of one or more radiographs in the observation period, impossibility of visualizing C4, failure to reach CS 5 in the last radiographs, anomalies in vertebral morphology, and evident orthodontic treatment (with the exception of space maintainers). All radiographs were staged with visual method by Baccetti et al. (2005) and with the objective one proposed by Perinetti et al. (2017). In the visual method, the intermediate or in-between stages (when the characteristics of two consecutive stages were present in a single image) were included in the more immature stage, e.g. the intermediate CS 3-4 was classified as CS 3.

Results: The intra-operator reproducibility was almost perfect (ICC=0.87); the agreement percentage between the results obtained by visual method and the objective one was 68.3% and the weighted kappa value was 0.9359, that showed an almost perfect concordance between the two assessments. Standard error was 0.00763, with a 95% confidence interval between 0.92094 and 0.95085. Excluded cases from this study were 137 (30%): from a total of 456 cases 319 were used for the comparison.

Conclusions: The two vertebral staging method showed an almost perfect agreement. However, the objective method should be re-formulated, taking into account all the possible combinations in order to reduce the number of cases that so far are not classifiable.

The marpe technique miniscrew-assisted rapid palatal expansion: a case report

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Aim: The MARPE technique exploits a particular orthodontic rapid palatal expander supported by miniscrews inserted in the palate basal bone. This technique is used for expanding the palate basal bone and the superior maxillary bone, in young adults, without surgical intervention and without having negative effects to the dento-alveolar area. The aim of this report is to describe one of the techniques available for the rapid palatal expansion in adult patients.

Methods: The 14-years old male patient came to the observation with a diminished trasverse diameter of the maxillary bone with bilateral cross-bite. Furthermore, the inclusion of the tooth 2.3 was observed. He had also tooth development anomalies, that consist in fusion of the teeth 1.7 and 1.8. After having collected the impressions and the needed x-rays, the treatment decided was to use a Marpe to expande and create more space for 2.3. The treatment involves the application of a rapid palatal expander supported by miniscrews and combined with monolateral distal sliders. MARPE appliance was secured to the palatal bone with 2 microimplants of 8 mm in length. They were positioned a centimeter behind the incisal teeth near the midline. Initially, the appliance was activated for 1 turn per day for 5 days and then for 2 turns per day. The appliance was activated for a total of 42 turns (screw's length: 10mm).

Results: When we reached the correct expansion, the upper and middle third craniofacial structures, including maxillary basal bone, were noticeably widened. A clear diastema opened between the upper central incisors. The anchorage to the palatal bone by miniscrews has allowed the correction of maxillary bone trasverse diameter without negative effects to dento-alveolar area. The expansion resulted in a total correction of the bilateral cross-bite.

Conclusions: This report demonstrates the effectiveness of the MARPE technique. It shows that the application of MARPE appliance can achieve successful transverse expansion of the diameter of maxillary bone and the surrounding craniofacial structures in patients with skeletal-grow advanced state. The MARPE technique, like the conventional rapid palate expansion treatment, has effect on the midpalatal suture. The bone anchorage given by the mini-implants allows a skeletal expansion of the maxillary bone and prevents side effect occurring to the dento-alveolar area. The use of this technique on this type of patients will allow you to have the same results as the traditional palatal expansion.

Mesiodistal crown dimension and tooth size discrepancy of the permanent dentition of an orthodontic population: analysis performed by intraoral scanner

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Aim: The aim of the study was the evaluation of the mesio-distal coronal width and the dental size discrepancy (TSD), intended as a disproportion between the size of each tooth of the upper arch and its omolgo of the lower arch, compared to the range of standard values, in a sample of orthodontic patients.
Methods: 106 pairs of orthodontic casts were selected. Each pair of casts was scanned using an intraoral scanner. The mesio-distal width of each tooth was measured on the STL files obtained using a digital caliper. After estimating the Bolton indices on the sample under examination, the percentage of the elements that did not fall within the range of the aforementioned indices (equal to the mean ± 2 standard deviations), that is with clinically significant dental size discrepancy, was assessed. The dimensional indices of the sample were compared with the original Bolton ones. The sample was then divided into subgroups based on the gender and Angle class. In each subgroup, the average, standard deviation, minimum and maximum values were calculated for each element. Student's t test for independent data was used to compare the subgroups two by two. Comparisons were made for each element separately. The significance limit was p=0.05.
Results: In general, the first lower molars had the greatest dimensional variability, except in the female patients and in the III Class of Angle ones, in which the greatest variability was observed in the upper lateral incisors. Class III patients showed a 38% TSD, significantly higher than Class I and II patients. By comparing the sample indices with the average Bolton indices, both all the elements as a whole and the anterior elements (but not the posterior ones) were higher in the patients of the sample considered. An overall tooth size discrepancy was found in 15% of the sample. 22% of the sample had a discrepancy in the anterior elements.
Conclusions: Based on the observed results, at least 1 in 3 Class III patients should be expected to show a tooth size discrepancy. However, it is considered useful for all patients to include an analysis of the dental dimensions in the diagnostic process, even if the Bolton index provides an indication of the presence of TSD, but does not give information on the extent of the TSD.

Root resorption of teeth adjacent to palatal impacted canines: a systematic review

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Aim: To define the main external root resorption features of teeth adjacent to palatal impacted canines.
Methods: An electronic search was conducted in the Cochrane Central Register of Controlled Trials (CENTRAL), Web of Knowledge, Scopus, MEDLINE and PubMed systematic review up to January 2020. An extensive search strategy was performed that included key words: "palatal impacted canine" – "root resorption AND predictive factors" – "palatal impacted canines AND complications" – "palatal impacted canine AND adjacent teeth". A manual search was also performed. The egibility criteria were the type of study: Randomised Clinical Trials (RCT), prospective Non-randomised Controlled Studies (NRS) and Controlled Clinical Trial (CCT), study report, systematic review, retrospective studies and prospective studies), the language (only English articles were included) and the period of publication (were included articles published after January 1990).
Results: Of the 593 articles identified by the search, 45 were excluded since they were duplicate, 335 were excluded due to the type of study, 67 were excluded due to the period of publication, 43 were excluded due to language criteria, and 96 were excluded because they didn't match the aim of the study and finally 7 articles remained (2 retrospective studies, 1 study report, 1 systematic review, 3 uNRS). Root resorption involves mainly the lateral incisive (80.5%-85.5%) followed by the central incisive (9%-12%) and the first premolar (4.48-11.72%). In more than the 41% of the cases the resorption affects the palatal surface of the palatal impacted canine. The most affected area is the apical third when the resorption is assessed on second-level X-rays (CBCT) while, instead, assessments based on first-level X-rays showed a greater resorption at the middle third. 43-74% of the resorptions are slight and in some cases the pulp is involved, and this mostly happens to the central incisor. The main predictor factor for root resorption is the proximity (<1 mm) between the canine and the adjacent tooth root. Another predict factor is the position of the canine: resorption is most frequent when the maxillary impacted canine is located mesially to the line passing through the central axis of the lateral incisive and the risk increases when the α and β angles are increased (usually >25° and >74° respectively).
Conclusions: Palatal impacted canines are associated in most of the cases with adjacent teeth resorption. The most affected tooth is the lateral incisor and the most affected area is the palatal surface of the apical third. The resorption is usually slight but in rare cases the pulp can be involved, expecially when the central incisor is affected. When the proximity between the palatal impacted canine and the adjacent tooth is less

than 1 mm, when the impacted canine tip is mesial to the central axis of the lateral incisive and when the α and β angles are increased, there is a higher risk to have a root resorption.

Telemonitoring role in orthodontics during COVID-19 pandemic

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Aim: Due to the COVID-19 emergency, dental offices were asked to stop elective treatments: suddenly orthodontic patients found themselves isolated at home, without the possibility of monitoring by their orthodontists. The use of telemonitoring via smartphones can be a quick way to recover the orthodontist-patient relationship essential for patient collaboration and the success of the therapy, monitor and give continuity to the treatment. The aim of this study was to propose an innovative, simple and reliable approach in the distance-management of orthodontic patients and to test it using a "ad hoc" questionnaire.
Methods: Starting from 287 patients screened, 159 were included and were contacted verbally by phone and via WhatsApp®. They were asked to send a set of 6 photographs taken with their smartphone, allowing to observe: the patient's smile, the frontal, right and left lateral projections in occlusion, the maxillary and mandibular arches in occlusal view. After receiving the photos, the orthodontist could advice patients in order to improve or eliminate problems such as wrong framing, blur, absence of light, or incomplete vision. They were asked to complete a questionnaire to evaluate the effectiveness of the approach. We conducted a literature review to identify whether a previously validated questionnaire already existed, unsuccessfully, and therefore we decided to build a short specific questionnaire composed by 8 simple questions: Were you aware of the possibility of remote treatment? Do you judge telemonitoring positively? Was the explanation of the telemonitoring system simple? Was the shooting of the photographs easy? In an emergency situation and inability to carry out outpatient checks, can telemonitoring replace an outpatient check or not? Were the indications provided by the orthodontist exhaustive? With this therapeutic approach, did you perceive the orthodontist took care of you? At the end of the emergency period, would you agree using telemonitoring for future checks? Descriptive statistics of questionnaire results were analyzed with Chi-Square test (p-value <0.00001). Finally, 137 patients send us both photo shots and questionnaire answers.
Results: The majority of patients considered that this approach was positive and they did not feel abandoned. The knowledge of the possibility of treatment by telemonitoring was unknown to the majority of patients (89.1%), although 98.6% of patients judged this possibility positively. Communication, characterized by a first telephone approach and by sending a message via WhatsApp® subsequently, was judged by 98.6% of patients as simple and intuitive. The personal ability to take pictures correctly was instead a reason for separation into two distinct groups: 36.5% of the patients found it difficult to take the pictures correctly, 63.5% had no difficulties. When asked if telemonitoring could replace an outpatient check in an emergency, 6.6% did not answer, 76.6% answered in the affirmative way, while 16.8% answered negatively. The indications that the orthodontist gave after viewing the photos via WhatsApp® were considered exhaustive by 98.6% of the patients, and 100% of the patients believed that the orthodontist took care of them. The possibility that this type of therapeutic approach can be repeated even outside this moment of emergency agreed 48.9%, while 45.2% did not consider it appropriate and 5.9% did not answer.
Conclusions: Teledentistry is aimed to have in the future a strategic importance, especially in emergency periods: the use of telemonitoring managed to recreate an effective relationship with the orthodontist.

The facial mask in the therapy of Classes III: a systematic review

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Aim: Orthopedic therapy with a protraction mask is the most common method for resolving skeletal Class III malocclusions and anterior cross-bite. The purpose of this review is to evaluate the efficacy and efficiency of the therapy with a facial mask associated or not with the use of a palatal expander, compararing patients in traditional RPE/Delaire mode and others treated with the Liou method, in relation to patient compliance.
Methods: The research included all the articles published until April 2018 with the keywords: "Class III malocclusion and: facial mask or Delaire mask or

Petit mask or protraction head gear or alt-RAMEC or maxillary protraction or reverse occlusion or chin cup or Extraoral appliance". The research databases chosen are: Pubmed, PMC, Scopus, Lilacs, Scielo, Cochrane Trial Library, Web of Science. Inclusion criteria were: clinical trials in humans; Class III skeletal and molar malocclusion; Wits Index≤2 mm; anterior crossbite or incisor "head to head" relationship; treatment period which includes a deciduous or mixed dentition; The methodological quality of selected papers was scored, using the "Swedish Council on Technology Assessment in Health Care Criteria for Grading Assessed Studies (SBU)" method.

Results: With the initial research, we found 50 articles of which 28 met the inclusion criteria. Of the 30 studies, 9 of them were classified with a high methodological quality, 9 studies showed a moderate quality, while the other 10 were classified as having a low methodological quality. The articles classified as having poor quality were excluded. The results showed that the face mask treatment is effective and efficient for sagittal bone and dental correction. The Mc Namara protocol for Class III therapy is the most used currently and provides for the RPE/Delaire combination with the activation of the palatal device. And although several studies show that without RPE the sagittal maxillary correction is obtained equally, the protocol of Mc Namara is interpreted effective because, in addition to increasing the transverse volume, it determines the disarticulation of the circum-maxillary sutures useful to start the movement forward and in bass. The Liou and coll protocol have proposed a new combined protocol (Alt-RAMEC) in which the RPE is activated and de-activated repeatedly. Thus, unwanted expansion is not achieved, but by effectively acting on the sutures far more than opening would do.

Conclusions: The applying orthopedic force on cranio-facial complex during early growth may contribute to the treatment of Class III malocclusions. Most Class III patients display a retruded and contracted maxilla, are ideally suited for treatment with maxillary expansion and protraction. The use of the alt-RAMEC protocol can improve the biomechanics of the Class III therapy. The achievement and maintenance of a short- and long-term success has depended on many factors such as the compliance of the patient.

Prevention of the palatal inclusion of the upper canines: three cases in comparison

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Aim: To evaluate how the position of the canine changes in relation to the root of the adjacent lateral incisor in reference to the preventive orthodontic treatment, aimed at reducing the risk of palatal inclusion of the upper canines (Ericson and Kuroll), by extracting the deciduous corresponding elements. Interceptive treatment represents the most advantageous therapeutic strategy as it often allows to avoid a longer and more expensive orthodontic-surgical therapy. Whenever, therefore, the dentist detects early signs of canine dystopia, the planning of an interceptive orthodontic therapy aimed at normalizing the eruptive path is indicated. In literature, the therapies most accredited for this purpose are the extraction of the deciduous canine associated or not with the extraction of the first deciduous molars; the increase of space in the arch both transversely and sagittally through, respectively, the maxillary expansion or the use of extraoral traction associated with the extraction of the deciduous.

Methods: 3 cases of patients were selected from the Orthognathodontics department of the IRCCS Galeazzi Orthopedic Institute. Specifically, 2 female subjects and 1 male subject, aged between 10 and 12 years. An orthopantomography of the dental arches was performed at zero time (T0) of all patients. Patient 1 (C.E.) was treated with Nance button and element 63 extraction. Patient 2 (M.C.) was treated with a rapid expander of the palate, with an activation protocol according to the School of Milan, and then a transpalatal bar and serial extractions of 54 and 64, followed by extractions of 53 and 63. Patient 3 (S.F.) was treated with Class III morphocorrector with lingual reeducation grid and extractions of 53.54 and 63. A check orthopantomography was performed one year after (T1) from time zero (T0).

Results: In all 3 patients, a significant improvement in the position of the upper canine was observed radiographically with respect to the adjacent lateral incisor. A better result was highlighted both in terms of position of the canine and inclination with respect to the midline in patients where, in addition to the interceptive therapy, an extraction of the deciduous canines was also provided. In the specific case, patient 1 shows a more marked improvement in the position of 23, which had been extracted from the deciduous consideration 63 and contextual application of anchoring equipment. On the contrary, in the same patient, 53 had undergone a spontaneous exfoliation, following an eruption of 12 with consequent loss of eruptive space for 13 and worse ratio of the β angle with respect to the contralateral element.

Conclusions: Preventive therapy in the area of risk of palatal inclusion of upper canines is effective especially if strategic extractions of the corresponding deciduous

canines are carried out in association with the interceptive therapy.

Immediate closure of post-extractive spaces facilitated by regional acceleratory phenomenon (RAP): case report

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Aim: With the present case report we want to point out the favorable therapeutic effects derived from the association between the Regional Acceleratory Phenomenon [RAP], induced by teeth extraction, and low-friction mechanics in order to implement the efficiency and effectiveness of a bilateral space-closure orthodontic treatment in an adult patient.
Methods: A 27years-old female patient comes to our attention in order to improve the aesthetics of her smile. The orthodontic problem list shows slight protrusive lips in an hypodivergent skeletal Class I frame, with increased overjet, reduced overbite and severe anterior crowding of both the arches. On the base of a complete clinical, instrumental and psychosocial evaluation, in accordance with the patient, a bimaxillary symmetrical first-bicuspid extractive therapy is planned with low-friction Insignia appliance and Integrated Straight Wire approach. According to current literature, considering that the remodeling of alveolar bone is the key element of orthodontic movement and bone metabolism is accelerated during wound healing process, due to the Regional Acceleratory Phenomenon, the space closure mechanics could be relevantly speeded up, provided that dental movement is started immediately after teeth extractions. In fact the physiological increase in local vascularization and bone density changes described within the alveolar sockets after such a surgical procedure represent a significant biological aid in promoting a quicker orthodontic movement. In the present case a complete bonding of the upper and lower arches with customized low-friction appliances is performed, the four first premolars are extracted and light elastic chains for immediate space closure with 014 CuNiti archwires are applied in the same appointment. In this way, the leveling and aligning phase are performed together with space closure since from the first set up.
Results: The application of light forces, which started the same day of surgical and bonding procedures, allows to perform a complete space closure mechanics only in 25 weeks, extremely reducing the average duration of an extraction orthodontic treatment. Moreover, the customization of arch form achieved with Insignia system Appliance is useful in order to improve the movement control, avoiding the contact of dental roots with cortical bone.
Conclusions: Space closure in modern Orthodontics requires, especially in adult patients, a solid knowledge of biology of movement and biomechanics in order to reduce the average duration of the therapy and to limit its well-known side effects.

Palatal anchorage in management of skeletal III Class

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Aim: The aim of this case report is to document the therapeutic efficacy of the upper maxillary expansion method in a highly carioriceptive subject in the III skeletal Class, using the palatal anchorage.
Methods: Female patient aged 9 years and 10 months is in mixed dentition, with carious lesions as a consequence of poor home oral hygiene. From an orthodontic point of view, it presents III skeletal and dental Class with anterior cross bite and a tendency to bilateral posterior cross bite. The patient's mother also reports difficulty in breathing and sleep apnea. It was decided to treat the patient, also considering the the previous loss of several dental elements, using a skeletal anchored hybrid device by positioning palatal mini screws and bands on the upper first molars in order to increase the maxillary transverse diameters and improve the patient's respiratory function. With this device the force is applied directly to the maxillary bones in order to obtain a greater skeletal effect and a significant enlargement of the upper airways. Once the radiographic examinations were performed, including cbct to evaluate their correct positioning and parallelism, the miniscrews were operatively inserted according to an anatomical and clinical criterio in a paramedian position in correspondence with the third palatine wrinkle at the point of contact between the canine and the first premolar for do not demage noble structures. At the same time, suitable measurement bands were selected and precision impressions were taken on which the laboratory could set up the orthodontic device. Vestibular arms have also been set up to finalize a second phase of treatment with extraoral traction of the Delaire mask type. After assessing primary stability at seven days, the bands were cemented and the device was placed in the oral cavity. The device was activated until the posterior cross bite was resolved and simultaneously the patient wore

the Delaire mask until the correct sagittal relationship between the upper and lower jaw was restored.
Results: Thanks to the use of the hybrid device it is possible to obtain an orthopedic correction by applying the disjunction force directly to the maxillary bones thus reducing both the extrusion of the posterior teeth and the effects of dento-alveolar pro-inclination. The association of the mask has made it possible to contrast the forecast of unfavorable growth in the pre-pubertal age. The palatal mini-screws are easily inserted due to the quantity and quality of the palatal bone and this allows the orthodontist to work safely and minimize the risk of failure.
Conclusions: From this case report it emerges that temporary anchorage devices are an advantageous method for the orthodontist who wants a stable anchorage minimizing undesirable effects. The palatal mini-screws are easily inserted and not very invasive and in clinical practice they represent an effective and rapid therapeutic option.

Interception of mandibular canine-lateral incisor transposition: laboratory projects and precautions

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Aim: To present the orthodontic treatment used to resolve an incomplete dental transposition in a young patient.
Methods: A 11-year-old male patient was referred to the orthodontic department of the Dental School of University of Padua for an orthodontic evaluation on February 2019. After the examination and the study of radiographs, the patient shows a Class I skeletal, a Class I occlusion both on the right and on the left, normal overjet and overbite, The dental midline is not symmetrical because the mandibular line is deviated 1 millimetre left in relationship with the maxillary, dental and facial line. He also shows a dental transposition between mandibular left canine and left lateral incisor. This condition produces the early exfoliation of the left primary canine. After the radiographic examination, we saw that lateral incisor crown erupted distally in canine site and it was rotated about 90 degrees. The lateral incisor apex was on its correct position. A lower welded arch with bands on left and right first permanent molar was positioned with a distal stop at the permanent central incisor and with a lingual loop behind central incisor to allow the rotation and the mesial replacement of the permanent lateral incisor and at the same time to maintain the lower arch perimeter. The mesialization was performed by using elastic chains. In September 2019, we removed the distal stop on central incisor because of the interference with the mesialization of the lateral incisor and we performed a lower orthodontic bandage on permanent teeth to allow the alignment. By using a closed coil spring between right first molar and right lateral incisor and an open coil spring between left first molar and left lateral incisor we continued the mesialization of tooth. We also performed the upper permanent teeth bandage to allow their alignment. The lower welded arch will remain in place until the dental replace occurs.
Results: By using the modified welded arch, we could maintain arch perimeter, and, at the same time, we performed the derotation and mesialization of left lateral incisor. The active phase of the treatment lasted 7 months, to whom will follow a maintenance phase in which the welded arch will maintain the arch perimeter place until the dental replace occurs.
Conclusions: The modified welded arch used in this treatment proved a suitable device to reach our purpose. It gave the correct anchorage to allow the application of necessary forces to replace in correct site the transposed tooth.

Orthodontic treatment choice in case of unilateral and bilateral upper lateral incisors agenesis: an overall flowchart

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Aim: Tooth agenesis is the most prevalent craniofacial congenital malformation in human. Excluding third molars, permanent maxillary lateral incisors are, after second mandibular premolars, the most prevalent missing teeth. The aim of this study is to identify all the possible therapeutic solutions that can be performed for the treatment of unilateral and bilateral maxillary lateral incisors agenesis. The purpose of this research is the creation of an overall flowchart that allows to decide the most appropriate orthodontic treatment, considering the characteristics of the specific clinical case and highlighting the relative advantages and disadvantages.
Methods: A literature search was performed in the PubMed/MEDLINE and Science Direct databases, without limiting the years of publications. Only studies published in English language were included. Articles published in scientific journals reporting on agenesis,

congenital absence of permanent maxillary lateral incisors and therapeutic alternatives were considered. The research was conducted by inserting the following keywords: incisors agenesis, missing lateral incisors, orthodontic space closure, canine substitution, orthodontic space opening, posterior space opening. No restriction of article's categories was applied.

Results: The analysis of the articles shows that the problem of the management of maxillary lateral incisors agenesis is very challenging. Moreover, the condition in which there is the agenesis of a single maxillary lateral incisor is often associated with the presence of the contralateral conoid and this must be considered in the treatment planning. In order to choose the correct treatment plan some clinical conditions must be assessed: skeletal and occlusal class and mandibular crowding. Also unilateral or bilateral agenesis and the presence of a conoid tooth must be evaluated. The clinician can choose between the orthodontic space closure, associated with the reshaping of the mesially displaced teeth or the orthodontic space opening. In case of orthodontic space opening in the sites of the agenesis, a temporary restoration of the missing lateral incisors may be necessary until the skeletal maturation will be completed. It is also possible to obtain the space closure at the missing tooth site and the space opening in the posterior region. When the unilateral lateral incisor agenesis is associated with the presence of the contralateral conoid, the conoid can be reshaped or extracted. In case of space opening, the prosthetic rehabilitation can be chosen between different treatments.

Conclusions: There are different treatments for the management of maxillary lateral incisors agenesis and they all require a multidisciplinary approach. This kind of approach is successful thanks to the synergy between the different practitioners who deal with orthodontics, conservative dentistry and prostheses. They must cooperate from the beginning to the end of the treatment plan. The advantages and disadvantages of these therapeutic alternatives must be assessed in relation to the specific clinical case because there is no treatment that is better than another one in an absolute sense. In conclusion, the choice of treatment is based on the evaluation of the possibility of obtaining satisfactory functional and aesthetic results.

Evaluation of Bolton's discrepancy indexes, Little's index and mesiodistal tooth widths in a caucasian orthodontically referred population with Angle Class III malocclusion

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Aim: Assuming that patients with Class III malocclusion have increased Bolton's ratios, the aim of the study can be summarized by the following research/clinical questions: Are the increased Bolton ratios due to smaller mesiodistal maxillary tooth sizes or to greater mesiodistal mandibular widths? Where is the alteration located within the arches? Which is the prevalence of the different degrees of Little's Irregularity index (LII) in a Class III malocclusion population? Is there a correlation between increased Bolton ratios and mandibular crowding (LII) in Class III patients? The null hypotheses are that increased Bolton ratios are related to increased teeth sizes in the lower arch, that a specific location of the altered sizes cannot be identified within the arch and that a correlation between Bolton ratios and Little's Irregularity Index cannot be identified.

Methods: 50 Caucasian subjects (28 men, 22 women; mean age 26,8 years) with Angle Class III malocclusion referred to the Orthodontic Unit of the Dental School of the University of Torino, were consecutively recruited. Patients were selected according to the following inclusion criteria: Class III molar relationship; Complete permanent dentition excluding the third molars; No previous orthodontic treatment; No previous prosthetic treatment; No Class II, III or IV restorations according to Black's classification of cavities; No history of craniofacial trauma; No systemic diseases or craniofacial deformities. For every subject intra-oral scans were obtained (iTero® Element, Align Technology, San Jose, California, USA). The mesiodistal width of each crown, from first molar to first molar and the Little's Index were measured using the Clincheck Pro® software (Align Technology, San Jose, California, USA).

Results: Bolton's Indexes (OR and AR) in the study group are increased compared to the results of the two reference groups (test groups A1 and A2) with a statistically significant difference ($p<0.005$). Our result is in accordance with what reported in literature regarding the overall Bolton index (OR), while there are not similar results regarding the anterior index (AR). We can take into consideration a link between the increase in Bolton indices and excess in the anterior region of the mandibular arch of patients with Class III malocclusion.

Conclusions: Although the Bolton index is useful for identifying dentodental discrepancies in most patients, it is still not possible to accurately determinate the degree and location of these dental discrepancies. Our study reveals that there is no correlation between Little's index and the other variables analysed.

Basal and dental Class II with deep bite and increased overjet being treated with PCFM: a case report

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Aim: The purpose of the present study was to present a clinical case of basal skeletal and dental Class II associated with deep bite and increased overjet, treated with a functional generating bite PCFM at the University of Turin, Dental School of Orthodontics.
Methods: The recruited patient was a male of 7 years and 7 months old with early mixed dentition associated with inferior labial interposition in rest position. The midline axis on the sagittal plane was deviated and several diastemas between the frontal teeth were observed in correspondence of both maxillary and mandibular dental arches. The following diagnostic data were collected: medical and dental history, clinical intra- and extra oral investigation and model casts. Orthopantomography, latero-lateral and posteroanterior teleradiography were requested before the treatment in order to achieve a cephalometric analysis. Moreover, intra- and extraoral photos were taken before and during the treatment. The diagnostic evaluation was made basing on the collected clinical data. According to the cephalometric values, the patient presented hyperdivergent growth (SpP^GoGn=26,40°), basal skeletal Class II (A:Po=13,24 mm) and a bilateral molar Class II. The patient presented an increased overjet and deep bite. The treatment consisted in the use of a PCFM (functional generating bite (FGB) appliance of the Dental School of Turin). FGB helps the movement of the teeth with the advantage of improving facial muscle function. This appliance is characterized by metallic bite planes which act simultaneously as orthodontic correctors and occlusal splint. The patient is currently under treatment after 4 months.
Results: After 4 months of functional therapy with PCFM, overjet seems to be remarkably reduced and the deep bite seems to be improved as well. In addition, it was possible to observe the tendency to dental Class I and the initial closure of the diastema in the front teeth of the upper and lower jaw. The patient will continue the treatment with monthly follow-ups.
Conclusions: A clinically significant correction of the overjet, overbite and maxillary and mandible incisor alignment was observed after treatment with functional generating bite device. The patient will continue the treatment and will be periodically monitored. It was possible to desume that PCFM may achieve a significant improvement of malocclusion characterized by basal and dental Class II and increased overjet associated to deep bite in a short period of time.

Rapid maxillary expansion in mixed dentition with hypertrophic maxillary frenulum: facioskeletal and dental changes. A case report

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Aim: The maxillary discrepancy with posterior cross bite, probably is the most common problem in early treatment. The etiology of transverse maxillary deficiency has been related to genetic factors, functional and anatomic problems involving breathing pattern anomalies, atypical swallowing and septum deviations, or a combination of these factors. The transverse insufficiency of the maxillary arch presents complex correlations with numerous pathological and dysfunctional conditions. The posterior cross bite, for example, is often associated with the formation of precontacts that can affect the physiological growth of the stomatognatic apparatus, causing, in some cases, mandibular shifts and lateral deviations during mouth's closing and, therefore, much more serious disgnatic conditions, as can be a skeletal Class III. Below, is detailed the clinical case of a female patient L.V. of 6 years old: the patient was sent to our observation, after pediatric examination, in order to evaluate the malocclusion and abnormal position of the upper labial frenum. At physical examination was observed: a transverse and sagittal deficiency of upper jaw with bilateral posterior cross-bite and anterior cross-bite and a low insertion of the labial frenulum at the level of the interincisive papilla. In these clinical conditions the treatment plan of choice involved rapid palatal expansion, with an overcorrection of the posterior crossbite-contacts edge to edge of the upper palatal cusps and lower buccal cusps which can be associated with superior median frenulectomy in case of persistence of the interincisive diastema beyond the physiological period of the permanent canines' eruption.
Methods: The therapeutic treatment has included a rapid palatal expander (RME) associated with postero-anterior traction (Petit mask) to correct the maxillary development deficit. The rapid expansion was obtained with the application of a traditional RME, fitted out with orthodontic bands arranged on the second deciduous molars. The active expansion phase involved 32 total activations that leads to 8 mm

of expansion. This first therapeutic phase determined the appearance of a large interincisive diastema. Moreover, the anomalous position of the labial frenulum entailed that the palatal disjunction caused a distal displacement of the central incisors not associated to the migration of the periodontal tissues. The closure of the diastema occurred after about 3 months and it was determined by the mesialization of the incisors pulled by the transseptal fibers. Once the expansion was carried out, the braces was worn for 9 months and this allowed to obtain a fibro-bone neo-apposition at the sutural level to guarantee a stability of the result. After 2 months from the end of the active expansion phase, the patient was indicated to wear the Petit mask for 14 hours/day for 4 months, although the sagittal relationships had already significantly improved.

Results: In the case of LV, the application of the RME therapeutic protocol associated with postero-anterior traction by the Petit mask allowed to resolve the dysgnathic condition, early re-establishing the correct dento-skeletal relation and a positive facial harmony. There was also a total and spontaneous apical repositioning of the upper labial frenulum before the eruption of the permanent canines. This avoided a subsequent lip frenulectomy surgery.

Conclusions: Early diagnosis and interceptive treatment in the removal of the epigenetic causes of the dysgnathic framework guarantee the optimal growth conditions. The therapeutic approach implemented leads to the prevention of functional and aesthetic damage, without deviate the patient's evolutionary parable from the biological norm.

Average bone morphology of the lower incisal sector and vertical skeletal typology: literature review

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Aim: To analyze the literature finds about the possibility of lower incisors proclination based on cortical bone thickness among subjects with different vertical facial dimensions. Furthermore we would value the correlation between typology of orthodontic movement and alveolar bone thickness variation.

Methods: An electronic search was conducted in PubMed, Scopus and Cochrane Library with no limitation on publication date, up to 2019. The articles selected for analysis included randomized controlled trials, case-control studies and cohort studies of patients with vertical malocclusion which the position of incisors have been measured on the dimensions of the cortical and spongious bone of the anterior mandibular alveolar process with CBCT before and after treatment.

Results: Of all the articles identified in the initial research, only a few were related to the review subject and selected for analysis. All the authors agree that after mandibular incisor movement, cortical bone thickness was greatest in average or low-angle patients compared to high-angled subgroup. Spongious bone was thinner and root apex was closer to the labial cortex in high-angle patients. Analyzing dental movement we observed that there are no reference values except for torque. For tooth inclination exceeding +5 or -5 degrees, the bone remodeling was evident.

Conclusions: There is a statistically significant relationship between facial type, alveolar height and thickness and mandibular incisor movement. Before any dental movement, considering that the mean alveolar buccal bone thickness at 3 mm apical to CEJ is 0.4-0.6 mm, we can affirm that:

- anterior mandibular region is the most affected area by bone remodelling;
- inter-radicular cortical bone of mandibular incisors is thinner in high-angle than in average- or low-angle subjects; so moving teeth in dolico facial pattern would be a risk, especially in patients with low initial bone thickness;
- high-angle subjects can be at increased risk of moving incisors beyond alveolar bone support when subjected to marked antero-posterior incisor movement.

Regarding type of movement we can say that:

- tipping is no indicated;
- uptighting is not strictly controindicated if the's a corporeal movement of the tooth because it allows bone gain;
- torque variation is highly related to apical bone thickness adaptation for mandibular incisors;
- there are no problem with teeth intrusion;
- extrusion is controindicated especially in dolico facial patients with low initial bone thickness;
- incisor rotation and derotation, especially in subject with narrow and high symphysis, may be critical lead to progressive bone loss of lingual and labial cortical plates.

Early treatment of a Class II malocclusion in a child with sleep-disordered breathing (SDB): a case report

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Aim: Obstructive SDB in children includes a wide spectrum of clinical entities with variable severity, ranging from primary snoring, its mildest clinical manifestation, to obstructive sleep apnea syndrome (OSAS), characterized by partial or complete obstruction of the upper airways. The aim of this study was to evaluate the effects of rapid maxillary expansion (RME) and twin-block appliance treatment in a little child with Class II malocclusion and obstructive sleep apnea (OSA). By orthopedic expansion of the maxilla the aim was to reduce the severity of SDB; infact, maxillary contraction can be related with different problems such as enhanced nasal resistance, alterations in tongue postureand constriction of the pharyngeal airway, resulting in retroglossal airway narrowing and oral breathing. Afterwards, the treatment provided mandibular advancement with a twin-block appliance in order to correct the Class II malocclusion and to increase the airway space.
Methods: A 6-years old child with oral breathing, snoring, OSA (AHI: 0.6) and oxygen desaturation (ODI, desaturation per hour: 0.5) was evaluated with cephalometric radiographs and study models. The little patient demonstrated a skeletal Class II pattern with maxillary transverse deficiency and mandibular retrusion, with an ANB value of 7.3° and a reduced mandibular growth. First of all, the patient was treated with Hyrax expander, held in place for six months as a retainer after the orthopedic correction. After RME, the orthopedic treatment proceeds with a twin-block appliance.
Results: After the orthopedic expansion of the maxillary the ANB value improved of 1.6°. Six months after the beginning of the twin-block therapy, a new polysomnography exam showed an improvement of SDB: AHI is not increased (0.6), reduction of ODI (0.0) and snoring reduction. Moreover, eight months after the beginning of the mandibular advancement therapy, a new cephalometric evaluation showed a further improvement of ANB value of 1.7°.
Conclusions: According to international literature, Class II correction by orthopedic and functional appliances in growing subjects might help to eliminate the anatomical predisposing factors to OSA, resulting in an increased air flow through the airways.

Skeletal and dental Class III with anterior cross bite treated with PFD functional bite: a case report

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Aim: This work consists in the presentation of a case of skeletal and dental Class III with anterior cross bite treated with PFD functional bite of the Dental School of Turin. The Class III malocclusion is associated with a deficiency of maxillary growth, an excess of mandibular growth, or a combination of both along with vertical and transverse malformations. A prompt diagnosis and early intervention of Class III malocclusion may be helpful to reduce the grade of severity of the malocclusion in adult age. The etiology of Class III malocclusion is multifactorial, in particular it is the result of interaction between innate factors or genetic hereditary with environmental factors. There are studies that provides enough evidence to establish that the role of the genetic heredity is decisive as regards the growth of the mandible. In fact, a signifier higher incidence of this malocclusion has been found between members of the same family. The PFD appliance can be built in two ways, with or without anterior metallic bites, according to the patient's divergence. The presence of the lingual shields lifts the tongue stimulating the growth of the upper jaw; while, the palatal resin button, thanks to the thrust of the tongue, activates the device itself. For the correction of Class III are inserted as accessories, a lower vestibular arch which contains the mandibular growth, and an upper vestibular shields that stimulate the growth of the maxilla. There are also expansion coils, vestibular shields and two metallic posterior bites.
Methods: The patient was a 9,2 years old female who presented mixed dentition and a mandibular incisor agenesis. The following essential clinical data were collected: medical and dental history, clinical investigation, model casts, OPT, L-L and P-A teleradiography. Following cephalometric analysis, intra- and extraoral photos were taken. The cephalometric measurements resulted as a dental and skeletal Class III (A:Po=-9 mm) with anterior cross bite in meso divergent patient according to Cervera (SpP^GoGn=20°). The patient was treated with PFD functional bite. After 4 years of monitored functional therapy, the patient was ready for the second therapeutic phase which provided fixed orthodontic appliances in order to close dental diastema caused by mandibular incisor agenesis.
Results: After 4 months of functional therapy,

maxillary incisors overcame mandibular incisors. After 4 years of therapy with PFD occlusion appears to be well-balanced in order to continue with the following orthodontic treatments, where needed.
Conclusions: Basal and dental Class III conditions can be treated and corrected thanks to the functional bite PFD (School of Turin). This appliance has performed the function of stimulating the growth of the upper jaw and inhibiting the protrusion of the mandible.

Correction of skeletal discrepancies in transverse plane through temporary anchorage devices

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Aim: The correction of skeletal discrepancies in the transverse plane has, as first choice, the rapid expansion of the upper jaw. Over the years, there have been many devices designed for this purpose, in order to achieve malocclusion correction and obtain a correct occlusal restoration on the transverse plane.
The aim of the study is to demonstrate how the use of orthodontic anchor skeletal devices meets the needs of minimal compliance by the patient and, at the same time, maximum control of the anchorage.
Methods: A 13 years old female patient has come to our observation at the U.O.C. of Orthodontics of the policlinico Umberto I in Rome. At the intraoral clinical examination it is evaluated the presence of a permanent dentition with absence in the arch of elements 1.5, 2.5 and 3.5, a molar Class I on the right and a III molar Class on the left, centered upper midline and deviated lower midline to the right, contract upper jaw and a moderate crowding of the lower arch. The Orthopantomography of dental arches shows all dental elements of the permanent series. From the cephalometric analysis performed on the latero-lateral teleradiography of the skull a skeletal Class I is detected (SNA=78°, SNB=75°, ANB=3°) , hyperdivergence (FMA=32°), clockwise facial growth trend; vestibularized upper incisors and normoinclined lower incisors. The patient does not report any systemic pathology of respiratory, cardiovascular or neurological type in her medical history, and declares that she does not take drugs. The treatment plan provided a correction of the transverse discrepancy through the use of a rapid expander of the upper jaw with skeletal anchorage and the restoration of the correct ratios both anterior and posterior occlusal. A CBCT cone beam CT scan of the dental arches was requested from the patient and some precision impressions with polyvinylsiloxane in order to match the model with CBCT. The site localization phase for the miniscrews was confirmed by the clinician, with subsequent realization of the template and the orthodontic device. The device has been built on 4 mini-screws, with a diameter of 2 mm and a length of 9 mmThe pitch of the screw is equal to 0.2 mm. The expansion protocol applied has provided for 3 activations per day until reaching the achievement of the target set at 8 mm expansion. The patient underwent monthly checks.
Results: After 6 months from the start of therapy, the resolution of the skeletal contraction of the upper jaw occurred. During the 6-month follow-up no miniscrew has lost its primary stability and no inflammation has been observed on the Perimplant tissues.
Conclusions: The correction of the transverse discrepancy has been carried out successfully, safely and without the need for cooperation between patients. The lack of dental support has a twofold advantage: on one hand, the protection of the periodontal health of the dental elements is allowed, while avoiding a vestibular inclination of the anchor teeth, with changes in thickness and height of the supporting vestibular cortex; on the other hand, it avoided an extrusion of the palatine cusps of the posterior teeth, with the consequent effect of a change in the verticality of the patient. In addition, the computer guided approach for surgical insertion allowed the determination of the positioning sites of optimal anteroposterior palatal miniscrews, considering the thickness and the width of the palatal vault.

Does rapid maxillary expansion therapy promote a spontaneous response of mandibular posterior units?

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Aim: Spontaneous changes in the mandibular dentition under the influence of maxillary expansion have been previously reported. It has been claimed that a permanent increase in the maxillary apical base leads to a spontaneous, permanent, and significant increase in mandibular arch width. Although this orthodontic treatment has been extensively discussed in the literature, mandibular arch decompensation during RME is still not clearly assessed neither with radiographic examination nor with assessment of dental model. Only few studies supporting the indirect effects of RME on mandibular arch with a 3D non-invasive analysis were published. In this study we evaluated potential decompensation of mandibular

posterior dental units after maxillary expansion protocol by referring to a specific methodology involving measurements of the inclination of the teeth's long axis on CBCT images.
Methods: CBCT scans from previous published material were included in the present study according to the following criteria: 1) age between 11 and 15 years, 2) CBCT scans of good quality taken prior to the placement of the maxillary expander (T1) and 6 months after its removal (T2), 3) no caries, dental restorations or endodontic therapy of the upper first molars and the first and second premolars, 4) no artifact, 5) absence of pulpal calcification, 6) no previous orthodontic treatment, 7) no systemic disease or usage of medication. Patients were scanned with the same iCAT CBCT Unit (Imaging Sciences International, Hartfield, PA). The setting protocol included 0.3 voxel, 8.9 seconds, large field of view at 120 kV and 20 mA. The distance between 2 slices was 0.3 mm which provided accuracy in anatomic registration. Each exam was converted into DICOM format and processed with Horos Medical Imaging software. After skull re-orientation, the three conventional scan planes (axial, sagittal, coronal) were oriented in order to detect the exact coronal scan used for the tested measurements. The linguo-buccal inclination of the lower posterior units (from left first premolar to left first molar and from right first premolar to right first molar) were measured according to the molar angulation component of CWRU's analysis. Student's t test was preliminary performed to investigate potential differences in angular changes between the same teeth of different side (right-left). Multiple Student't t test were used to compare angular measurements between T1 and T2 for each investigated tooth.
Results: No significant differences were found in angular changes (T2-T1) between both sides. Lower first molars showed the highest increment of linguo-buccal inclination (2.4°+-0.9°) followed by lower first premolars (1.4° +-0.6°) and lower second premolars (0.8°+-0.5°). All data were statically significant except for lower second premolars ($p>0.05$).
Conclusions: A slight spontaneous increment of linguo-buccal inclination (decompensation) of mandibular posterior dental unit could be expected after rapid maxillary expansion. However, these findings are far from suggesting RME a potential therapy for obtaining spontaneous arch expansion in the lower arch.

Conservative treatment of mandibular condylar fracture in growing patients: a systematic review and metanalysis

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Aim: To investigate the published evidence regarding the non-surgical management of mandibular condyle fractures in growing subjects. A systematic review with meta-analysis was conducted to answer the following question: which is the most effective type of conservative treatment among those described in the literature?
Methods: The Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement was used to guide this study. A literature search was performed using the following electronic database: PubMed, Cochrane Library, SCOPUS, Scientific Electronic Library Online (SciELO), Latin American and Caribbean Health Sciences (LILACS). For our search query, medical subject headings (MeSH) terms and free text were used in combination to restrict the search. Some of the keywords used in the search were "mandibular condyle", "fracture", "treatment", "children", and "in growth". The survey covered the period from 1 January 1990 to 31 March 2019, with no language restrictions. The methodological quality of the studies was assessed by 2 operators independently, using a 13-point scale, in which 1 corresponds to the lowest score and 13 to the highest score. The maximum mandibular opening values observed after treatment were combined by meta-analysis.
Results: A total of 528 articles were found: 24 met the inclusion criteria and were included in the qualitative synthesis, whereas 5 of them were included in the quantitative synthesis (meta-analysis). The selected studies reported the following conservative treatments: simple observation, rigid or elastic fixation, functional appliance and functional exercises; these treatments were sometimes combined with each other. The maximum mouth opening after treatment was always >35 mm, the protrusive and lateral movements of the right and left were almost always >7 mm; radiographic remodeling was generally good or incomplete. Detailed analysis of the methodology in selected articles revealed quality scores ranging from "medium" for 4 studies to "low" for the remaining 20 studies.
Conclusions: Due to the heterogeneity of the studies and the low methodological level, there is not enough scientific evidence to establish which of the proposed treatments is more effective. Further longitudinal studies are required, sharing a common classification system of mandibular fractures with the same nomenclature, as well as using appropriate outcomes measures to investigate clinical and radiographic findings for follow-up evaluation.

Postural follow-up in a patient affected by down syndrome treated with rapid maxillary expander

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Aim: Trisomy 21, commonly known as Down Syndrome, from a craniofacial point of view is characterized by modifications mainly in the middle third of the face, with reduced development of the maxillary bones and the skull base. The sagittal and transverse dimensional deficit of the palate, already found at birth, is accentuated with growth. A form of macroglossia is also very common. A syndromic patient, a 10-year-old girl wearing glasses, was considered during her rapid maxillary expander treatment, in order to evaluate its effect from a postural point of view.
Methods: The rapid palatal expander (rpe), also known as rapid maxillary expander, it's a device to detach the palatal suture, allowing a much greater transversal growth of the jaw bones with consequent increase in the space dedicated to the dentition. The analysis was carried out using the Lizard Ultimate® bipodal stabilometric platform, consisting of two distinct platforms with three vertical force detectors per platform, through which three detections each lasting 51.2 seconds were realized each time, two with open eyes with or without glasses, and one with the eyes closed, in an environment free of visual and auditory stimulations. The patient was positioned in an orthostatic position with arms at her sides, with her gaze parallel to the horizon and her feet aligned according to the indications marked on the platform, with a reciprocal angle between the feet of 30°. We considered four detections: T0 minutes before positioning the rpe, T1 when it was just cemented, T2 one week after the first activation and T3 one month after the end of the expansion.
Results: There's been a minimal improvement since the time of the positioning of the device, regarding both the distribution of loads and the center of gravity which is shown to be more aligned with both axis, with a reduction of the lateral oscillations and a closure of the angle at heel level. The most striking results, however, are highlighted at T2 and T3 times with a transition from an average of 3.8 kg more on the left foot (average performed between measurements with eyes closed and open with or without glasses) to 0.79 kg in excess on the right foot, up to an average of 0.63 kg more on the left foot. The overall distribution of the loads on the foot had also improved. The oscillations of the center of gravity decreased mainly at time T2, while at time T3 there was a slight regression of the center of gravity on the x axis in the recording made with glasses, while it improved without glasses and with the eyes closed. Finally, the heel loading angle passed from an average of 6.78° (left foot) and 2.99° (right foot) in T0 to an average of 1.00° and 0.80° in T2 up to an average of 2.52° and 1.85° in T3.
Conclusions: The expansion carried out on the patient results in a clinical improvement from a postural point of view, indicating that the growth of the space reserved for the tongue, the latter being an important proprioceptor connected to the lingual muscle chain which extends to the lower limbs, also influences posture itself. The typical macroglossia of this syndrome could therefore be the reason for such a substantial and immediate improvement, so the enlargement of the palatine vault allows to better accommodate an hypertrophic tongue.

Correction of unilateral cross-bite by means of rapid maxillary expander with fully digital approach: a case report

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Aim: This case report describes a patient with Class II malocclusion and unilateral cross-bite treated by a procedure that reduces the patient cooperation: a Rapid Maxillary Expander (Hyrax-type) realized by fully digital process.
Methods: The patient, a 8-year-old boy, presented a Class II malocclusion, transverse maxillary deficiency and unilateral cross-bite on the left side. Maxillary and mandibular intermolar widths were 43 and 49 mm, respectively. He was in mixed dentition. He showed a convex profile and had a mandibular shift to the left due to interferences of the deciduous teeth on the left side. There was lack of space in the maxillary arch. The first treatment objective was orthopedic correction of the posterior cross-bite by skeletal maxillary expansion. A customized Hyrax rapid maxillary expander anchored to deciduous teeth completely digitally developed was realized. The workflow consisted of: 1) intraoral scanning (Trios 3, 3Shape, Copenhagen, Denmark) 2) digital design with incorporation of a STL file of expansion screw (Leone, Orthodontic Products, Sesto Fiorentino, Firenze), 3) direct 3-dimensional metal printing via laser melting, 4) welding of an expansion screw A0630-CADCAM (Leone, Orthodontic Products, Sesto Fiorentino, Firenze), 5) insertion, and finally 6) activation in the patient's mouth. The hyrax surface was prepared with Scotchbond universal adhesive (3M Unitek, St. Paul, MN, USA) and subsequently bonded with Transbond XT (3M Unitek, St. Paul, MN, USA).

The patient's parents were instructed to activate the expansion screw a quarter turn one time a day (morning or evening) for 40 days, producing 8 mm of expansion, corresponding to 2 mm of overcorrection of the crossbite, since a small relapse was expected. The hyrax was left in place for additional 6 months as a retainer at the end of the activation period. After 8 months, the first phase of the treatment was complete. The transverse constriction of the upper jaw had been corrected and the unilateral cross-bite resolved. Clinically, the appliance fitted perfectly, and no breakages were registered. The device could be debonded easily at the end of treatment.

Results: Maxillary expansion is a common orthodontic treatment used for the correction of posterior crossbite resulting from reduced maxillary width. This case report showed that a Rapid Maxillary Expander (Hyrax type) digitally made, allowed a correction of maxillary discrepancy and to regain space for the maxillary permanent lateral incisors in the mixed dentition with a reduced discomfort for the patient. The clinical results showed that this procedure is an efficient digital way for constructing metallic orthodontic appliances. This fully digital approach may generate a faster workflow. There are many advantages in terms of speed of application and patient compliance because no impression is required for the construction.

Conclusions: The main feature of the Digital Rapid Maxillary Expander is that it is developed with a completely digital and individualized process for the treatment of maxillary transverse deficiency in young patients.

Operculectomy as a preliminary treatment for impacted second molars: a retrospective case-control study

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Aim: Failure of eruption of permanent second molars is a relative rare condition that affects 0.06% of the population. The aim of this study is to compare delayed eruption of second molars treated with operculectomy and controls who refused to undergo the same procedure.

Methods: A total of 222 patients with one or more retained second molars treated at the Department of Orthodontics of the University of Milan between January 2018 and March 2019 were considered for the study. One hundred forty-five subjects satisfied the inclusion criteria (75 cases and 70 controls). Inclusion criteria were: no previous orthodontic treatment, no other systemic or dental disease but one retained permanent second molar per arch when more than two-thirds of its root was formed and the other one is erupted, absence of interference from third molar and of second molar root anomalies. Patients were randomly allocated into two groups. In the first group, patients underwent removal of the overlaying mucosa; the control group was followed-up for one year. The present study was conducted in accordance to the Declaration of Helsinki.

Results: Eruption occurred in 93.3% teeth in the treated group (70/75), while in the control group only 10% erupted (7/70). Among treated patients, eruption in the upper arch occurred in 95,2% of cases (40 out of 42), while in the lower arch spontaneous eruption occurred in 90,9% of cases (30 out of 33). In the control group, spontaneous eruption of the upper second molars occurred in 8,5% of cases (3 out of 35), while in the lower ones the spontaneous eruption occurred in 8,5% (3 out of 35). Statistical significance was set at $P<0.05$ and calculated with Chi-square test. We calculated the erupted permanent second molars compared to those not erupted, divided by lower and upper arch. The non-erupted teeth presented the following characteristics: 23 were positioned with a mesial inclination (41%); 13 were positioned vertically (34%); 8 showed a bigger crown compared to the contralateral (13%); 10 showed an enlarged follicle compared with a normal crown follicle (12%).

Conclusions: Actually, there are no guidelines for the treatment of the eruptive problems of the impacted second molars. For a correct treatment plan, it is advisable to proceed to an early and precise diagnosis, which permits to identify the causes involved. Surgical exposure is a treatment which might facilitate the spontaneous eruption of second molars compared to the observation group used in the study.

Cone-beam computed tomographic assessment of the mandibular condylar volume: a restrospective study in adult patients

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Aim: To explore the variation of the mandibular condylar volume in adult patients based on Cone Beam Computed Tomographic analysis. The volumes were related to sex and cephalometric parameters in the three planes of space and relative compensations in the sagittal, transverse and frontal planes.

Methods: A sample of 73 patients, 49 females and 24

males, starting from an archive of TC Cone Beam, was retrospectively selected. The inclusion criteria were: adult patients; CBCT performed with the same protocol (4 mm slice thickness, 16x22 cm field of view, 20 sec scan time); patients without systemic diseases and not subjected to previous orthodontic treatments. Using Mimics Materialize 20.0® software, the 3D cephalometry that identifies 18 points and 36 measurements, was calculated for each patient; subsequently the volumes of the mandibular condyles were isolated and calculated. Then, specific cephalometric variables, were selected: for sagittality the skeletal class (anb angle), for verticality the angle of divergence, intermaxillary, (Ans-Pns ^ Go dx / sx – Me) and the total goniac angle (Cd dx / sx - Go dx / sx –Me) and for transversality the height of the branch (Cd dx / sx- Go dx / sx) and the length of the mandibular body (Go dx / sx- Me). The mandibular condyle head was therefore isolated and analyzed with a cut parallel to the Frankfurt plane and passing through the right and left pterygoid fovea point. Finally, a descriptive statistic using the Kruskal-Wallis, Mann-Whiteny, Chi square tests and an inferential statistic with the linear regression test, were developed.

Results: Mandibular condylar volume was statistically significantly lower in females than in males ($p<0,05$), these findings agree with previous research. We also found that vertical skeletal pattern appeared to be associated with condylar volumes that are inversely proportional to the intermaxillary angle and to the total goniac angle: the mandibular condyle volume in hyperdivergent subjects with a post-rotation growth pattern was significantly smaller compared to hypodivergent patients with a horizontal growth pattern ($p<0,05$).

Conclusions: The mandibular condyle varies considerably in size and shape between individuals of different age and sex. This study focused on the assessment of average mandibular condyle volume measurements using CBCT and allowed us to render and visualize the real anatomy of mandibular condyles into 3D images. Orthodontists have long been interested in the differences in diagnosis and planning treatment among the different vertical facial types. The correlation between mandibular condylar volume and vertical facial patterns reveals us important information that can lead clinicians to make more specific diagnosis and treatments.

Orthodontic evaluation in children with Down syndrome: an epidemiological study

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Aim: To identify and evaluate the occurrence of orthodontic malocclusions present in special needs children (Down syndrome patients) and to relate the underlying conditions to a set of clinical and demographic variables.

Methods: The study consisted of the physical examination of 220 subjects (107 F, 113 M; mean age 8.8 ± 3.6) from the Section of Orthodontics, University of Naples Federico II that were diagnosed with Down syndrome (DS). Data were collected during specialist visits undergone by patients, consisting of the evaluation of facial profile, crowding, transversal discrepancies, vertical discrepancies, sagittal discrepancies and dental wear. Data were reported as frequencies and the distribution of differences between sexes was assessed (X2 test, $P<0.05$).

Results: As far as sagittal discrepancies are concerned, the study showed that most of the patients had an orthognathic profile (162), only 21 children had a Class II profile (9 F, 12 M), while 37 had a Class III profile (23 F, 14 M). Out of the total sample, 39 patients had a molar and canine Class II (23 F, 16 M) and 41 had a Class III (17 F, 24 M). In terms of overjet, 97 children (46 F, 51 M) had an overjet <0 mm and 67 children showed an anterior cross-bite (29 F, 38 M). In terms of vertical discrepancies, 90 children (42 F, 48 M) had an overbite <0 mm, while only 5 subjects showed a deep-bite (OVB>5 mm, 3 F, 2 M). Crowding was present in 35 children out of 220 (17 F, 18 M) and only 4 children showed spaces between teeth (2 F, 2 M). As far as transversal discrepancies are concerned, more than 50% of the subjects (117 children) showed a reduced maxilla (57 F, 60M), while 99 showed a normal maxilla (47 F, 52 M). Moreover, 56 patients (26 F, 30 M) showed dental wear and 83 patients (33M, 50 F) showed proxy-reported grinding/clenching during the night. This group of subjects did not present any statistically significant association between all the orthodontic characteristics assessed and gender ($P>0.05$).

Conclusions: Children with Down syndrome reported particularly high prevalence of malocclusion - due to a reduced maxilla in most subjects on the transversal plane - despite most of the children showed an orthognathic profile on sagittal plane. Gender did not result to have any association with the orthodontic characteristics assessed.

Electromyography follow-up in a patient affected by Down syndrome treated with rapid maxillary expander

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Aim: Trisomy 21, commonly known as Down's syndrome, from the craniofacial point of view is characterized by changes mainly in the middle third of the face, with reduced development of the maxillary bones and skull base. The dimensional deficit of the palate, already found at birth, both sagittal and transverse, is accentuated with growth. A syndromic patient, undergoing treatment with rapid palate expander (REP), was taken into consideration to evaluate the myofunctional balance through electromyography.
Methods: The Rapid Palate Expander (REP) is a device designed to disjoin the palatine suture to allow greater transverse growth of the maxillary bones with a consequent increase in the toothing space. The electromyographic evaluation was carried out by standardized electromyography and by analysis with DAQ software. The recordings were performed by placing the patient in a seated position, using disposable bipolar electrodes pregeled in Ag/AgCl. The test included one measurement in maximum clench and two in occlusion on cotton rolls to determine the Percentage Overplaning Coefficient (POC). The POC obtained allowed the evaluation of joint symmetry during muscle activation. In addition, the two measurements made it possible to calculate other indices, such as: the asymmetry index, the activation index, the torsion index and the impact index. A single 10-year-old patient was evaluated with 3 measurements: T0 before the start of orthodontic therapy by REP; T1 after mounting the REP; T2 at the end of the median palatine suture expansion.
Results: Following the placement of the appliance, a worsening of the myofunctional balance was found, probably caused by the presence of the orthodontic device inside the oral cavity. It is significant the result at time T2 in which compared to time T0 we have the asymmetry index shift from 29.44% to -8.57%, the activation index from -8.12% to 6.50%, the torque index from -1.12% to 2.77% and the impact index from 109% to 104%. In addition, the average POC rose from 69.05% to 82.80%.
Conclusions: The expansion carried out on the patient results in an improvement of the muscular balance in centric occlusion given by an increase in the transversal dimension of the palate. This results in a stable and functional occlusion and a better neuromuscular structure for myofunctional balance. Fundamental is the decrease in asymmetry that at T0 showed an excessive prevalence of right muscles while at T2 showed a situation of balance in the normal range between 10% and -10%.

Cephalometric evaluation of differences between a group of I Class patients, a group of II Class patients, and a group of II Class patients with steep posterior occlusal plane: the association between occlusal posterior plane and II Class malocclusion

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Aim: Occlusal plane is defined as the line connecting posterior cusps contacts with anterior incisal contacts. Some author divided maxillary occlusal plane is into posterior, from maxillary second premolar incisal point and second molar cusps, and anterior plane, from maxillary second premolar cusp tip to incisal point. Several authors studied the association between different skeletal patterns and the angles between occlusal plane in correlation to the Frankfurt plane and other cephalometric axes. The aim of this study was to demonstrate the connections between malocclusion and altered cephalometric values, to detect the relationship between the Anterior occlusal plane (AOP) and Posterior occlusal plane(POP) with the skeletal pattern of Class II subjects.
Methods: We performed a retrospective study on 28 randomly selected patients from the Orthodontic department of dental school of University of Bari. Inclusion criteria: Angle Class I or Angle Class II, complete permanent dentition, no previous orthodontic treatment. Exclusion criteria: patients with Angle III Class or unilateral Angle Class II, cleft lip and palate, oligodontia, craniofacial anomalies. Sixteen patients (n1, n16= females and n7=males) affected by II Class malocclusion with significant overjet were compared with twelve patients (n2, n6=females, n6=males) with I Class occlusion. It was performed a cephalometric evaluation on both groups. Moreover, in Class II group, it was selected a group of eight patients (n3) with more than 30° inclined posterior occlusal plane in correlation with the Frankfurt plane (FH). Statistical analysis was performed with T-student for independent samples between group n1 and n2 and between group n 3 and n 2.
Results: Cephalometric values comparison performed between group n1 and n2 showed the following results: it was found a statistically significant increase of the following angles and linear measures in n1 Class II patients: FHˆRAM-I (FHˆtangent of posterior border of the mandible), Na-Pog (distance Pogonion-perpendicular axis to FH from Nasion), A-P diff.

(difference of distance from Pogonion and A point to the perpendicular axis to FH from Nasion). It was found a statistically significant increase of the following angles and linear mesures in n2 Class I patients: FX (FH^Mandubular plane), Mand-L (Mandibular lenght), P^PO (posterior occlusal plane^FH), U6^FH (first maxillary molar axis^FH), U7 (second maxillary molar axis^FH). n3 group compared with n2 group showed a statistically significative increase of the following values: Na-Pog, AP-diff, and a statistically significative decrease in FX, RAM-H (Mandibular height), Mand-L, Max-L(Maxillary lenght, SNA-SNP).
Conclusions: The patients in group n1 with II Class malocclusion showed smaller, retruded and in clockwise rotated mandible. Half of the n1 group showed a posterior occlusal plane steep posterior occlusal plane and an accentuated occlusal curvature in the upper dentition. Posterior occlusal plane's major inclination is associated with smaller, retruded, clockwised mandible. Steep occlusal plane is associated with less vertical growth of upper second molars. Increase of vertical growth of inferior second premolars. It was showed that skeletal II Class malocclusion was linked to vertical deviation of occlusion. Inclination of POP was related to the development of Class II with significant overjet malocclusion in previously untreated subjects.

Orthodontic approach in dentalalveolar trauma: a case report

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Aim: Traumatic events of the oral and maxillofacial district which involve frontal teeth are common in daily dentistry clinical practice. The prevalence of dento-alveolar traumas is estimated to be 30%, with greater involvement of male gender, in pediatric and adolescent patients. The most frequently affected teeth are the central upper incisors followed by the upper lateral incisors and the lower incisors. Among the predisposing factors we find:
1. Dental factors (cavities, enamel dysplasias, etc.).
2. Dento-facial factors (open bite malocclusion, prognathism, etc.).
3. Systemic factors (age, stress, epilepsy, sports practice during school activities etc.).
We present a relevant case report: S.P.M.T., a 14-year-old male patient, on 5 April 2018 came in the E.R. of the San Paolo Hospital (Milan) because of a facial trauma due to an accident occurred during school time: he had been hit by a friend with the tip of an umbrella extruding 2.2. During the clinical examination it was noticed: swelling and soft tissue edema, extrusion of tooth 2.2, multi-bracket orthodontic appliance in either dental arches.
Methods: In the first instance X-rays examinations were carried out. Ortopamtomography: to evaluate the state of the teeth involved and possible consequences interesting jaw bones. Endoral RX: to rule out any fractures of any teeth. It was confirmed extrusion of tooth 2.2, without any teeth o or jaws fractures. The orthodontic treatment was performed after a local anesthesia with 2% mepivacaine and vasoconstrictor (adrenaline 1:100.000): Repositioning of tooth 2.2 in its alveolus; Stabilization of the tooth involved by orthodontic stainless steel wire (.018 x .022) inserted inside preexisting brackets with a metal binding from tooth 1.3 to tooth 2.6. Antibiotic and analgesic therapy with topical applications (gel with chlorhexidine) have been prescribed.
Results: Periodic checks (1, 2, 6 weeks and 20 months) were performed in which orthodontic appliance stability, soft tissue healing, mobility and vitality of the tooth were evaluated. After 2 weeks: tooth 2.2 was positive on the cold vitality test (delayed) with no mobility and local lesions were absent; endoral RX didn't show any periapical alterations. After 6 weeks: tooth 2.2 maintained its vitality, had no mobility. Patient was visited by his orthodontist for subsequent checks. After 20 months: tooth 2.2 maintained its vitality, no mobility. OPT and endoral RX were perfomed: no lesions were found.
Conclusions: This case report underlines the importance of orthodontic approach in the treatment of dentoalveolar trauma. In addition, periodic controls with a correct follow-up play an important role in the final outcome and, therefore, in the optimal resolution of the case. In particular, our little patient has restored the function and the aesthetics of the interested anatomical district.

3D quantitative analysis of the hard and soft tissues of the palatine vault for orthodontic miniscrew insertion

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Aim: The purpose of this investigation was to determine the optimal insertion site for orthodontic mini-implants, evaluating total and cortical bone thickness of the hard palate, and mucosal depth, in the area of the third palatal ruga, and if the

bone availability changes, further or closer to this level, in the anteroposterior direction, based on the measurement grid of the anterior palate, using digital models superimposed on CBCT.
Methods: In this retrospective cross-sectional CBCT study were included 32 subjects. CBCT records were generated by i-CAT CBCT scanner (Imaging Sciences International, Hatfield, Pa), each CBCT exam was exported with the Digital Imaging and Communications in Medicine (DICOM) and were imported in Blue Sky Plan software V4.7 -64 bit (Blue Sky Bio LLC, Libertyville, IL, USA). Stone cast models were digitalized with an extra-oral scanner (Maestro 3D, Age Solutions, Pisa, Italy) and exported in STL (STereo Lithography) format and imported in Blue Sky Plan Software. The Blue Sky Plan Software allows the superimposition of the CBCT volume and the digital model of the upper arch, permitting to measure with the same software interface mucosa and bone thickness. All the records were evaluated overlapping CBCT volume and digital model. Cortical bone thickness palatal mucosa thickness and bone depth was measured at the level of the third palatal ruga, 2 mm more anteriorly and 2 mm more posteriorly: these three outcomes were evaluated at the level of the palatal suture, 2 and 4 mm laterally to the palatal suture. Descriptive statistics and inferential statistic were performed for the considered outcomes.
Results: The average higher amount of total bone thickness was measured 2 mm distally to the third palatal ruga and 4 mm laterally to the median palatal raphe. Total bone thickness is decreasing in the anterior and median region of the palatal vault. In the median anterior zone of the palate the total amount of bone is reduced compared to the most posterior median regions of the palate. The amount of palatal mucosa thickness is ranged between 2 and 3 mm.
Conclusions: The findings of this study showed that the perpendicular palatal bone height increases from anterior to posterior, in the paramedian area. The study showed, regarding all measuring points performed, on the midpalatal suture less bone depth, for the presence of the nasopalatine canal. Furthermore, our data recorded shows, in the anteroposterior direction, higher mean values of total bone thickness behind the third palatal ruga, whereas cortical bone remains unchanged, and it means that it is not necessary to perform a predrilling. Mucosal depth value of 2 mm suggests a transmucosal miniscrew collar height not less than 2 mm. The findings of the present investigation further improve our knowledge regarding palatal bone anatomy and provide a guide for clinicians that prefer to inter palatal miniscrew avoiding to expose patients to the radiation dose of a CBCT exam.

Influence of orthodontic retention on oral microbiological status

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Aim: The oral microbiota provides an important contribution to maintaining oral health and therefore the balance between the over 700 microbial species that populate the mouth. This harmony can be altered by innumerable factors, including the change in the habitat following treatment with orthodontic devices. This study was designed to evaluate alterations in the resident oral microbiota and oral health indexes during the orthodontic retention phase.
Methods: 30 patients were selected with a mean age of 22.3 ± 0.3 years and divided into three groups: 10 patients were treated with upper and lower fixed retention devices, 10 with upper and lower removable retention devices and 10 with lower fixed and upper removable retention devices. The inclusion criteria included: aged between 15 and 30 years, patients at the end of orthodontic therapy, compliance (motivation and good level of oral hygiene), approval of consent regarding the treatment and experimental part of this study. The exclusion criteria included: denture wearers, smokers, allergies or intolerances towards the materials used in the study, antibiotic therapy taken within 3 months prior to the start of the study, radiographically evident loss of alveolar bone, participation in other studies, presence of systemic diseases (diabetes, hypertension, rheumatoid arthritis, depression and obesity), presence of enamel developmental diseases (amelogenesis imperfecta, enamel hypoplasia).To evaluate the oral microbiota, two salivary swabs were collected for each individual: upon delivery of the retention device (T0) and after 5 weeks (T1). Six bacterial species were selected and analysed. In addition, the oral health indexes were monitored at both time points (T0 and T1) for all patients: Plaque Index (PI), Gingival Inflammation Index (GI), Pocket Depth (PPD), Bleeding on the Probe (BOP), White Spots (WSL) and Decayed Missing Filled Teeth (DMFT).
Results: The oral health indexes of both T0 and T1 were monitored for all patients. Between the instances

of time T0 and T1, the salivary levels of the bacteria examined tend to decrease and the values of the oral health indexes tend to improve with all types of retention devices (fixed and/or removable). Both improvements found were statistically significant ($p<0.05$).

Conclusions: Fixed and/or removable orthodontic retentions similarly affect salivary bacteria levels and oral health. If correct oral hygiene manoeuvres are performed, the conditions of the oral cavity after orthodontic treatment tend to return quickly to normal.

Low energy polarized light treatment of TMJ disorders in JIA (juvenile idiopathic arthritis) patients

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Aim: Patients suffering from JIA (juvenile idiopathic arthritis) have been treated for years at the orthodontic department of the Polyclinic of Milan. JIA patients in orthodontic therapy come to our observation complaining about algic symptoms of TMJ. The presence of symptoms and signs of functional impairment such as reduced capacity for maximum oral opening, appearance of pain during mouth opening movements, muscle pain and joint noises, were observed in percentages ranging from 26% to 74% of patients. This symptomatology limits the movements of the ATM and the usual oral hygiene maneuvers. The objective of the study was to assess the effectiveness of a therapy using low energy polarized light (PI) devices, in reducing pain, promoting healing of soft tissue injuries and reducing inflammation, improving function and quality of life of the temporomandibular disorders patients.

Methods: Bioptron® phototherapy acts in a natural and non-invasive way, promoting the body's natural regenerative capacity. The light energy, reaching the tissues, promotes the process of biostimulation. The biolamp "Bioptron Pro 1" was used for this purpose, polarizing light in the wave spectrum of 400-2000µm. The resulting light can penetrate the tissues with a depth of 2 to 2.5 cm, depending on the duration of the treatment. The lamp consists of the 50W halogen portion with an attached cooling device. Biopton phototherapy creates an x-ray temperature of about 37° degrees, which is slightly higher than body temperature. International Clinical Research has demonstrated the validity of supportive treatments in the conservative management of acute and chronic injuries as well as post-operative wounds and in the control of painful symptoms in rheumatology, physiotherapy and sports medicine. The following tests are performed before subjecting the patient to phototherapy: measurement with millimeter gauge of the maximum opening taking the distance between upper and lower incisors; documentation of the extent of joint pain opening up through the Numerical Rating Scale NRS (Downie, 1978; Grossi, 1983) asking the following question: "If 0 means no pain and 10 indicates the worst possible pain, what pain do you feel now?"; posturometric evaluation using the Lizard Ultimate® bipodal stabilometric platform; Electromyography; Jaw-tracking. No other treatment was given and patients were asked to refrain from taking analgesics during the course of the treatment. Patients undergo phototherapy using 2 applications for 20 minutes at the right and left TMJ.

Results: After phototherapy, clinical data showed statistically significant reductions in pain and muscular spams, improvements in function and increases in muscular strength were reported. From the jaw-tracking examination, significant differences can be seen in both opening and closing movements, protrusion and retrusion. The posturometric examination shows a muscle and postural rebalancing, in the same way with electromyography you get an improvement in the balance of contraction between the masseter and temporal muscles.

Conclusions: Bioptron phototherapy® improves microcirculation, stimulates regeneration and repair, promotes wound healing and relieves pain, with no adverse effects. low energy polarized light could be a valid alternative or concomitant treatment of temporo-mandibular disorders. Due to its non-invasiveness it is particularly suitable in patients with AIG who can carry out this therapy even domicily given the ease of assembly and application of the device.

Orthodontic patients on the web. What's the quality of orthodontic information available online?

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Aim: In a world that's becoming more digital-based than ever, patients tend to use the Web to gather information concerning oral health conditions and treatments. Unfortunately, the Internet may represent

an ambiguous source of health information, since there's no control over the material that can be uploaded online. This study aims to assess the quality of digital information that can be found online by Italian patients when searching for orthodontic and/or gnathological topics on Google.

Methods: 6 different Internet searches were conducted on Google. To simulate real searches carried out by patients in our Country, search terms were written in Italian. The keywords were chosen using Google Search Predictions after deleting search history and cookies from the browser, in order to select search terms actually used by laypeople and representative of real trending searches conducted in Italy. For each search, 10 websites were selected according to the following criteria: advertisement websites, repetitions, sites requiring registration or login, and those linking out to scientific articles were excluded. The quality of information contained in each website was assessed using the DISCERN tool. Each site was evaluated by 2 examiners independently, and their assessments were then compared using Mann-Whitney's test. For each website, Mean Overall Score (MOS), Mean Reliability Score (MRS), Mean Informative Score (MIS) were calculated. Comparisons between the websites, grouped basing on the 6 different searches used to find them, were made using MOS, MRS and MIS.

Results: Less than 25% of the websites reached a "good" quality level. None of the selected websites was evaluated "very poor", although only 2 websites were "excellent". MRS resulted to be lower for the websites found using the keyword "orthodontics" ("ortodonzia"). Reliability of the web pages found with Google search "invisible appliance" ("apparecchio invisibile") showed great variability. The websites found typing the keyword "gnathology" ("gnatologia") were characterized by very low informative quality scores (mean=13,90/35).

Conclusions: The quality of orthodontic information available online resulted to be mediocre. Hence, patients who seek information on the Web should be cautious in interpreting and trusting what they may find. Clinicians as well as scientific societies should use the DISCERN tool as a guide to organize complete and valid contents to upload online, therefore creating reliable and exhaustive digital publications. Eventually, this could lead to an improvement in the overall quality of orthodontic information available for laypeople on the Web.

Comparative evaluation of two different computerized cephalometric analysis software

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Aim: Cephalometric analysis is an essential tool for orthodontists, as it is used for diagnosis and treatment planning as well as for evaluating the treatment results. Due to technological progress, conventional cephalometry – performed by hand-tracings on acetate overlays – is now flanked by computerized methods based on programs which automatically calculate cephalometric values, making the analysis less time consuming. This study aims to compare two different widely used programs: OpenCeph (version 4.1.0.0, developed by Doctor Bruno Oliva) and NemoCeph (version 10.4.2, developed by Nemotec), in order to assess if there is any significant difference in the linear and/or angular values obtained.

Methods: 20 pre-treatment cephalometric radiographs were randomly selected from the archives of Institute of Dentistry and Maxillofacial Surgery, Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Università Cattolica del Sacro Cuore, Rome. Each cephalometric radiograph was processed using the two programs under investigation. Eight skeletal and dental parameters of Tweed analysis were chosen: SNA, SNB, ANB, FMIA, FMA, IMPA, AO-BO and occlusal plane angle. Cephalometric analysis was performed by two examiners qualified as Orthodontic students: the first examiner processed each of the 20 cephalometric radiographs twice using each program in order to control intra-examiner variability. The second examiner performed the tracings of the 20 radiographs once with each program to assess inter-examiner variability. The values obtained by the two examiners were then compared. Reliability and reproducibility of the results for each parameter were measured using Bland-Altman plot. Intra-class correlation coefficient (ICC) between the examiners' assessments was calculated for each variable measured with each program.

Results: Bland-Altman analyses of the variables showed that almost all measurements lied within the confidence interval and that no systematic error was detected. Mean difference between the measurements performed with the two programs was close to zero for the following parameters: SNA, SNB, ANB, FMA and occlusal plane angle. Occlusal plane angle, however, displayed the wider confidence interval of all the parameters analyzed. The correlation between independent measurements performed by the two examiners resulted to be high for all parameters. ANB, SNA and SNB were the parameters that showed the highest reliability, with ICCs greater than 0.96 for both the programs.

Conclusions: Computerized cephalometric analyses performed by the same clinician using OpenCeph and NemoCeph gave similar results for all the parameters

analyzed. Occlusal plane angle was the parameter that showed the highest variability between the measurements performed using the two programs under investigation. Results show that there is agreement between the two cephalometric programs.

Influence of bone morphology on dental displacement in case of post extraction space closure: a literature review

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Aim: To analyze how the bone morphology affects in space closure of post extraction sites, in case of orthodontics extraction treatment and on terms of space closing time.
Method: The research was carried out through scientific libraries as Pubmed, Cochrane. We considered articles concerning: bone thickness, the difference between the upper and the lower arch in case of closing space in orthodontic treatment, the time elapsed between tooth extraction and the beginning of the dental movement, the closing speed of the space. Article regarding bone changes in patients with systematic diseases have been excluded from the research. In particular, 11 articles were considered relevant.
Results: The research did not produce significant results, the literature did not provide sufficient articles on the subject. In most of the articles found the topics are about the bone loss that occurs in the incisors during the retraction process; several articles propose methods for mesialization in the lower arch; still others confirm the need to acta s soon as possible in the process of closing spaces to keep the alveolar bone as intact as possible.
Conclusions: From the analysis of the articles found and in particular from those selected it is possible to ascertain the following results, since they have more than one article. The changes found after retraction of the anterior sector were noted at the level of the cervical portion of the alveolar bone in the labial part of the mandibular incisors. In both arches, however, there was a decrease in bone thickness in the lingual / palatal part. In some cases, vestibular bone exostoses may occur to the lower incisors following thein retraction. The thickness of these exostoses is greater than the interdental bone thickness and allows safe retraction movements. In case of retraction of the upper incisors, several studies demonstrate the increase in thickness of the alveolar bone in the cervical third of the vestibular wall. The movement of the posterior sectors is difficult in the lower arch than in the upper arch. Northway proposes an alternative method for mesial displacement in the lower arch in a post extractive segment, with a procedure that allows to safeguard interdental bone trabecula. The proposed method avoids the immediate collapse of the alveolus since the tooth is extracted in more times, in this way the movement takes place more easily. In the mandibular molars the bone thickness increases during the closure of spaces while it decreases or remains stable during the opening of the spaces. Finally, starting the space closure processa s soon as possible helps to mantain sufficient bone levels and reduce post extraction atrophy, especially in the jaw where greater bone loss has been seen in the labial part of the alveolar bone.

Risk factors for gingival recession: a systematic review

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Aim: The purpose of the study is to analyse, in a systematic review of the literature, a number of clinical and X-ray elements useful to the orthodontist to identify the possible risk of recessions in patients who are candidates for fixed orthodontic therapy that foresees a pronounced advancement of the mandibular incisors.
Methods: A systematic review of the materials has been carried out from 1996 to 2020 through the search engine PubMed (Mediline), with the use of the following key words: periodont, orthodontic treatment, fixed appliances, gingival recessions, mandibular incisors. We included 7 articles (review) out of 880 evaluated, reporting clinical and X-ray analyses on patients undergoing fixed orthodontic therapies. The analyses evaluated were performed at multiple time intervals (pre-treatment, immediate post-treatment, late post-treatment).
Results: The soft tissue recessions on the facial, or lingual, or interproximal areas are defined as the displacement of the marginal tissue apical to the Cemento-Enamel Junction. The occurrence of gingival recessions is from 1,3% to 10% in orthodontic patients. The etiopathogenesis of recessions is yet to be defined, although we identified some predisposing and determining factors. Predisposing factors are: anatomical and morphological features, determining factors are every kind of conditions which can induce or accelerate soft and hard tissues inflammation or creations of alveolar bone dehiscence. From the literature review, clinical aspects which emerged as relevant are: dolichofacial individuals, less than 2 mm of keratinized gingiva, thin biotype, inadequate

plaque control, smoking, radicular tooth decay or incongruous fillings, prosthetic over contours, pulling frenulum, abnormal dental positions, cross-expansion therapies, excessive orthodontic forces, presence of pre-treatment mucogingival lesions or chronic marginal gingivitis and ulceronecrotizing diseases.The x-ray aspects which seem significative are: hyperdivergence, vertical facial growth patterns, dehiscence and fenestration (preexisting or iatrogen), a thinner and longer symphysis, a drop form symphysis, a thinner labial alveolar bone, a thinner total alveolar bone, increased IMPA angle (Tweed), inclination between lower incisor long axis and Pg-point A line (Ricketts), inclination between lower incisor long axis and Nasion- point B line and millimetric distance from incisal edge and point B (Steiner). They are not instead risks factors: age, genre, race, treatment duration, treatment type, the skeletal or dental relationship (AOBO according to Wits, ANB according to Steiner).

Conclusions: Although the etiopathogenesis is almost undefined, a determining factor is the way of bone remodelling: a complete bone remodelling prevents from bone defects unlike, a partial bone remodelling could form a dehiscence in the alveolar crest. Not being possible for the clinician predicts the exactly way of bone remodelling, the creation of standard parameters considerable risk factors can reduce the risk of developing recessions. It's always recommended, in case of doubt, to refer a periodontal specialist for a interdisciplinary management of the case.

Bone anabolism and catabolism during orthodontic movement

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Aim: Metabolites are the best key to understanding phenotypic expression, since they are the final products of cellular regulatory processes and their levels can be considered as the biological system's definitive response, reflecting both the information contained in the genetic code and the influences coming from the interaction with the environment. Metabolomics principles can be applied in order to monitor the conditions of the periodontium during an orthodontic treatment. The aim of this literature review is the analysis of biomarkers and metabolites described during orthodontic tooth movement considering both catabolic and anabolic sites.

Methods: The review search in databases such as Pubmed, Scopus and Cochrane was performed with a clear search strategy with inclusion and exclusion criteria. To be considered for the review, the studies had to be clinical case-control studies, with a minimum sample of 10 patients in orthodontic therapy, including comparison between catabolic and anabolic sites and analyses of biomarkers and/or metabolites in GCF samples. In vitro, animal and descriptive studies were excluded.

Results: Accordingly to the inclusion and exclusion criteria, 5 studies were retrieved (Dudic et al 2006, Cantarella et al 2006, Canavarro et al 2013, Barbieri et al 2013, Castroflorio et al 2017). All the studies performed an analysis of biomarkers in anabolic and catabolic processes during orthodontic movement, but none of them performed metabolites' analysis. The examined studies were characterized by methodological heterogeneity, even if the findings of Barbieri et al and Castroflorio et al, highlighted a characteristic variation in the production of anabolic and catabolic biomarkers when comparing moving teeth to control teeth. The biological description of the orthodontic movement, including the increasing concentration of RANK and the decreasing concentration of osteoprotegerin (OPG) in the analyzed samples of anabolic sites, indicate an ongoing bone remodeling process, as well as the pro-inflammatory cytokines increase highlighted in the catabolic site samples' analyses.

Conclusions: The review underlines the lack of information regarding metabolites of the anabolic and catabolic sites during orthodontic tooth movement. Studies in this field are highly recommended. In the era of personalized medicine metabolites involved in orthodontic tooth movement could provide information related to the patient response to specific treatment mechanics.

3D evaluation of a clinical case of orthognathic surgery

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Aim: A 27 years old female patient (R.T.) who was

referred to the University of Chieti-Pescara in Chieti, Department of Oral Science, Nano and Biotechnologies tols us her symptoms: she had a main complaint of pain and functional impairment at the temporomandibular joint associated with episodes of tension-headache, pain at the level of the shoulder and masticatory difficulties. We made a clinical examination, so we recaved some important characteristics: III Class, recurved mandibular condyle in backward position, narrow dental arches, dolicofacial aspect, concave facial profile, dental crowding. Our patient reported this symptomatology a medium/intense headache (most likely of a tension nature), pain at the level of shoulder of medium intensity (so the movement of the shoulder were reduced), a sense of heeling, a limitated opening of the mouth and finally, pain during chewing.

Methods: Prior to surgery, the patient underwent orthodontic treatment which included: Treatment with a bite of new generation (0,7 mm thick) for a period of two months. This treatment could induce muscle relaxation at the level of the ATM and a possible relief of the algic symptomatology. The treatment was accompanied by appropriate exercises of muscle contraction and relaxation prescribed twice a day. Finally, orthodontic brackets were applied to get the patient ready for the surgery. We also applied a surgical approach using Orthognatic surgery, post surgical orthodontics and in the end passive aligners to keep our results in time.

Results: The patient had a great benefit due to our treatment. She now can accept herself and the pain she felt expecially to the shoulder (a pain that limited a lot her movements) and to the head disappeared, so her quality of life had a big increase.

Conclusions: Following orthognathic surgery which led to a correct positioning and function of the temporomandibular joint, we obtained a complete remission of the patient symptoms. Our results clearly show that anatomic and functional alterations of the temporomandibular joint can have a profound impact on everyday life of a person. In the case presented here, the patient fully recovered the function of the ATM, including a correct mastication.

Mandibular and maxillary implant site changes in three different clinical approaches: orthodontic extrusion, regenerative surgery and spontaneous healing after extraction. A systematic review

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Aim: To compare the biologic, functional and esthetic outcomes of three different approaches prior to implant placement in both maxillary and mandibular arch: orthodontic extrusion, regenerative surgery and spontaneous healing after extraction.

Methods: The systematic research of articles was conducted up to January 2020 in three databases: Medline, Scopus and the Cochrane Library. The following limits were activated for the digital research: Human, English. Studies were selected in a three-stage process according to the title, the abstract and the inclusion criteria. The reviewers performed each phase of this selection process independently and any disagreement was resolved through discussion. The methodological quality and the risk of bias of the included studies were evaluated using specific tools: ROBINS-I tools for non-randomized studies, Rob 2.0 for RCT. Quality evaluation of Case reports was performed using CARE guidelines.

Results: Through the digital search 1,607 articles were identified and 25 of them were included in the systematic review: eleven studies (9 case reports and 2 case series) reported on orthodontic extrusion and nine studies (5 case reports, 3 case series and 1 RCT) reported on regenerative procedures for implant site development; five studies (4 RCT and 1 prospective study) reported on spontaneous healing of the extraction socket and delayed implant placement. The studies were conducted in a private office or in a university setting. The qualitative evaluation showed a good methodological quality for RCT, while non-randomized studies and case reports showed a modest and poor methodological quality respectively. Based on the available results both orthodontic extrusion and regenerative surgery allowed an implant site development with satisfying esthetic and functional outcomes. On the contrary, studies about spontaneous healing of the extraction socket reported a resorption of the edentulous ridge, which complicated the implant insertion. No study referred failures or severe complications. Most of studies reported only qualitative results.

Conclusions: The present systematic review demonstrated that in Literature there is a substantial lack of data and evidence to determine which of the presented methods is better to develop a future implant site. Both surgical and non-surgical procedures appear effective in the regeneration of hard tissue, whereas not all the techniques can improve soft tissue volume, too. Orthodontic extrusion appears a promising approach for the implant site development, because it enhances simultaneously both hard and soft tissues and shows a lower risk of complications compared to surgical procedures. Further studies are necessary to quantitatively evaluate the efficacy of

the different approaches and to create an evidence-based clinical protocol.

Serious anterior open bite associated with oral habits treated with orofacial myofunctional therapy: a case report

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Aim: This work illustrates a case of serious anterior open bite associated with pacifier sucking and atypical deglutition. The type of treatment used is only represented by orofacial myofunctional therapy (OMT).
Methods: The recruited patient was a 5,8 years old, male and had a deciduous dental formula. All essential clinical data were collected, including medical and dental history and clinical investigation. Model casts have been made, intra and extra oral photos were taken and, moreover, OPT, L-L and P-A teleradiography have been requested and analyzed. At the subsequent cephalometric analysis, the patient resulted hyperdivergent (SpP^GoGn =30°) and belonging to skeletal Class II (A:Po=11 mm). At the beginning of the therapy the first permanent molars were not erupted and therefore the dental class was not evaluable. A series of deglutition exercises were chosen and the patient was motivated to abandon the noxious habit of the pacifier sucking. The use of any type of intra oral device has not been envisaged. The myofunctional exercises had to be practiced regularly every day, 3 times per day, in front of the mirror. The patient was included in a follow-up program in order to properly monitor both his results and his compliance over time. The therapy lasted 8 years.
Results: It has been observed that after only one month of myofunctional therapy there was a clear clinical improvement of anterior open bite. Regular and constant practice of the deglutition exercises changed tongue elevation, tongue posture at rest and tongue position during swallowing. After one year of therapy the malocclusion was almost completely corrected and the achieved results appeared to be stable over time, thus non orthodontic bite was needed. Moreover, during the whole period of supervision the patient had a good compliance and his growth was well-balanced.
Conclusions: The persistence of a noxious habit such as the pacifier sucking may result in long-term problems. Non-nutritive sucking can affect the stomatognathic system, leading to a lack of balance between external and internal muscle. The early detection and timely treatment represent a valid aid for the resolution of the dysfunction. The correct and regular training of home exercises as well as the cessation of bad habit require patient's cooperation and therefore the compliance plays a key role in the effectiveness of the treatment. In selected patients, orofacial myofunctional therapy may be a valid non-invasive interceptive therapy, contributing spontaneously to a structural and functional normalization. Therefore, it is possible to correct a serious anterior open bite associated with oral habits using the OMT.

Correlation between resting tongue posture and obstructive sleep-related breathing disorders

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Aim: In physiological conditions the respiratory airflow passes through the nosepharynx. If problems of various nature that make nasal breathing difficult arise, adaptations are made to facilitate oral breathing, this causes repercussions on the musculoskeletal orofacial complex. The aim of this study is to investigate the correlation between resting tongue posture and presence of a high risk of obstructive sleep-related breathing disorders in growing subjects.
Methods: The study was conducted on a sample of 100 subjects, aged between 8 and 12 years, recruited sequentially, over the period 1st September 2018-31st May 2019, in the Department of Orthodontics, Institute for Care and Scientific Research Galeazzi, University of Milan. For the evaluation of the risk of obstructive sleep-related breathing disorders, a validated questionnaire, the Pediatric Sleep Questionnaire (PSQ) in 22 items (PSQ-SRBD scale), was administered to one of the child'sparents. Raw scale scores were calculated as the proportion of questions answered affirmatively. Occasional missing answers or responses of 'don't know' were discounted from the denominator when calculating these proportions. If the score is greater than 0.33 the test is positive and the patient is considered to be at high risk for

obstructive sleep-related breathing disorders. The examination of the resting tongue posture was carried out on the dental unit using the Payne technique which includes the application of a fluorescent substance in three points of the tongue. Then, using an ultraviolet lamp, areas of the oral cavity with which this substance came into contact can be visualized. The association was analyzed using Fisher's exact test. Significance values p less than 0.05 were considered statistically significant.
Results: The results of this work suggest the existence of a statistically significant association between low posture of the tongue at rest and the presence of a high risk of obstructive sleep-related breathing disorders in growing subjects (p=0.01). The stomatognathic system participates harmoniously in the respiratory function thanks to a fine sensorimotor system under the control of different cortical and subcortical regions. This harmony can be compromised and alterations may occur in the posture and mobility of orofacial structures and in their respective functions such as swallowing, breathing and phonation. In the sample examined, the majority of patients with a high risk of obstructive sleep-related breathing disorders have predominantly oral breathing in accordance with the scientific literature. This breathing pattern is associated with oral changes: lip incompetence, low tongue posture, hypotonic lips and cheeks and incorrect posture of the tongue interposed between teeth during swallowing and phonation.
Conclusions: In the clinical examination, the presence of an incorrect posture of the tongue constitutes a first element that may suggest a mainly oral breathing and an increased risk of obstructive sleep-related breathing disorders. This allows, already in the first instance, to identify potential patients who need a deeper investigation.

Atypical swallowing: use of froggy mouth® in patients with juvenile idiopathic arthritis (JIA)

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Aim: For a few months now, in the orthognatodoncy department of the dental clinic of the Polyclinic of Milan, has been introduced a new therapeutic device Froggy mouth®. It's an innovative and simple myofunctional appliance used in order to solve atypical swallowing and to allow myofunctional correction of altered tongue position. In particular, the first devices were used in patients with juvenile idiopathic arthritis (AIG).
Methods: Froggy mouth® is a lightweight, non-invasive functional device designed by Dr. Patrick Fellus to correct swallowing defects in children and adolescents. It's made of a flexible thermoplastic elastomer, without latex or phthalates. This helps to significantly reduce the treatment time and avoids the recurrence of deformities due to atypical swallowing, for example. If worn from an early age, it corrects the harmful effects of pacifier, re-educates swallowing and avoids or reduces future functional orthodontic therapies. The device comes in 3 sizes: 4-7 years (size S), 8-11 years (size M), from 12 years (size L). It should not fit perfectly at the level of the lip commissures, but 2 mm from them in order not to generate excessive tensions at the level of the lip muscles. The device should be used 15 minutes every day (in order to activate the neural circuits that generate the automatic movements controlled by the trigeminal nerve) always during a playful activity (in order to activate the lymbic system that facilitates and accelerates the learning process) [Kandel, 2007]: preferably watching TV, while playing videogames or using the computer. The protocol requires to maintain a correct head position parallel to the floor. The clinician will invite the patient to swallow normally with the inserted device, already from the first application in the studio. Since the patient can no longer tighten his lips, he will no longer be able to swallow the saliva with a suction-swallowing, as a result he will have to find a new swallowing program. Checks were scheduled every 6/8 weeks.
Results: Froggy mouth® is also a valuable aid in the treatment of atypical swallowing, then tongue-in-cheek misplacement, in patients with juvenile Idiopathic arthritis. From the comparison of the pre-oral photographic documentation pre and post-treatment you can see an enlargement of the wings of the nose, a greater opening of the eyelids. Extraoral photos show the change in the face, neck and shoulder position immediately after wearing the device. These clinical results can point out a direct correlation between an altered contraction of perioral and masticatory musculature and an asymmetrical contraction of cervical musculature, with TMJ and posture implications.
Conclusions: It's well tolerated by the little ones and therefore well accepted even by the parents, it does not create damage to the mucous, does not need special collaboration. It has no limits of use in patients with JIA in which it manages to explain its effect in a functional, light and non-invasive way.The indications for the device are not limited to open bite, incorrect swallowing, oral breathing, interposition of the tongue, but also in cases of contraction of the palate, deep bite, incisive proclinate, protrusion of the jaw, loss of saliva, difficulty in phonetics and snoring.

Dento-skeletal comparison of two functional therapies for Class II growing patient

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Aim: The aim of this study is to compare the skeletal and dental effects produced by the Forsus Fatigue Resistant Device (FRD) in combination with fixed appliances versus the Pul Fix Device (PFD) in combination with fixed appliances in growing patients having Class II division 1 malocclusion. Class II is one of the most common dentofacial malocclusion and it affects one-third of Caucasian population. Many therapeutical options exist in order to treat Class II patients: functional jaw orthopedics, including fix and removable functional appliances, is one of the recommended therapeutic approaches. The aims of these treatments are jaws relationship correction and overjet reduction.
Methods: Patients were included in the study considering the following criteria: patients who could benefit from a Class II treatment, patients that had a bilateral Angle Class II division 1 malocclusion, ≥1/2 cusp width, permanent dentition, overjet greater than 5mm. Thanks to these criteria 20 consecutively treated patients were evaluated. 10 Patients (6 males and 4 females, mean age 11,25±1,74 years) formed the PUL FIX Group (PG). They were treated with the PUL fix appliance and successively with multi bracket therapy. 10 Patients (4 males and 6 females, mean age of 11,85±1,66 years) formed the Forsus Group (FG). They were treated with FORSUS Fatigue Resistant Device applied during multibracket therapy. The SO-cephalometric analysis of Pancherz was carried out for each patient before (T0) and at the end (T1) of Class II treatment to analyze skeletal and dental changes. Measurements were compared using the T student test. The value for significance was set at 0.05.
Results: A significant advancement of lower jaw with improvement of facial aesthetic was observed in both groups. In particular Pogonion showed an advancement with a minimum proclination of lower incisors in both treatments (FG=4,90 mm; PG=6,60 mm). Pul fix group showed a greater advancement of Pogonion (6,60 mm). Both appliances present an improvement of ANB which showed statistically significant differences from T1 to T0 values for the Pul fix Group (p=0,045). Lower molar showed an advancement in both treatment (FG=5,70 mm; PG=5,40 mm); the differences between T1 and T0 values were statistically significant for Forsus Fatigue resistant Group (p=0,20). Overjet correction was also obtained with a minimum retroinclination of upper incisors in both groups.
Conclusions: Both fixed functional appliances, Forsus Fatigue Resistant Device and PUL fix, lead to a significant skeletal and dental correction of Class II Division 1 malocclusion.

Class III skeletal malocclusion in adult patients: two case reports

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Aim: To compare the effects of surgical vs non-surgical treatment in adult patients with skeletal Class III malocclusion, in order to evaluate the cephalometric values that are indicative of choice between the two treatment modalities.
Methods: One adult patient with skeletal Class III malocclusion was treated with orthodontic camouflage, and one with orthognatic surgery. Pre- and post-treatment latero-lateral teleradiography of the head were examined with Steiner and Tweed analyses. The following cephalometric variables were measured on pre-treatment (T1) and post-treatment (T2) latero-lateral cephalograms : SNA (sella-nasion-A-point), SNB (sella-nasion-B-point), ANB (A-point-nasion-B-point) angles, inter-incisal angle and the upper and lower incisors inclination. The software used for the cephalometric study was Dolphin Imaging and OpenCeph.
Results: The results of the cephalometric analysis showed that in the non-surgical case there was a worsening of the inter-incisal angle (IA: the angle between the upper incisal axis and the lower incisal axis), also associated with an increase of the lower incisors proclination. The IA at T1 was about 125°, while at T2 was about 121°. The upper incisor position continued to be unaltered. In the surgical case there was an improvement related to the advancement of the upper jaw, that may have contributed to an improvement of the SNA (the angle between S-N and N-A planes). As a result, there had been also an improvement of the ANB (the angle between N-A and N-B planes) and the upper and lower incisors position had been corrected after the surgical therapy. The SNA angle at T1 was 82°, while at T2 was 89°. The ANB angle at T1 was -0.8° and at T2 was 4°. There was also an improvement of the inter-incisal angle (IA) in the surgical group, which passed by -7.3° at T1 to -5.5° at T2.
Conclusions: In the non-surgical patient, the proclination of the maxillary incisors and the clockwise rotation of the occlusal plane may have contributed to a positive

overjet and to an improvement of ANB angle. In the surgical patient, the mandibular set-back may have contributed to a correct position of the mandibular incisors and to a reduction of SNB angle.

Neurocentric osteopathic tests predictive to individual response in the treatment of the patient with skeletal II Class

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Aim: Individual variability in the response to orthodontic treatment (interceptive, functional, orthopedic) has always been one of the most significant issues in clinical practice. The aim of the study is to create an osteopathic evaluation model inspired by the tests and treatments performed by the osteopaths Francesco Cerritelli and Andrea Manzotti, in order to create an easy-to-interpret algorithm for evaluating the patient's response from a prognostic point of view. The results of the osteopathic evaluation were compared with those of the individual response to the treatment of Classes II in CS3 on the basis of the orthodontic response predictive parameter, according to L. Franchi and T. Baccetti. Ultimately, a comparison was made between the skeletal divergence according to the Gonial angle of Jarabak and the osteopathic evaluation of the patient's response.
Methods: N=98 patients with an average age of 16 years have undergone an orthodontic case study and a specific osteopathic evaluation, based on the use of perceptual tests and palpatory tests, and have therefore been classified in bad, marginal bad, good, marginal good responder. From this population, a sample consisting of N=5 patients, three females and two males, who have a skeletal Class II in a CS3 vertebral stage was extracted. These were evaluated using the osteopathic algorithm and for each the orthodontic predictive parameter of L. Franchi and T. Baccetti was calculated, equivalent to the width of the Co-Go-Me angle, which has a threshold value of 125.5°: if the angle is greater than 125.5°, the patient is considered Bad responder; instead, when it is lower than 125.5°, the patient is evaluated as a Good Responder. Subsequently, the width of the Gonial angle, Ar-Go-Me, was analyzed, according to Jarabak.
Results: The collected data were compared using the Chi-square statistical test, in order to evaluate the presence of statistically significant values with a p-value <0.05. The results obtained by comparing the orthodontic and osteopathic predictive values did not show statistically significant values for the small number of patients. However, there was a statistical trend (100%) of correlation between all osteopathic and orthodontic parameters, so the orthodontic Good Responder corresponds to the osteopathic Marginal Good and the orthodontic Bad corresponds to the osteopathic Marginal Bad. In the same way, we have a 100% correspondence of the values between the divergence and the osteopathic evaluation of the patient, so the hyperdivergent coincides with the osteopathic Marginal Bad responder and the hypodivergent coincides with the osteopathic Marginal Good responder.
Conclusions: A larger sample will be the subject of further studies in order to obtain statistically significant values and to strengthen and validate the partnership between osteopaths and orthodontists both in the diagnostic phases and during the treatment.

Unilateral posterior crossbite treated with function generating bite (FGB) and evaluation of masticatory function, postural stability and spinal flexion: a case report

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Aim: Presentation of a case of right unilateral posterior crossbite treated with Function Generating Bite and analysis of chewing pattern, postural stability and spinal curvature in the frontal plane before and after orthognatodontic therapy.
Methods: A 7,3 years old male patient with right unilateral posterior and canine crossbite, mesodivergent (SpP^GoGn=20°), basal Class III (A:Po=1 mm, ANB=1°) is presented . The following diagnostic data were collected: medical and dental history, clinical investigation, model casts, OPT, L/L and P/A teleradiography and cephalometric analysis, intra- and extra-oral photos. Masticatory function have been recorded with a K7 Myotronics Kinesiograph. The spinal curvature in the frontal plane was recorded with the use of the Spinal Mouse. It was also registered postural balance with the use of Lizard stabilometric platform. The following stabilometric measurements were considered: weight distribution on foot area, speed of body sway, right and left center of gravity; tests were performed under two occlusal conditions: teeth in maximal intercuspal position (MI) and in rest position without dental contacts (RP). The

therapy was carried out with Function Generating Bite (FGB). The FGB used was manufactured with acrylic resin, expansion springs and stainless steel posterior bites that prevent occlusal contacts between opposing teeth. The data were recorded before treatment and after the correction of the crossbite.

Results: Before treatment, the analysis of the masticatory function showed on crossbite side a predominance of reverse chewing cycles while the unaffected side showed exclusively physiological cycles. After the correction of malocclusion, the analysis of the masticatory function showed a predominance of physiological cycles on both sides. Before therapy, the patient presented significant differences in weight distribution and in speed of body sway between the two conditions of with/without dental contacts. It was registered also unbalanced forward weight distribution, asymmetrical foot pressure and anti-clockwise rotation of the trunk. Spinal Mouse in the frontal plane registered an asymmetrical curvature of the whole spine in the frontal plane with greater flexion on the crossbite side (35.7° left side curvature, 50.2° right side curvature). After the correction of malocclusion there was a significant change in the postural stabilometric features with symmetrization of the all stabilometric measurements. It was registered also a significant change in the curvature of the column with symmetrization of spinal flexion in the frontal plane (37.2° left side curvature, 37.4° right side curvature). After functional correction of an asymmetrical malocclusion as unilateral crossbite with Function Generating Bite, the spine curvature of the entire column showed a postural symmetry, showing a general healthier muscular balance.

Conclusions: Patients with unilateral posterior crossbite showed an asymmetrical masticatory function and asymmetrical body posture. The therapy with FGB induced not only the correction of dental malocclusion but also the restor of the symmetry and balance of chewing function and symmetric favorable change in the neuromuscular postural control, allowing the effective achievement of patients' oral and general health after orthognathodontic therapy.

Biomechanical considerations in the treatment of vertical dental dislocations

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Aim: The present study aims to focus the attention of the orthodontists on a frequent traumatic situation: the extrusive dislocation of the teeth. In the authors' opinion, a segmented arch technique approach, instead of a continuous arch technique, may be the better choice for several reasons explained in this paper.

Methods: We performed a literature review on epidemiology, classification and orthodontic management of dental trauma, using the databases PubMed and Scopus. We also reported two clinical cases of extrusive dislocation, treated with segmented arch technique: the biomechanics of the utility arch (UA) was analysed and the efficiency and effectiveness of this approach was discussed.

Results: Dental trauma is a very common occurrence in school-aged children. Prevalence is particularly high in the male sex, especially when a large overjet, more than 6-7 mm, exists. An excessive overjet makes the upper incisors particularly exposed to traumatism. Several classifications of dental trauma have occurred over time, however the bases are common, starting from the direction and the amount of impact and its consequences on the hard and soft tissues of the district. We can distinguish: Concussion, dental trauma with sensitivity to the percussion and mild mobility without tooth dislocation. Subluxation, situation similar to concussion, but associated with increased mobility, bleeding of the gum margin and less favourable prognosis for the pulp tissue vitality. Dislocation, as above but with even greater mobility, traumatism and bleeding of the gum margin, dislocation of the dental element without avulsion. Dislocation direction may be extrusive, intrusive and lateral. Exarticulation, when traumatic avulsion of the dental elements affected by trauma occurs. The International Association of Dental Traumatology (IADT) regularly produces and updates guidelines for the proper management of dental trauma* (https://www.iadt-dentaltrauma.org/for-professionals.html). In the clinical team dedicated to the treatment of dental trauma, the orthodontist plays an important role. He is called in the acute phase in stabilizing a subluxation or in correcting a dislocation. In these cases, there are many problems that the orthodontist is facing: the fragility of traumatized elements, the pain and fear that the small patient experiences, the bleeding of the soft tissues that hinders the correct placement of brackets and, finally, the effective and efficient biomechanics to be employed in the presence of anchorage areas that may lack or be traumatized. The choice must first go through the selection of the best strategy between continuous and segmented arch techniques. In the authors' opinion, segmented arch techniques are more favourable in extrusive dislocation because the extrusive side effect of the utility arch is anchored on molars instead of the other frontal teeth. It is very important to avoid an anterior anchorage because a Burstone Class I mechanic would be created causing some disadvantages: 1) extrusion of the unaffected tooth 2) less intrusion of

the affected tooth 3) rotation of both affected and unaffected tooth 4) the amount of the force may be inaccurate. These side effects do not exist in a segmented arch technique, because a single precise force passing through the center of resistance of the affected tooth is created, while the anchorage unit is only located on molars.
Conclusions: Dental trauma is a severe clinical situation frequently occurring in children. A correct biomechanical approach is the key for a complete correction and, especially in extrusive cases, the segmented arch approach may be the better choice.

An evaluation of pulp cavity/chamber volume and shape changes after maxillary expansion performed with tooth-borne versus bone-borne expander. A CBCT short term study using surface-based superimposition and deviation analysis

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Aim: The effect of rapid palatal expansion, and in general of orthodontic forces, on the dentin-pulp complex is as yet unclear. There is evidence that orthodontic forces induce neurogenic inflammation, mediated by neuropeptides, that causes alteration of the pulpal blood flow and hyperemia. Until today the pulp tissue has been analyzed through inspection of histological material and assessment of the pulpal respiration rate. Also, panoramic or periapical radiographs have been used to assess the pulp cavity/chamber size with their intrinsic limitations related to two-dimensional (2D) images analyses of three-dimensional (3D) morphological changes of the pulp cavity. The aim of the study was to compare volume and shape changes of pulp cavity/chamber of maxillary posterior teeth between tooth-borne and bone-borne maxillary expansion in adolescents.
Methods: This retrospective study included 36 adolescents with bilateral maxillary crossbite who received tooth-borne rapid maxillary expansion (TB group, average age: 14.4 years) or bone-borne rapid maxillary expansion (BB group, average age: 14.7 years). Cone-beam computed tomography (CBCT) were taken before treatment (T1) and after a 6-month retention period (T2). Volumetric and shape changes of pulp cavity/chamber of maxillary first molars, first and second premolars were detected by referring to a specific 3D digital technology involving surface-based registration of CBCT scans at T1 and T2 and deviation analysis of CBCT-derived models of pulp cavity/chamber. Unpaired Student's t test was used to 1) compare T1 and T2 volumes of pulp cavities in TB and BB groups, 2) assess if there were differences between the two groups in the post-treatment volumetric changes and in the percentage of matching of 3D pulp models.
Results: All investigated teeth showed a reduction of pulp volume, being this difference statistically significant for the upper first molars in the TB and BB groups and for the upper first and second premolars in the TB groups ($p<0.05$). This volumetric reduction was significantly greater in the TB group, also subjects in the TB group showed a lower percentage of matching between T1 and T2 pulp models compare to BB group ($p<0.05$). The area most affected by shape change was that of pulp horns.
Conclusions: When tooth-borne expander is used, rapid maxillary expansion could induce a higher volumetric reduction of pulp cavity/chamber of posterior teeth compared to bone-borne expander, in the short-term.

Online orthodontics: the information found on the web. An observational study to evaluate the importance given by patients to digital information, assessing the difference between digital natives and digital immigrants

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Aim: The number of patients who search the web for information concerning medical conditions has increased over the years. More and more often, orthodontic patients surf the web looking for information about diagnosis and therapy. This study's primary aim is to assess the differences between digital natives (born since 1986) and digital immigrants (born before 1986) concerning on the one hand the tendency to search for orthodontic information on the web, and on the other hand their consideration of online sources of information. Furthermore, this study aims to understand how relevant online information can be for orthodontic patients, and to evaluate how many patients seek orthodontic information online, identifying the most used platforms. It also investigates the effects of digital research on patients' decision-making process.
Methods: An anonymous questionnaire was developed and distributed, after being validated through a pilot survey. The study population is composed of 200 parents of orthodontic patients referring to Gemelli policlinic in Rome, including subjects ranging from 18 to 70 years old. Using this questionnaire, the study participants are asked questions concerning the ways

they gather orthodontic information as well as the effects digital material has on their decision-making processes. The survey features open general questions about age and gender. Multiple-choice questions are then asked on the following topics: online research carried out before the orthodontic visit, main platform used, secondary platforms used, how much the patient considers useful the information found online; consistency between information found online and diagnosis and treatment proposed by the orthodontist, evaluation of the reliability of the sources, decision-making processes in case of divergence between material found online and orthodontist's opinion. Descriptive statistics indexes (percentages and means) are used to describe the answers given by patients and to create graphs. Chi-Square test is then used to compare the answers given by the two groups (digital natives and digital immigrants).

Results: Three-quarters of the respondents claim to use the Web in order to seek information about orthodontics. Google and Youtube are the most used platforms by both age groups. The results of the Chi-Square test reveal a statistically significant difference ($p<0.05$) in the behavior of the two groups, exclusively as regards the tendency to seek information online before the orthodontic visit and the decision-making process in case of divergence between material found online and orthodontist's opinion. The tendency to search for orthodontic information on the Web is more common in women and digital natives. Among the latter, the majority trust the doctor's opinion, or alternatively many of them propose to the orthodontists what they found online; among digital immigrants, the majority also trust the dentist's opinion, but a considerable percentage decides to consult other orthodontists, thus interrupting the relationship of trust with the doctor.

Conclusions: It may be desirable that orthodontists, dental professionals and doctors in general, take into consideration the requests of the patients or their parents, especially of those who are unfamiliar with digital technologies, in order to help them to discern between scientifically valid and clinically unfounded, incomplete or inaccurate sources, in the vast world of the Internet.

How to prevent periodontal defects in the disimpaction of buccal canines: tunnel traction and roll flap techniques

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Aim: The purpose of this paper is to present two techniques, that allow to avoid the onset of periodontal defects on the impacted buccal canines. These procedures are the tunnel traction and the modified roll flap (MRF).

The aim of the tunnel traction method is to guide an infracrestal eruption of the canine reproducing the physiological eruptive process in the centre of the alveolus. This closed eruption prevents periodontal defects creating an osseous tunnel between the empty socket of the removed deciduous tooth and the impacted cusp. If the deciduous canine is no longer present, it's possible to create a tunnel directed towards the center of the alveolar ridge. The modified roll flap is a way to increase buccal keratinized soft tissue in canines that are located in the alveolar mucosa.

Methods: The procedure applied in the treatment of the impacted canines with the tunnel traction technique is the following: the deciduous tooth was extracted and then the impacted canine was exposed by opening a full thickness flap to place an attachment on its crown. The cusp of the impacted tooth was put in continuity with the empty alveolus of the deciduous by creating a tunnel in the bone. The traction of the canine was directed towards the center of the alveolar ridge using a chain. The flap was sutured to its original position.

In the cases treated with the roll flap technique a semilunar flap was rolled up and sutured towards the amelocemental junction of the tooth. The gum unrolled on the dental surface during tooth extrusion.

Results: In patients that we have treated with these two approaches we have not observed periodontal defects or attachment loss on the disimpacted canines even after years, with normal probing depth. Tunnel technique allows the impacted tooth to erupt in the arch following a physiological path promoting periodontal health. The roll flap technique promotes the presence of keratinized tissue buccally to the canine.

Conclusions: These two techniques are helpful in managing the periodontal health and aesthetics of impacted buccal canines.

Effects of additional surgical and non-surgical techniques on the acceleration of orthodontic movement

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Aim: In this study, we will analyze the additional surgical and nonsurgical methods that are supposed to accelerate the orthodontic movement and we will evaluate their effects and efficiency based on the current scientific data.

Methods: The statistical technique used for the analysis of data will be Network Meta-Analysis NMA through

which a ranking draw of all techniques will be produced and then will be a comprehensive summary guide will be produced. The research was carried out depending on an electronic database on (PubMed, Cochrane Library, Web of Science, Scopus and Embase with the last access in March 2019. The strategy of searching based on using a combination of these keywords: (Orthodontic OR malocclusion OR tooth movement OR tooth displacement OR teeth movement OR Teeth displacement) and (Accelerate OR rapid OR short) and (Random OR Controlled trial). The bibliographies of works and articles were also checked for more additional studies. Manual research (European Journal of orthodontics and craniofacial research). Google Scholar also was used for more potential relevant studies. Some authors were contacted for other unpublished articles or for declaration of results if necessary. 32 studies were included in the study of NMA network meta-analysis.

Results: Based on the additional techniques of acceleration the studies that show monthly rate of orthodontic movement RTM was categorized according to 3 techniques (surgery, laser, vibration) According to the concept of RTM, the orthodontic treatment with additional surgical therapy was the most efficient followed by laser therapy and vibration. The comparison showed that the additional devices of vibration resulted in the same results as the orthodontic treatment without additional techniques of acceleration.

Conclusions: Corticotomy may show clinical benefits in regards to the acceleration of tooth movement in relation to the conventional orthodontic movement and in comparison with other techniques. In particular, the benefits of results are observable soon after the intervention but in the long term are questionable. Particular attention must be taken regarding non-invasive interventions such as vibration. This technique is easily accepted by patients and there are no contraindications or complications after treatment. However, don't show any clinical benefits in the aspect of acceleration of tooth movement. The scientific evidence is limited In both quantity and quality and the confidence in the results is limited. more clinical investigations are necessary of higher quality to estimate the efficiency of additional techniques of acceleration of ortho tooth movement and their potential clinically.

Efficacy of oral irrigators during orthodontic treatment with multibrackets and clear aligners. Microbiological analysis with phase contrast microscope

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Aim: Recent literature reviews showed that there is moderate-to-high evidence that orthodontic appliances are able to significantly influence the concentration of oral microbiota affecting the process of tooth enamel demineralization and increasing caries risk. It was also suggested that appropriate strategies for plaque control should be applicated during the orthodontic treatment, considering the type of orthodontic appliance. The aim of this study is to analyze the microbioma of subjects in orthodontic treatment with multibrackets appliances and clear aligners and the efficacy of oral irrigators on the oral hygiene and periodontal health of orthodontic patients.

Methods: Fifty subjects (27 females, 23 males; 13-30 years old; mean age 21.5 years) were recruited from a larger group of patients (124). The enrollment process was based on the following criteria: (1) age between 13 and 30 years, (2) permanent mandibular dentition, (3) angular Class I malocclusion, (4) 6–6 mild lower crowding measured on dental model, (5) no diastema or spaces in the lower arch, (6) no ectopic tooth, (7) no extraction required or intraoral or extraoral aids, (8) no previous orthodontic treatment, (9) plaque index equal to 0, (10) PSR 0, (11) no gingival recession, (12) periodontal probing not greater than 3 mm in all the sites examined. The sample was divided in two groups: Group A underwent multibracket self-ligating therapy, group B used clear aligners (Ortobel System; Italy). The patients wore the aligners 22 hours a day and replaced them every 14 days. Patients with multibracket self-ligating appliances combined use of orthodontic brush, interdental brushes and one-tuft brushes; patients in therapy with aligners used soft brushes and dental flosses. Every 28 days all patients in the two groups, A and B, underwent plaque sampling and evaluation with a phase scanning microscope. The immobile plaque on microscopic analysis corresponds to compatible flora, the mobile plaque to incompatible flora. If the test result shows compatible flora, the subject continued in the normal home hygiene protocol. If the test found incompatible flora, the subject changed the hygiene protocol, based on the use of sonic toothbrush with vertical oscillation and oral irrigator, while the microbiological analysis continued to be performed every 28 days. Data about the number of patients who changed to incompatible flora and about the variations in microbiological composition after the application of sonic toothbrush with oral irrigator were compared between and within the groups.

Results: Results showed that, even in young subjects, it often happens (about 40%) that patients who start with

compatible flora pass to the incompatible typology. An higher risk of passing to the incompatible plaque was observed in subjects treated with multibrackets appliances as 10 out of 25 patients worsened at the third evaluation while in patients with aligners, only 3 out of 25 patients changed from compatible flora to non-compatible flora (about 10%). The use of oral-irrigator and sonic toothbrush for three months brought back all the subjects to compatible flora.
Conclusions: This study confirms a higher risk of subjects treated with multibrackets to develop risky microbiota compared to subjects treated with clear aligners. The use of an oral irrigator combined with sonic toothbrush seem to be able to restore a good oral hygiene and microbiota in subjects with incompatible flora.

CBCT evaluation of the upper airway changes in growing patients of Class II malocclusion using sander bite jumping appliance

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Aim: To evaluate, through CBCT, the short-term effects induced by the Sander Bite Jumping Appliance on the upper airway volume in 7 growing subjects (2 males and 5 females) with Class II malocclusion due to mandibular retrusion, for an average period of 8.6 months.
Methods: The Sander Bite Jumping Appliance is an orthopedic-functional appliance that aims at an early correction of occlusal and skeletal relationships, at stimulating mandibular growth and at achieving an antero-repositioning of the mandible. The appliance consists of two resin plates: the upper plate has a median expansion screw and two stainless steel extensions (clamps) that form a 60° angle with the occlusal plane. The lower plate, on the other hand, has an inclined plane, parallel to the clamps. Both plates are anchored to the upper molars by two Adams clasps and they have a vestibular arch at the front which reaches the canines. The lower plate has also an incisal resin coating which aims at reducing the vestibularization of the lower frontal group. The initial (T0) and final (T1) upper airway volumes were defined and quantified using the ITK-SNAP segmentation software starting from CBCT, performed using the "NewTom VGi evo". The defined and quantified volumes, delimited by parallel planes to the Frankfurt plan, were: retropalathal volume (RPV); retroglossal volume (RGV); total volume (RPV+RGV).
Results: The collected data were statistically analyzed using the Student's T-Test for paired data (significance<0.05). The variations of all three volumes were all statistically significant, especially the retroglossal volume (P-value=0.002).
Conclusions: The Sander Bite Jumping Appliance leads to the correction of Class II malocclusion and produces a significant increase in retropalatal, retroglossal and total oropharyngeal volumes. The volume that is most influenced by the appliance is the retroglossal one. An airway enlargement may allow prevention and treatment of sleep-related breathing disorders in Class II malocclusion patients, including OSAS: the correction of mandibular retrusion allows Class II patients to obtain better respiratory function.

Assessing intra-arch discrepancy versus inter-arch discrepancy in the orthodontic diagnostic process of surgically assisted palatal expansion: Prevalence of intra-arch transverse discrepancy

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Aim: To assess the intra-arch discrepancy in the diagnostic process of DTM in orthognathic surgery. Managing the transverse diameters means correcting the discrepancy between one arch and the other but also within the same arch. The absence of a therapeutic protocol that starts from the localization of the transverse deficit makes the choice more operator-dependent and the prognosis more uncertain.
Materials: Three patients with transverse maxillary discrepancy have been included in the study. Two patients were treated with surgically assisted palatal expansion before bimaxillary procedure, and one patient with Le Fort I segmental osteotomies (3 pieces) and BSSO. They were asked to get a CBCT before clinical evaluation in order to plan the pre-surgical Orthodontic treatment and the surgical procedure. Thanks to Dolphin Imaging software, 2D radiographs were obtained. This evidence was then compared with post-surgical radiographs and photographs to consider the correction occurred. In particular, from the pre-surgical SARPE latero-lateral cephalometric Mc Laughlin analysis, the inclination of upper incisors (U1-APo) was considered. Anterior and posterior inter-arch discrepancy and crowding values were measured through sectioned 3D maxilla and mandible.

Intra-arch discrepancy (crowding and inclination) was quantified and compared to inter-arch discrepancy to determine if post-surgical unwanted clinical evidence could have been avoided with other treatment choices. Diastema was quantified considering the post-surgical activation of the palatal expander.
Results: In the first and second cases, the intra-arch discrepancy was greater than the inter-arch discrepancy. SARPE in the first two cases is the most suitable treatment since it allows to obtain the necessary space for the resolution of intra-arch problems. In the patient who underwent multisegmented Le Fort I, however, despite the lower intra-arch discrepancy, the presence of vertical and dual plane deficits influenced the therapeutic choice, making the multisegmented osteotomy the best option.
Conclusions: In case of crowding of anterior elements, the space necessary with the expansion methods will be in first place necessary to resolve the anterior discrepancy. In this situation the SARPE technique is the most suitable. With rapid expansion of the surgically assisted maxilla, expansion occurs mainly at the level of the canines and less at the level of the molars, while the segmental osteotomy type Le Fort produces an expansion more in the molar region than that of the canines.

Considering intra-arch discrepancy versus inter-arch discrepancy in the orthodontic diagnostic process of surgically assisted palatal expansion: Prevalence of inter-arch transverse discrepancy

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Aim: To assess the diagnostic role of inter-arch discrepancy quantification in the diagnosis of palatal constriction in patients who need surgically assisted palatal expansion with SARPE or multi-fragmented Le Fort I surgery.
Methods: 3 patients with transverse maxillary discrepancy are considered. 2 patients were treated with surgically assisted palatal expansion before bimaxillary procedure, 1 patient with Le Fort I segmental osteotomies (3 pieces) and BSSO. They were asked to get a CBCT before clinical evaluation in order to plan the pre-surgical orthodontic treatment and the surgical procedure. Thanks to Dolphin Imaging software, 2D radiographs were obtained. This evidence was then compared with post-surgical radiographs and photographs to consider the correction occurred. In particular, from the pre-surgical SARPE latero-lateral cephalometric Mc Laughlin analysis the inclination of upper incisors (U1-APo) was considered. Anterior and posterior inter-arch discrepancy and crowding values were measured through sectioned 3D maxilla and mandible. Intra-arch discrepancy (crowding and inclination) was quantified and compared to inter-arch discrepancy to determine if post-surgical unwanted clinical evidence could have been avoided with other treatment choices. Diastema was quantified considering the post-surgical activation of the palatal expander.
Results: Cases 1 and 2 presented a greater inter-arch transverse deficit than the intra-arch one. The expansion of the maxilla with the SARPE method in these cases creates an excess of unnecessary space, and therefore important diastemas (17 mm in the first case and 24 mm in the second). In Le Fort I patient, however, the preponderance of the inter-arch deficit makes the tripartite osteotomy the best choice, since, leaving the anterior teeth in the initial position, it controls the repositioning of the maxillary arch without creating any spaces and the resolution of problems of skeletal open bite.
Conclusions: In patients who underwent multisegmented Le Fort I surgery, the front teeth are correctly aligned and inclined. An expansion with SARPE technique, which as a method is indicated in the resolution of anterior rather than posterior discrepancies, would result in an increase of anterior space not required for the initial clinical situation and therefore in the formation of excess space, i.e. a diastema that it can be closed by traditional fixed orthodontic treatment only 6 months after surgery. Moreover, the retro-inclination of the upper central incisors could lead to the formation of a negative overjet such as to also require a second intervention of anterior repositioning of the maxilla with the Le Fort I technique, especially in patients in Skeletal Class II.

Assessing the success of aligner orthodontic therapy: a novel 3D method

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Aim: The use of aligners has spread widely in orthodontic practice because it represents an aesthetic and comfortable alternative to conventional fixed equipment. Despite frequent use, not much scientific evidence accompanies the aligners and studies on the predictability of the orthodontic movement and the efficacy of the treatment are few and not very consistent. Although the aligners' design involves the entire surface of the arch, the comparison in most studies is carried out using 2D linear or angular

measurements. In this study, a new method of 3D surface morphometric analysis is proposed for the quantification of treatment success after aligners treatment.
Methods: A sample 10 adult patients (3 Males and 7 Females; mean age 35±9 years) with mild or moderate anterior sector misalignment is considered in this study. All subject underwent orthodontic treatment with aligners and digital dental models were acquired pre-treatment (T0), post-treatment (T1) and compared with the Programmed teeth movement by CAD design (C). A 3D-3D superimposition procedure was performed by VAM© software to reach the minimum point-to-point distance between the two dental arches before and after treatment (T0 and T1), before treatment and Programmed CAD design (T0 and P), after treatment and the Programmed CAD design (T1 and P). The root mean square deviation (RMS) was used as an index to quantify the difference between the overlapping surfaces, in the comparison of the entire arch and the isolated moved teeth. The isolation of the moved teeth was carried out manually. Mean and standard deviation were calculated for all RMS values obtained and the Test T for paired data ($p<0.05$) was used to compare results. The treatment effectiveness was assessed with an innovative percentage index set as the complementary to 100 of the percentage ratio between RMS moved teeth in T1-P overlaps and RMS moved teeth in P-T0 overlaps.
Results: A statistically relevant difference was found in the comparison of the entire arch and the isolated moved teeth before and after treatment (T0-T1) and before treatment with Programmed CAD design (T0 and P). No relevant difference was found in the comparison of the entire arch and the isolated moved teeth after treatment with the Programmed CAD design (T1 and P). The average accuracy index was 54% (SD 8) for the upper arch and 49% (SD 13) for the lower arch.
Conclusions: This study shows that are effective in obtaining a dental movement, not statistically different from what is programmed during the CAD designed of the dental movements. The percentage of reaching the programmed teeth movement obtained in this study is in line with what reported in the literature.

Hyrax versus transverse sagittal maxillary expander: an assessment of arch changes on dental casts. A retrospective study

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Aim: To compare arch changes before and after maxillary expansion with Transverse Maxillary Sagittal Expander (TSME) and Hyrax Palatal Expander (HPE), in growing patients with diagnosis of maxillary hypoplasia.
Methods: The sample consisted of 40 patients' records (20 males 20 females mean age 9.2±2.6 years) were selected from the archive of the Orthodontic Department of the University of Milan, Italy. Patients were randomly divided in two groups: patients in group 1 were treated with HPE as they presented only transverse deficiency of the maxilla and in group 2 were treated with TSME. Plaster models have been measured with a Verniere caliper to evaluate the differences in max- illary expansion of the two devices. Measurements were performed on casts poured from impressions taken before appliance bonding (T0), immediately after appliance debonding (T1) and at 6 months follow-up (T2). The variations in the following distances have been considered: inter-molar distance, inter-canine distance, palatal depth, palatal length and arch circumference. Shapiro-Wilk test was performed to assess normality distribution. ANOVA for repeated measures with multiple paired t- test for pairwise comparisons and its non-parametric equivalent Friedman's test with multiple Wil-coxon tests for pairwise comparisons were performed to evaluate changes in time of each variable in each group. Between groups comparisons were performed for each variable at each observing time using independent t-test or Mann-Whitney test. Significance level was set at $p<0,05$.
Results: Both the Friedman test and the rm-ANOVA test and their respective post-hoc show that within both groups the respective variables have a statistically significant increase between T0 and T1 ($p<0,05$) and a slight decrease between T1 and T2 ($p<0,05$) that is not clinically relevant remain- ing always T2 greater than T0 in a statistically and clinically relevant way ($p<0,05$). The analysis between the differences of the measurements at different timing measured by the Mann-Whitney test shows that for all the variables there is no statistically significant difference between the 2 devices ($p<0,05$), except for the perimeter of the arch and the length of the palate; in this case it appeared that the TSME is better statistically ($p < 0,05$).
Conclusions: The study has shown that RPE and TSME can achieve similar results in transversal palatal expansion. Differences have been found in the palatal length and in the arch perimeter where TSME seems to be more efficient.

Dento-skeletal modifications in functional treatment of Class II/1 malocclusion with elastodontic and three bite plane appliances

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Aim: Class II malocclusion is a condition related to a dento-skeletal sagittal discrepance and an increase of overjet. It is classified as Class II/1 and Class II/2. The purpose of Class II/1 malocclusion treatment is to reduce the overjet and skeletal alteration by improving the mandibular sagittal growth and by blocking the maxillar one. Both removable and fixed appliances can be used to achieve the goal. The aim of this study was to compare the different effects (skeletal and dento-alveolar) of Elastodontic Appliance (EA) and Three Bite Plane (TBP) therapy in growing patients with Class II/1 malocclusion.
Methods: Twenty patients (mean age 11 years old) with Class II/1 malocclusion were selected and examined. Inclusion criteria were: ANB ≥2°; overjet ≥2 mm; Class II division 1 relationship; distal step type deciduous molar relationship; late mixed or permanent dentition; adequate growth potential. Growth potential was evaluated using the cervical-vertebral maturation method (CVM). Children were divided in two groups of 10 patients respectively: group 1 was treated with EA and group 2 with TBP. The Shapiro-Wilk normality test was used to evaluate the type of data distribution. The associated sample T-Test was used to evaluate group comparisons. Statistical significance was set at $P<0.05$. The cephalometric parameters analyzed are: SNPO° angle, SNGoMe° angle, SNPP° angle, ArGoMe° angle, Lower Facial Height, Condilion-Gnation distance. For each patient, the differential values for single cephalometric parameter were calculated. The differential values were established subtracting the pre-treatment cephalometric values from the post-treatment ones.
Results: The most significant results concern the following parameters:. 1. Lower Facial Height: TBP allows an average increase in facial height lower than 0.7 mm, while EA allows an average increase of 8.847 mm. This difference shows an important statistical significance ($p<0.01$): it represents the main difference between the two devices. 2. Condilion-Gnation distance: Both the devices let increase CoGn distance: for TBP the value is 7.349 mm, while for EA is 16.82 mm. This difference shows an important statistical significance ($p<0.05$): it means that the average growth of the lower jaw is greater in patients treated with the EA.
Conclusions: TBP is more indicated in patients with II skeletal Class associated to hyperdivergence.
EA is indicated in II skeletal Class associated to hypodivergence. Specifically, TBP, thanks to the presence of the metal bites, leads to an intrusion (or rather to a "non-extrusion") of the diatoric teeth, allowing greater control of the patient's vertical dimension. EA has an extrusive effect on the diatoric teeth, being more indicated in cases where an increase in the vertical size of the patient is required. Regarding the sagittal mandibular growth, Condilion-Gnation distance values show the main effect of the functional devices in question: they allow a sagittal release of the jaw, "freeing" the lower arch from the occlusal contacts with the upper one, so that the jaw is free to slide forward, allowing its physiological development.

Pain control during orthodontic treatment first

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Aim: The introduction of aligner treatment has recently modified patients' expectations regarding orthodontic treatment. Since their demand for smart, fast and comfortable treatments cannot be neglected, interest for new techniques and devices in this field has raised. Among these, AcceleDent® (OrthoAccel Technologies, Inc., Houston, TX) has been drawing the attention of the scientific community. AcceleDent® is a vibrating device (frequency 30 Hz, force 20 g), which, through a daily 20 minutes usage, promises to accelerate orthodontic tooth movement and reduce treatment-related pain. This device is currently being employed during both fixed orthodontic appliance and aligner therapy all over the world and received FDA approval and CE marking. In particular, pain control has been little investigated up to now. It seems to be due to reduction of periodontal ligament compression and/or to 'gate control' mechanism activation. Both theories are valid, but we still need a good amount of data to assess if this effect is clinically relevant or not. Therefore, our aim with this study is to investigate the effectiveness of vibrational forces in reducing aligner treatment-related pain during initial alignment.
Methods: Adult patients who began an aligner treatment (Lineo®, Micerium, Italy) were allocated to two arms. The first one (group A) used 20 minutes per day the AcceleDent® device, while the second one (group B) did not use any additional device. We registered pain perception during first week of treatment, which is usually the most troublesome when it comes to patients' pain and discomfort. We made use of VAS analogic scale to record pain perception and quantify it. Strict selection and exclusion criteria were applied in order to obtain a sample as much homogeneous as possible.
Results: Twenty-four patients were allocated to group A or B depending on the acceptance of AcceleDent® use. Four patients discontinued treatment and ten of each group were analysed. The two groups were found to be homogeneous for age and malocclusion

type. Group A, which used AcceleDent®, reported a lower perception of pain, with a mean value of 2,4±1,0 versus an average of 4,4±1,4 in group B. According to Student's t-test, the difference is statistically significant ($p<0,05$).

Conclusions: Our initial aim was to assess if vibrational forces had a potential of reduction of pain perception in subjects undertaking an aligner treatment. Data contained in this controlled clinical trial show that AcceleDent® has a significant effect on patients' pain perception, if compared to patients that are not using any device. Authors believe that pain control effect can be added to other reported effects of vibrational forces, such as shortening of treatment duration and complex dental movements' facilitation.

Treatment of a Class III malocclusion with anterior open bite and prevention of bone resorption in agenesis site placing an orthodontic miniscrew

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Aim: To show a possible treatment of a Class III malocclusion with anterior open bite and agenesis of a maxillary lateral incisor, in a growing patient, and to validate the effectiveness of preventing bone resorption in agenesis site through the placement of an orthodontic miniscrew, which supports a fixed prothesis, waiting for a subsequent implant rehabilitation.

Methods: A 6-year-old female patient with Class III malocclusion, anterior open bite, narrow palate with bilateral cross-bite, agenesis of the element 1.2, macroglossia and bad habits (constant use of pacifier) was recruited. Firstly, the bad habits were eliminated, and a bonded rapid palatal expander with vestibular hooks was cemented, anchored to the deciduous molars and to the first permanent molars. After 14 activations distributed in 7 days (0.5 mm per day), extraoral traction of the upper jaw was performed using a Delaire mask for 9 months (with an average force exerted per side of 350g). At the age of 10 years, a second cycle of expansion of the upper jaw was performed using Pendex appliance (0.25 mm per day for 3 weeks) with bands on the permanent first premolars and first molars and, only after the expansion, the activation of the arm for the distalization of the element 1.6 was carried out. Subsequently, brackets were bonded on all the teeth in the upper and lower arch. Immediately after debonding and before lingual retainer bonding of lower and upper arch, at the age of 14 years, a CBCT of the upper maxilla was performed. It showed a vestibular-palatal bone thickness of the agenesis site of 3.54 mm and a bone highness of 20.3 mm (measurements obtained through OsiriX software). Therefore, a self-drilling and self-tapping miniscrew (Orthoeasy Forestadent, 6 mm) was placed perpendicular to the alveolar process, at the level of the first palatine wrinkle, with a flapless surgery (Ciarlantini and Melsen, 2017). A prosthetic crown was connected to the miniscrew by 0.21x0.25 SS wire.

Results: After two expansion cycles and postero-anterior traction, the anterior open bite, the Class III malocclusion and the bilateral cross-bite were corrected. With the subsequent multibracket treatment, using also Pendex appliance as anchorage and to distalize the element 1.6, teeth alignment and the space required for the future prothesis of element 1.2 were obtained. In accordance with what is reported in literature, the placement of an orthodontic miniscrew in the agenesis site clinically and radiographically showed absence of bone resorption after 1 year.

Conclusions: This clinical case corroborates the effectiveness of orthodontic treatment of a Class III malocclusion with anterior open bite in a growing patient, without resorting to a surgical procedure. In addition, it tends to support the efficiency of a prosthetic rehabilitation of an agenesis element through a crown that anchors itself to an orthodontic miniscrew, waiting for the end of growth and a definitive rehabilitation. In this way, a mechanical stress, useful to bone preservation, is transferred to the bone through normal oral function. Moreover, aesthetic patient satisfaction and function are guaranteed.

Reliability of the presurgical orthodontic virtual planning

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Aim: To evaluate the reliability of the pre-surgical orthodontic virtual planning performed at the Department of Orthodontics of the Dental Clinic of Milan directed by Prof A.B. Giannì. The degree of discrepancy between the situation prospected by the pre-surgical orthodontic virtual planning and the one actually recorded at the end of the pre-surgical orthodontic was evaluated.

Methods: The study involved 14 patients at the end of growth (7 males and 7 females) undergoing orthognathic surgery treatment at the Department of

Orthodontics of the Dental Clinic of Milan directed by Prof. A.B. Giannì. Inclusion criteria were: adult patients with skeletal Class II or III malocclusions; absence of implants or prosthesis on implants; absence of local or systemic diseases; absence of dental anomalies; absence of previous orthodontic treatments. For all 14 patients a pre-surgical orthodontic virtual planning was performed according to the protocol experienced at the School of Orthodontics. The steps of the planning were: 1) Impressions - 2) Reference aligner - 3) CBCT with landmarks - 4) Scanning of casts - 5) Interface between CBCT and digital casts - 6) Virtual orthodontic-surgical VTO - 7) Realization of pre-surgical templates. Once the presurgical orthodontic is completed, impressions were taken on the patient, from which we obtained casts that have been scanned and then overlapped on the virtual models of the initial planning. Through a colorimetric scale, the discrepancies between the digitalized casts in question were evaluated.

Results: Evaluating the deviation of 1.5 mm as the maximum acceptable deviation, in all patients a good degree of overlap between the models of the virtual planning and the digitalized casts which represent the real presurgical orthodontic was obtained. In particular: In the lower arch an average degree of overlap of' 89,22%, with a minimum of 75.08% and a maximum of 99.23% was obtained. In the upper arch an average degree of overlap of' 87,15%, with a minimum of 75.33% and a maximum of 95.73% was obtained.

Conclusions: The study, although conducted with an implementable number of patients, suggests that the virtual plannig protocol is reliable, and involves some advantages regarding the amount of information obtainable, the reduction of the chair time and the errors associated with laboratory procedures and the reproducibility of the planning.

Respiratory and cardiovascular parameters evaluation in osa patients treated with mandibular advancement device

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Aim: In the present paper, authors evaluated the effects of MAD on respiratory index (Apnea/Hypopnea Index and Oxygen Desaturation Index) and cardiovascular index (i.e. Heart Rate).

Methods: Fifty subjects (26 males and 24 females; mean age of 48.5±8.7 years), with diagnoses of mild/severe OSA were visited at Orthodontic department of University of Foggia and enrolled in the present study. Patients had a complete evaluation from Sleep Medicine Specialists. They also performed a polysomnography before and after treatment with MAD. Parameters evaluated were AHI (apnea/hypoapnea index), ODI (oxygen desaturation index higher than 4% of the baseline value per hour of sleep), average heart rate, average minimum heart rate and average maximum heart rate. Inclusion criteria were: age>20 years, non-obese patients, not smoking patients, patients without comorbidity at diagnosis, patients who did not take medication for neurological disorders, patients without cervical head trauma, patients with OSA diagnosis confirmed by a nocturnal polysomnography, patients treated with night-time MAD therapy with a fully customizable device (Protrusor®) and completeness of diagnostic records.

Results: Cardio-respiratory parameters have been evaluated using polysomnography's data, comparing values at diagnosis and after three months of treatment with MAD. A significant reduction of AHI has been noticed in patients using MAD (from 25.34 at T0 to 5.528 at T1). Another significant reduction is related to ODI: this value goes from 17.71 at T0 to 3.844 at T1. Heart parameters are also significantly modified as a consequence of the use of MAD, especially heart rate values. These parameters, indeed, show an average maximum HR value reduced of -20.4 (from 136.1 bpm to 115.7 bpm) and an average minimum HR value increased of + 4.09 (from 42.25 bpm to 46.54 bpm). The value of mean HR decreased of -2.12, which is not statistically significant result.

Conclusions: Treatment with MAD is very effective in mild/severe OSA patients: respiratory parameters were reduced, according to the scientific literature; the average maximum HR value, among the cardiac parameters, was reduced, and with it also the risk of cardiovascular mortality, according to the scientific literature; the average minimum HR value was increased, so that the cardiovascular risk associated with bradycardia could be reduced, even if the impact of OSA treatment with MAD on bradycardic rhythms is still unclear. These results encourage to consider the use of oral appliance as a viable alternative to CPAP therapy.

Tongue-tie: 3D palatal morphology and upper arch dimensions after frenulectomy in early mixed dentition

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Aim: The relationship between tongue posture and facial skeletal structures is an essential element in understanding the growth and development of craniofacial structures, the etiology of malocclusions, and the prediction of stability after orthodontic treatment. In this context, the ankyloglossia, or tongue-tie, is a congenital anomaly, characterized by a shortened lingual frenulum that may cause restricted tongue mobility resulting in several functional limitations. This diseases, with a prevalence ranging from 4.2% to 10.7% in general population, is commonly treated through frenulectomy. In literature, it has been showed that a short lingual frenulum might lead the tongue to not generate enough upward pressure resulting in a narrow and underdeveloped palate. Thus, aim of the present study was to determine if there is a change of maxillary dental arch transverse dimensions, palatal depths, palatal area and volume in tongue-tie patient after frenulectomy, using laser scanner 3D technology.
Methods: In this retrospective study we included patients referred to an Orthodontics Outpatient Clinic for an initial visit. Inclusion criteria were: mixed dentition phase with cervical vertebral maturation (CVM) less than 4 and moderate or sever ankyloglossia diagnosis according to Kotolow classification. Subjects with history craniofacial malformations (including cleft lip or palate), history of frenectomy, dental trauma, oral neoformations and other oral cavity pathologies, or previous or concomitant orthodontic treatment were excluded. Digital dental casts were obtained using a 3Shape TRIOSÒ 3 Basic laser scanner. Intercanine and intermolar widths (cusp and gingival levels), anterior and posterior palatal depth (cusp level), palatal surface area and volume were measured. Subjects dental casts were analyzed before the surgical treatment (T0) and after 15 months (T1).
Results: In this retrospective study, we included 24 Caucasian subjects (13 female and 11 male), mean aged 8.62±1.35 years. Palatal area was significantly increased at T1 (p=0.022), whereas palatal volume was increased but not significantly (p=0.062). Intercanine widths at the cusp level were significantly increased (p=0.003), whereas at gingival level were increased although not significantly (p=0.125). Intermolar widths were reduced, but not significantly, both at the cusp (p=0.359) and at the gingival level (p=0.415). Anterior palatal depth was increased (p=0.048), whereas posterior palatal depth was increased although not significantly (p=0.138).
Conclusion: 3D evaluation of the maxillary arch and palate highlighted significant differences before and after frenulectomy surgery in mixed dentition subjects. Maxillary dental arch dimensions and palate morphology might allow early identification and prevention of ankiloglossia to prevent a narrow and underdeveloped palate.

Laypeople's perception of facial profile aesthetics: a systematic review

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Aim: Aesthetic perception by laypeople is not commonly consistent with orthodontics professionals. Thresholds of laypeople aesthetic acceptance of facial profile features should be defined to prevent disagreements between patient's and orthodontist's treatment objectives regarding profile aesthetics. Therefore, this systematic review aimed at assessing the laypeople's evaluations of facial profile and identifying any thresholds of acceptance.
Methods: In this systematic review, we planned a research on 9 different databases (PubMed, PMC, NLM, Embase, Cochrane Central Register of Controlled Clinical trials, Web of Knowledge, Scopus, Google Scholar, and LILACs) for all the studies published in medical literature up to June 2019, through the following search strategy: "(Profile* OR Facial) AND (esthetic* OR aesthetic* OR prominence) AND (perception OR perspective OR evaluation OR awareness OR attention OR attractiveness)", in order to identify all peer-reviewed articles reporting data regarding evaluations of laypeople's perceptions of

profile aesthetics. We have defined to include in our review all the observational studies aimed to analyse the laypeople's perception on facial profile aesthetics with a sample of at least 10 observers. Exclusion criteria were: a) descriptive studies; b) editorials; c) letters; d) reviews; e) experts' opinions. After duplicate selection and extraction procedures, the risk of bias was assessed according to the Centre for Reviews and Dissemination at the University of York in the United Kingdom and the PRISMA statements.

Results: Of the 13621 analysed articles, 20 were selected for the final review process. Among the selected articles 12 investigated the perception of profile aesthetics by profile photographs, 8 by profile silhouettes and 1 by lip profile silhouettes. Three main topics were identified: profile convexity, facial height ratio and lip position. Regarding profile convexity, a straight one was considered to be the most appealing, while a retruded position of chin was preferred in females. A mesiodivergent pattern resulted as the most appealing. Focusing on lip position, profiles with upper and lower lips behind to the E-line were considered to be more attractive.

Conclusions: Any threshold of acceptance of profile aesthetic characteristics was obtained due to heterogeneity of measurements and the facial profiles preferred by laypeople resulted to be: Skeletal Class I, mesobrachyfacial type, and lips inside Ricketts' aesthetic line. Adults observers preferred a more retruded profile than younger ones. Upper and lower lip position posterior to the E-line is consistent with more attractive profiles, independently from race and sex; furthermore, black people preferred a more convex profile, with much more protruded lips than white people. Concerning chin projection, a more retruded position is deemed as more acceptable in female profile than in male one. Lastly, dolicofacial patterns were always considered as the least attractive ones.

Laypeople's perception of facial profile esthetics: effects of cephalometric parameters on a large sample of observers

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Aim: A balanced and harmonious facial appearance is one of the main goals of orthodontic treatment along with optimal occlusal relationships. Furthermore, esthetic concern is a major reason why patients undergo orthodontic treatment. Thus, aim of this study was to identify the preferred facial profile aesthetics by laypeople in order to obtain standard cephalometric measures that correlate with judgments of facial esthetics.

Methods: We recruited as participants adult Italian laypeople (aged ³18 years) with no prior knowledge in the dental field, referring to an Italian City Mall in November 2019. Exclusion criteria were: a) apparent facial deformities; b) apparent body dysmorphia; c) altered facial morphology due to trauma. A silhouette indicating the mesotype was modified changing from time to time a specific cephalometric value: SN^GoGn, SNA^, SNB^, Ls:E, Li:E, and SnPg^GSn; for each cephalometric value taken into consideration a group of five silhouettes was created. Primary outcome of this study was to evaluate the personal preference of the examiners for each of the 30 silhouettes, through a visual analogue scale (VAS), ranging from 0 to 100.

Results: One thousand twenty-two questionnaires were prepared and distributed. Three questionnaires were returned with missing information and for this reason were excluded whereas nineteen questionnaires were not returned. Therefore, 1000 examiners (502 male and 498 female), mean aged 42.9 ±17.0 years were considered for the study. The highest rated silhouettes from each group are the following: Silhouette C (Go^Gn=32°) for the Go^Gn group with a VAS of 71.5±16.4; Silhouette H (SNA^=82°) for the SNA^ group with a value of 64.3±20.1; Silhouette M (SNB^=80°) for the SNB^ group with a VAS of 71.4±17.4; Silhouette R (Ls:E=-4 mm) for the Ls:E group with a VAS of 66.2±18; Silhouette W (Li:E=-2 mm) for the Li:E group with a VAS of 65.9±19.8; Silhouette BB (SnPg^GSn=12°) for the SnPg^GSn group with a VAS of 72.6±16.7.

Conclusions: Reduced vertical skeletal dimensions were rated as significantly more attractive than the corresponding images with increased ones. The greater the retrusion or protrusion of the chin is, the lower are the rates of facial esthetics. Furthermore, slightly convex profiles were rated the highest. For both upper and lower lip a more retruded position is preferred. Age of the observer has a great impact on profile features evaluation, influencing all parameters' scores. Age and study level of the observers could affect the esthetical evaluation of maxillary sagittal position. Age and gender of the observers influence significantly the perception of modifications in cranio-mandibular divergence. Profile perception might be influenced more by vertical characteristics

than antero-posterior features.

Germectomy or estraction of third molars?

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Aim: To estimate the risks and benefits of germectomy compared to delayed removal of third molars. Lower third molars present the highest incidence of impaction and have been held accountable for periodontitis, pericoronitis, second molars tooth-crown resorption, cysts or odontogenic tumors, pain, primary or secondary crowding of the dentition. The risk of development of these pathologies in presence of impacted third molars is quite low as recent studies show, but certain morbidity associated to this procedure may be expected, so a very careful risk to benefit ratio must be considered.
Methods: A literature search was performed in the following databases; the Cochrane Central Register of Controlled Trials (CENTRAL), PubMed and Scopus. Last search was done on September 2019 including articles published from the last 19 years. The search aimed to identify all relevant studies written in English language. Keywords selected were: third molar, wisdom tooth, wisdom teeth, 3rd molar, tooth impact, teeth impact, tooth unerupted, wisdom tooth germ, wisdom teeth germ and 3rd molar germ.
Results: The initial electronic search resulted in a total of 1610 titles. A total of 1293 articles were removed based on their title and abstract; therefore, 86 full-text articles were selected. After accurate checking of the bibliographies of all selected articles no additional publications were recovered. In conclusion, only four studies were identified as potentially eligible for inclusion in this review. Considering the limited number of studies included and the level of risk of bias there is no sufficient evidence to define absolute indications or contraindications for preventive removal of impacted third molars.
Conclusions: Pros and cons of such intervention must be verified by further studies that are encouraged to be conducted with a prospective design, following appropriate scientific guidelines. A systematic approach to diagnosis and treatment planning involves clinical and radiographic examination that encompasses information regarding patients' health status, age, and compliance. Syndrome patients often present third molars with different crown shapes and sizes, root morphology, position and inclination, eruption paths, development periods, and relationships with contiguous anatomical structures. The rationale of a removal of third molars is to monitor hygienic situation and avoid the extraction of tooth germs in case of missing teeth. Considering the quality of life as the main goal of our job, is important to discuss with parents/caregivers about surgical and nonsurgical treatments alternatives, considering patients' conditions and preferences.

Canine inclusion: recovery time forecast through the skull latero-lateral teleradiography

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Aim: Treatment of impacted maxillary canines is a common challenge faced by dental professionals in daily practice. This is due to the fact that dental eruption is a complex series of genetically controlled events and, during this period, many pathogenic noxae can interfere with the normal eruptive process. An impacted canine is one that is not present in the oral cavity at the time of the physiological eruption because of malposition, lack of space or other impediments. After the third molars, the maxillary canines are the most impacted permanent teeth (Bass, 1967). The incidence of ectopic canine eruption has been shown by Ericson and Kurol to be 1,7% (Ericson and Kurol, 1986). Radiographs are required to view the correct position and angulation of the impacted tooth, to evaluate any resorption, to analyze the relationship to the midline and adjacent teeth and to view supernumeraries, odontomes and pathological lesions (Stivaros and Mandall, 2000). The views commonly used for assessing ectopic canines include: orthopantomogram, lateral cephalometry, parallax method, occlusal radiography, CT and CBCT (Maverna and Gracco, 2007). The retrospective clinical study aims to identify a relationship between specific parameters measured in the skull latero-lateral teleradiography and the time required for the forced eruption of canines included in the jawbone.
Methods: The research involved 50 canines included in the palate in 40 patients between the ages of 11 and 17. Each patient was submitted to the same protocol of surgical exposure and elastic orthodontic traction on an anchoring system in a patient bandaged with fixed multibracket therapy. For each case were required the patient's medical history, the skull orthopantomography and telaradiography latero-

lateral pre-treatment (taken from CBCT scans) with cephalometric analysis. On the initial teleradiography and orthopantomography were measured specific angular and linear parameters in order to define the position of the canine included in the bone.
Results: The duration of the mechanical eruption showed no dependence on sex or age at the time of surgery. The angular and linear teleradiographic parameters measured at T0 showed little correlation with the time of traction.
Conclusions: The angular and linear measurements analyzed on latero-lateral teleradiography did not prove to be valid prognostic indicators for the duration of the active traction phase in case of palatal inclusion. Radiographic evidence shows that impacted canines moved 1mm a month during the traction treatment. In any case, radiographic correlations with traction time allow only an approximate prediction of the duration of treatment: the experience of the operator and the traction system can modify the time required for the emergence of the canine, as well as individual biological variables, such as bone density, cortical thickness and residual eruptive potential of the tooth are factors that can speed up or slow down the descent of the canine into the arch.

Geometric morphometric analysis (GMA) for the study of craniofacial growth: a systematic review

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Aim: The variety of growth within individuals is impressive, and it has long been questioned whether initial craniofacial patterns are associated with morphological growth direction. The objective of our study was to investigate about the use of the geometric morphometric analysis (GMA) to study craniofacial growth patterns. GMA is a relatively new branch of statistics that enable to quantify the geometric information relating to the shape of individual objects of a study sample.
Methods: The scientific research was conducted by using Pubmed database. A combination of the following search terms was used: "geometric morphometric analysis" and "orthodontics" and "development". A total of 17 items were found. Studies on animals and regarding dental structures, anomalies or treatment were excluded. A focused approach on the development of craniofacial structures was used in the selection of the articles.
Results: As results, 4 articles were considered valid. Ferros et al. used GMA to study the relationships between the nasomaxillary complex (NMC) and the cranial base in skulls with artificial deformations (ADS) both posteroanterior and circumferencial. The cranial base showed a great deformity that produced anteroposterior constriction of the NMC. Morphological changes propagated also to distant anatomical units as the maxilla. The same authors used GMA to study in ADS the covariation between cranial base deformation and the position of the mandible. The cranial base of the ADS presented a marked deformation that provoked a more anterior position of the mandibular condyle but without producing a net anterior mandibular displacement. This compensatory modification in the mandible are the confirm that the cranius is made by a mosaic of modular units that create a complex pattern of integration. Katsadouris et al. through GMA have studied the correlation between initial craniofacial shape and the direction of shape change in humans between 12 and 14. They obtained a statistically significant difference both at 12 and 14 between females and males observing a longer vector in shape change for the last ones. They observed that there is no correlation between the initial shape of the craniofacial complex and the magnitude of shape change, contrasting to the findings that Class III subjects experience greater mandibular growth than subjects with normal occlusion. The coefficient of total variation of initial shape and direction of shape change was statistically significant but not very strong. Gkantidis et al. studied the morphological covariation between the face and the basicranium (midline and lateral) in a group of children compared to a group of adults. Whereas middle cranial base is related to facial patterns in children, lateral cranial base elements assume the primary role later in adult life, due to the major duration of developmental timing.
Conclusions: The use of GMA introduces significant advantages in the study of the direction of the shape change. There are no clear guidelines to estimate sample size in GM studies and more studies are necessary. The studies support the theory of an all-inclusive integration of the different cranial units, suggesting that there are other factors that may affect the direction of shape change during growth.

Geometric morphometric analysis applied to the study of asimmetry in patients affected by orofacial clefts: a systematic review

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Aim: Orofacial clefts are the most common congenital anomalies affecting humans, with estimates ranging

from 1:500 to 1:2500 depending on regional and ethnic variation. They occur due to the failure of fusion of the lateral palatine processes, the nasal septum, or the median palatine processes and their aetiology is multifactorial. Unilateral clefts are associated with excess facial asymmetry (FA), expecially to the nostrils and the nasal cavities, due to the loss of tissue integrity on one side of the midface and the subsequently altered growth patterns. GMA is a new branch of statistics that enable to quantify the geometric information relating to the shape of individual objects of a study sample. The objective of our study was to investigate the significance level of FA in patients with orofacial clefts with GMA.

Methods: The scientific research was conducted by using Pubmed database. A combination of the following search terms was used "asymmetry" and "cleft palate" and "geometric morphometric". A total of 4 items were found and all the articles were included in the research.

Results: According to the study of Hartman et al., septal deviation is associated with asymmetry primarily in the nasal floor and the palatal region. Zhang et al. examinated the level of corrispondence of soft-tissue nasal asymmetry between unaffected parents of children with a history of orofacial and control patients. They found that FA in both parents and controls was directional in nature, although the magnitude was greater in parents.Furthermore, the side of the unilateral cleft (right vs left) in the children was not associated with the direction of the nasal asymmetry in parents. Bugaighis et al. investigated 3D facial variation including asymmetry among and between groups of children with unilateral-cleft-palate (UCLP), unilateral cleft lip and alveolus (UCLA), bilateral-cleft-palate (BCLP) , isolated cleft palate (ICP) and a control group. The most severely affected groups in terms of form were those with defects involving the lip, alveolus, and palate (UCLP and BCLP). Asymmetry represented a rather small aspect of the overall differences between groups (approximately 10–15 per cent) and was most pronounced in the UCLP and UCLA groups. FA is more present in patients with UCLP, as confirmed by the study of Ceuninck. Its magnitude is larger in regions directly influenced by the cleft, such as the anterior nasal spine, the labrale superius and the lateral border of the nasal aperture, and decrease in regions more distant such as the cranial base, which is symmetric.

Conclusions: The general hypothesis is that such FA are indicative of an underlying genetic risk for clefting. However, there is debate as to how these differences arise; whether they occur as a result of intrinsic factors related to the cleft or as a consequence of cleft repair. It has been suggested that the causes of abnormal facial morphology may be intrinsic, iatrogenic or functional. GMA show promise in clinical evaluation of orofacial clefts.

Surgery in miniscrews, a review

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Aim: To evaluate different surgical technique of mini-screws insertion and to establish the related factors for a successful anchorage

Methods: The research has been made through Pubmed browser using keywords like "mini-screws", "MSI", "TADs", "surgical technique". Research results were many but the ones effectively related to the topic almost 40. Of these 40 articles, 9 were chosen for this review.

Results: As described by Jason P. Jones et al.1 nowadays there are as well self-tapping and self-drilling screws with many difference in therms of length, diameter, the area of insertion and the soft tissue characteristics. The self-drilling technique is normally used in the maxillary bone due to a reduced thickness of the cortical bone and the self-tapping one in mandible for the inadequate drilling power of the screw itself so there is the need of a pilot hole. For S. Baumgaertel 2 there is no need of soft tissue preparation before insertion of the screw except in pre-drilling cases. This is right when the transmucosally insertion is made in attached gengiva or in a limited-mobility mucosa. Nevertheless (as described by D. Gill et al.3), the placement in this area increases the risk to damage the tooth roots and can also limit the amount of tooth movement because of interference by the screw. The employment of the CBCT has either diagnostic and therapeutic use. Lately the CBCT has been employed to build surgical guides at the aim to increase the success rates of implant insertion and avoiding possible damages, as described by M. Cassetta, E. Barbato, R. Di Giorgio 4 in their CAD-CAM new surgical guide. In diagnostic therms a CBCT study is useful to verify the right interface between bone and implant to measure either the primary and secondary stability. For S. Kalra et al.5 it may be not always needed, instead for R. El-Beialy et al.6 a 3D study is often very useful. Nevertheless some other authors have studied other types of diagnostic devices such as RFA (resonance frequency analysis) that for Derid S. Ure et al.7 could be considered a valid diagnostic analysis as well as insertion torque and periotest values (T. Watanabe et al.8). Even if these are important surrogate they are not able to detect cortical bone thickness which remains the exclusive

competence of the CBCT. In the end has been carried out an experiment on the angulation of the mini-screws in the cortical bone at the aim to find out if the gain of contact between implant and cortical bone increases the anchorage values but N. Woodall et al. (9) found out that the major amount of resistance is reached by a perpendicular angulation.
Conclusions: From the articles read we can declare that even if there had been improvements over time we are not yet able to reduce the failure rate which is still around 10-20% of whole insertions. However with the collected informations we can delinate a sort of guideline for the insertion precedure.

Evaluation of Bolton discrepancy indexes, little's index and mesiodistal tooth widths in a caucasian orthodontically referred population with Angle Class II malocclusion

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Aim: Assuming that patients with Class II malocclusion have reduced Bolton's ratios, the aim of the study can be summarized by the following research/clinical questions: Are the reduced Bolton ratios due to smaller mesiodistal mandibular tooth sizes or to greater mesiodistal maxillary widths? Where is the alteration located within the arches? Which is the prevalence of the different degrees of Little's Irregularity index (LII) in a Class II malocclusion population? Is there a correlation between reduced Bolton ratios and mandibular crowding (LII) in Class II patients? The null hypotheses are that reduced Bolton ratios are related to reduced teeth sizes in the lower arch, that a specific location of the altered sizes cannot be identified within the arch and that a correlation between Bolton ratios and Little's Irregularity Index cannot be identified.
Methods: 50 caucasian subjects (14 men, 36 women; 27 years old) with Angle Class II malocclusion referred to the Orthodontic Unit of the Dental School of the University of Torino, were consecutively recruited. Patients were selected according to the following inclusion criteria: Class II molar relationship; Complete permanent dentition excluding the third molars; No previous orthodontic treatment; No previous prosthetic treatment; No Class II, III or IV restorations according to Black's classification of cavities; No history of craniofacial trauma; No systemic diseases or craniofacial deformities. For every subject intra-oral scans were obtained (iTero® Element, Align Technology, San Jose, California, USA). The mesiodistal width of each crown, from first molar to first molar and the Little's Index were measured using the Clincheck Pro® software (Align Technology, San Jose, California, USA).
Results: Anterior Bolton's Index (AR) in the study group is increased compared to the results of the reference group A1 with a statistically significant difference ($p<0.005$). The other variables analysed were not statistically significant.
Conclusions: Although the Bolton index is useful for identifying dentodental discrepancies in most patients, it is still not possible to accurately determinate the degree and location of these dental discrepancies.

Serious dental crowding treated with fixed appliances: a case report

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Aim: Presentation of a clinical case of serious maxillary and mandibular dental crowding treated with fixed self- ligating appliance without the need for dental extractions.
Methods: The present case is about a young male patient of 13,1 years old, in full permanent dentition. The following essential clinical data were collected during the first visit: personal medical and dental history, clinical oral investigation, model casts, OPT, L-L and P-A teleradiography, with subsequent cephalometric analysis and intra and extraoral photos. A diagnostic evaluation was made based on all the previous clinical data collected during the visit. At the

cephalometric examination it was possible to observe a hyperdivergent patient SpP^GoGn=26,05° with a basal Class I (A:Po=1,53 mm); the molar class was not evaluable on the right side rather on the left side resulted Class I; the canine class was not evaluable due to the significant dental malposition. There was a relevant deficiency of space in both dental arches, especially considerable in the mandibular jaw where the space location of 3.3 was completely lacking. Moreover, malocclusion was emphasized by the presence of cross bite of 2.2/3.3., scissor bite of the element 1.6, disalignment of superior and lower premolars, thus rotation of the element 1.5 of 180°. The patient underwent an orthodontic treatment with the use of self-ligating fixed appliances for a period of 2,5 years. The cardinal feature of a self-ligating bracket is an inbuilt metal labial face to the bracket slot, which is referred to as a clip or slide. Several studies have shown very low levels of archwire friction for self-ligating brackets when compared to conventional ligation methods. A functional therapy was not considered because of the patient's claim: a young professional sportsman and the compliance would have been rather poor.

Results: After 2,5 years of orthodontic therapy with self-ligating fixed appliances, dental arches resulted well-balanced and harmonious. The dental crowding was solved and the cross bite of 2.2/3.3 was corrected. The bilateral canine I Class was obtained and the first superior right molar and the premolars were aligned in dental arch.

Conclusions: Self-ligating fixed therapy lead to a balanced occlusion and the correction of a severe dental crowding in association with the aesthetic and periodontal criterions. Since there is evidence of dental crowding relapse, more follow-ups will be done to monitor the future changes of the obtained results.

Correlation between facial growth patterns and cortical bone thickness assessed with cone-beam computed tomography in young adult untreated patients

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Aim: The vertical facial growth pattern is one of the most important issue in the orthodontic diagnosis and treatment. Previous studies investigated the association between interdental bone thickness and facial divergence using mainly bidimensional analysis. When two-dimensional dental radiographic views are not sufficient for diagnosis and measurements, cone-beam computed tomography (CBCT) images should be used to assess the alveolar bone structure three-dimensionally and with high accuracy and reliability. The aim of the present study was to evaluate the correlation between alveolar bone thickness and facial divergence in young adults untreated patients using a three-dimensional method analysis with CBCT images.

Methods: Records of 30 untreated patients (mean age 16±2 years) with Angle Class I and mild to moderate crowding were analyzed. Subjects were classified as hypodivergent (<39°), normodivergent (41±2°), and hyperdivergent (>43°). according to the inter-maxillary angle between the sagittal maxillary plane (ANS-PNS) and the mandibular plane (GN-ME). The alveolar bone thickness measurements were taken for the buccal and palatal/lingual surfaces of maxillary and mandibular anterior teeth. Axial-guided navigation (AGN) was used to locate all landmarks using a specific software (Horos 3.0).

Results: The statistical analysis showed a significant difference between the hypodivergent and hyperdivergent group regarding buccal bone height (P=0.005), buccal apical bone thickness (P=0.003) and palatal mid-root bone thickness (P=0.006). Moreover, buccal bone height (P=0.006) was found to be statistically significant different in normodivergent compared with hypodivergent individuals

Conclusions: Facial types were found to be correlated with alveolar bone thickness. The hyperdivergent subjects presented thinner alveolus bone in the anterior maxilla and at almost all sites in the mandible. Clinicians should be aware of the possibility of thin cortical bone plates in hyperdivergent patients, reducing antero-posterior movements to avoid fenestration and dehiscence.

Dentoalveolar effects analysis of rapid maxillary expansion with hybrid expander

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Aim: The aim of the hybrid palatal expander is to maximize skeletal expansion effects and, in the meanwhile, decrease to a minimum the dental modifications. The purpose of this research is to compare the dentoalveolar effects of the hybrid palatal expander (miniscrews and first molars anchorage)

and the multibrackets therapy in 3 different groups divided by skeletal age.

Methods: In this retrospective study, 68 patients (39 females, 29 males, mean age 13.45 years) underwent treatment with hybrid expander and multibrackets therapy. The criteria adopted for the inclusion in the study were: presence of maxillary transversal deficit, no previous orthodontic treatment, no orthognathic surgery performed, no extraction performed, absence of agenesis, congenital pathologies and cranio-maxillofacial malformations, use of an Hybrid device by the same operator. They were divided into 3 groups based on their skeletal age, using the cervical vertebrae method. Group 1: n=21 patients in phase CS1/ CS2 (mean age 10.21, 9 females, 10 males); Group 2: n=28 patients in CS3/CS4 (mean age 13.37, 18 females, 10 males); group 3: n=19 patients in CS5/CS6 (mean age 17,14, 12 females, 7 males). All the scanned models were transferred to the OnyxCeph program (Image Instruments, Chemnitz). Dental elements have been segmented through the "Segmentation" tool; through the "Aligner" tool, the initial and final tip and torque values were obtained. In order to ensure the software reliability, tip and torque angles were graphically measured via the 'goniometro online' website. In both cases there is an excellent interclass correlation between the results (ICC=0.9134; ICC=0.8723).

Results: There are statistically significant differences in the intra-group torque of the elements 17 (groups 2, 3); 15 (groups 2, 3); 14 (group 3); 11 (group 1); 24 (group 1, 2, 3); 25 (group 2). The tip result are statistically significant for the elements 16 (group 1, 3); 14 (group 1, 2); 12 (group 1); 24 (group 3); 26 (group 1, 2). Statistically significant intergroup differences are reported for element 16 and 12.

Conclusions: Both the tip and the torque presented statistically significant intra group changes. No statistically significant differences were detected among groups considering torque values while for the tip values differences were found for first molar and lateral incisor.

Evaluation of apical root resorption on root filled teeth after fixed orthodontic therapy: systematic review and meta-analysis

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Aim: This systematic review and meta-analysis evaluated variation of apical root resorption after fixed orthodontic therapy on root filled teeth, lacking pulpal inflammatory factors.

Methods: This systematic review was conducted according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement. The research question was put down following the "PICOS" model: "After orthodontic treatment, root filled teeth (Patient) undergo a bigger apical root resorption (Intervention) than the contralateral vital ones (Control), needing of different levels of orthodontic forces (Outcome) in split mouth studies (Study design)?"6 databases were searched up to April 2020. The keywords used in the search strategy were as follows: "[(resorption) AND ((root filled teeth) OR (endodontics)) AND ((orthodontics) OR (orthodontic force) OR (orthodontic movement)]". This search key was initially created for MEDLINE, and appropriate modifications were made according to the database. There was no restriction on publication years (last search was on April 2020) or language. The studies were evaluated for eligibility criteria: Randomized clinical trials, prospective and retrospective controlled clinical trial articles conducted as split-mouth protocol were included. The amount of root resorption after orthodontic treatment was compared in patients having both root filled tooth and contralateral vital one. Study selection excluded case reports, trials on animals, studies on lateral cephalometric radiograph, study in vitro, trials on patient with removable appliance or presence of impacted teeth and residual periapical inflammation. The generic inverse variance method was performed using REVMAN software version 5.3 (Cochrane Collaboration, Copenhagen, Denmark) to integrate outcome measures from similar studies and provides a common numeric estimate for OIERR. Means and standard deviations were used to summarize the data for each group (root filled teeth vs contralateral vital ones) with 95% confidence intervals, and the effect estimate of an intervention was expressed as mean differences. Weighted means of OIERR across the studies were calculated using a random effects model, due to the heterogeneity of the studies. A test of significance was performed with the Cochran test for heterogeneity between the studies using the I^2 test, which describes the variation percentage caused by heterogeneity rather than chance. I^2 test over 50% was considered as moderate to high heterogeneity.

Results: Between 600 articles, only 7 ones were admitted in meta-analysis. The pooled data showed statistically significant less apical resorption in favor of root filled teeth (mean difference=-0.36 mm; 95% confidence interval, -0.68 mm to -0.05 mm; $P<0.05$; $I^2=66\%$). Because I^2 was 66%, it was performed the funnel plot that exhibited a symmetrical distribution, which indicates no publication bias of the included studies. Moreover, a sensitivity analysis was obtained: Although both studies on digital panoramics and on periapical radiographs revealed less apical resorption on root filled teeth, only the first one group has shown

a statistically significative difference (P value = 0.01). **Conclusions:** The absence of pulpal inflammatory pathway in root filled teeth seems to have an important influence in the amount of apical root resorption after fixed orthodontic therapy. Apical root resorption on root filled teeth is less than contralateral vital ones in statistically significative way (P value=0,007). However, the moderate heterogeneity, due to different radiological methods between the articles, gives a low evidence to the results.

Variation in apical root resorption between root filled teeth and contralateral vital ones after orthodontic treatment using two types of brackets: a retrospective study on digital panoramic radiographs (DPR) with a split mouth approach

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Aim: Root shortening, resulting from apical root resorption (ARR), is an undesirable consequence often associated to orthodontic treatment. According to the most recent scientific literature, root resorption is significantly correlated with fixed appliance treatment. Aim of the present study is to evaluate the percentage of ARR after orthodontic treatment on previously endodontic treated teeth.
Methods: In the present study, digital panoramic radiographs from Orthodontics Unit, Department of Oral and Maxillofacial Sciences, Policlinico Umberto I, Rome, were examined. All data derived from the Department of radiology of the Umberto I Hospital, to avoid bias due to different radiological device and to obtain superimposable radiographs with the same level of magnification. The eligibility criteria were: the presence of a root filled tooth at the beginning of therapy (T1) on an hemiarch and the presence of a contralateral vital tooth. The same teeth must be detectable in another radiograph requested before debonding stage (T2). Patients with no contralateral tooth, with no radiological records of fixed orthodontic appliance or with any radiological sign of periapical radiolucency in the treated tooth were excluded from the study. After the selection, according to the inclusion and exclusion criteria, 15 roots (three upper molars and three lower molars) from 6 patients between 20 and 50 years were included in the study. Between the 15 examined roots, 7 were treated with standard edgewise twin brackets and 8 with MBT technique. The measurement of the root length (from apex to cementoenamel junction) of single and multi-rooted teeth in T1 and T2 was performed using a software (Adobe Photoshop) for both roots filled tooth (RFT) and its contralateral vital tooth. To obtain the millimetric length of root shortening, the values measured from T1 were subtracted from the values obtained in the same way from T2 using a spreadsheet software (Excel). The calculated data were converted to percentage. The same method was adopted to calculated root resorption in contralateral vital tooth: This measure was used as group control and compared with the RFT measures. The same clinician performed all assessments of root resorption, to avoid bias due to different operators' skills. Afterwards statistical analysis was performed using GraphPad analysis software applying t-test with Welch's correction. The significance was set at 95%.
Results: Unpaired t test with Welch's correction was applied at first for all the sample: P value has no statistical significance for the whole sample (P=0,6019), neither for singular group of patients with twins edgewise brackets (P=0,3004) or MBT technique (P=0,8424). Otherwise F test to compare variance was statistically significant: P=0,001 for the whole sample, P=0,0345 for patients with edgewise braces, P=0,0274 for patient treated with MBT technique.
Conclusions: Despite several times RFT have been proposed as one of the main concern related to orthodontic forces and despite the attention reserved to the biomechanical management of (RFT), the results from the present study seem showing that root canal treated teeth have no difference in ARR after orthodontic therapy, if compared with corresponding contralateral teeth. Anyway, further studies are needed to overcome the bidimensional digital panoramic radiographs limits and tridimensional evaluate the ARR.

Evaluation of the reduced condylar excursion through the use of ultrasound in patients affected by juvenile idiopathic arthritis

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Aim: The study was to evaluate the reduced excursion of the right and left temporomandibular joint through the use of ultrasoud in patients with juvenile idiopathic arthritis(JIA), who refer to the orthodontics department of the Milan Polyclinic. Juvenile idiopathic arthritis (JIA) is a chronic disease of unknown ethiology, with an estimated incidence of 16 to 150 cases per 100 000 children worldwide. Juvenile idiopathic arthritis (JIA) is a chronic disease

of unknown ethiology and Temporomandibular joint (TMJ) arthritis is a common consequence of the systemic disease in patients with JIA.
Methods: The ultrasounds represents the main diagnostic examination for all the small patients belonging to our ward because it provides useful information on joint kinematic parameters and condylar morphology. Since 2013, we have been analing more than 133 patients suffering from JIA, each of whom has undergone periodic checks to validate the functional therapeutic efficacy of the orthodontic device. All patients underwent an intra- and extra -oral clinical examination to consider the functionality of the joint. Patients were treated with ultrasound through standardized technique, they lying down on the GE brand Logic E9 brand platform using transducers from 11 to 18MHz depending on the age of the patient. The analysis of each joint was analysed the reduced excursion of the right and left temporomandibular joint.
Results: In the total of cases with an average age of 12 years 16.5% show a reduced excursion. Only on the right there was no reduction of the excursion, while only on the left 4.5% have a lower excursion and 9% bilateral, so both right and left.
Conclusions: The ultrasounds is a valuable first instance support for evaluating condylar changes in small patients with AIG. Although it does not allow you to view the entire structure, it does allow you monitor the condylar growth of patients. It is easy to perform without having to submit young people patients with stress and sedation, without biological and predictable costs over time. TMJ arthritis was associated with high JIA duration and activity and influenced some activities, such as eating, hygiene, emotional and social well-being, especially in female subjects. Displacement of the disc with reduction often results in a painless click or snap at the opening of the mouth. Pain may occur, particularly chewing hard food. This diagnostic examination provides the opportunity to intervene promptly and quickly, providing a significant contribution in the diagnosis.

Clinical experimentation of functional orthodontic treatment on patients with AIG: improving the quality of life

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Aim: This study, focused on the temporomandibular joint in children with juvenile idiopathic arthritis, led us to a process of evaluation of the morpho-structural alterations and the dysfunctional consequences that this pathology has on the articulation. The purpose of this study is to review the clinical features and the treatments that monitor the joint inflammation, to limit the damage, to reduce the functional disability which may show during daily activities and to evaluate the benefits of the orthodontic-functional therapy.
Methods: We investigated a total of 68 patients affected by AIG and 30 cases, aged between 5 and 16, who have not been subjected to an orthodontic treatment, nor to maxillofacial surgery and who do not have congenital genetic syndromes. We have distributed to 68 patients a survey about the global functional disability and daily functions in kids through a survey on childhood evaluation (C-HAQ) and a survey on childhood perception (CPQ11-14). C-HAQ and CPQ11-14, with specific sections about the disease, are validated to estimate the functional evaluation during AIG. Among the total cases, 53 patients suffering from AIG have been treated with functional orthodontic appliance e 15 control group healthy patients while the remaining 15 patients with AIG have been treated with fixed orthodontic treatment with REP e 15 control group.
Results: It has been demonstrated that C-HAQ determines significantly a child ability to carry out everyday tasks such as getting up, dressing up, eating, walking, taking care of personal hygiene and even reaching up and grabbing items, as the disease develops. The usage of a functional orthodontic appliance is successful in treating patients with ATM and it implies an early intervention to prevent a negative facial development. We have noted how this appliance can also represent a valid device to treat and provide relief for young patients. Furthermore, we have seen how, during the usage of REP in patients who are suffering from AIG and healthy patients, there is no difference and clinical indications are the same for healthy patients. In the treatment of subjects affected by AIG in a quiescence phase with maxillary hypoplasia, the usage of REP is a suitable option for every patient who do not show signs of relapse of the disease on the ATM level. AIG is identified as a possible pathological cause of transversal discrepancy and the rapid maxillary expansion is acknowledged as one of the best treatment options.
Conclusions: At the end of the research we have been able to evaluate how the AIG can affect daily activities and habits of patients who are suffering from this pathology. We advise a regular clinical examination and an early treatment, along with a systematic monitoring of the cranio-facial development. Overall,

this study suggests that subjects with AIG show a severe involvement of ATM and this disorder, if not treated, may cause serious social impairments and impaired growth.

Aetiology, diagnosis and management of external apical root resorption (EARR): a systematic review

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Aim: This study deals with classifications and aetiology of dental resorption with particular attention to diagnosis and management of the external apical root resorption (EARR) induced by orthodontic treatment.
Methods: A systematic analysis of the materials has been carried out through the search engine PubMed (Medline), with the use of the following key words <<dental root resorption>> - <<root resorption and orthodontic treatment>> - <<management of root resorption>> - <<external apical root resorption>> with no limit in terms of the date of publications. From a total of 6192 articles, 4124 have been discarded since they were replicated, 2058 since they were not relevant. 10 articles have been selected based on focus approach (external apical root resorption).
Results: Root resorption is the progressive loss of dentine and cementum through the continued action of osteoclastic cells. Resorption is known to be initiated and maintained by many factors: pulpal necrosis, trauma, periodontal treatment, orthodontic treatment and tooth whitening agents are the most commonly described stimulants. According to Andreasen resorptive lesions can be classified as external or internal and be based upon the aetiology. EARR has been reported in 19-31.4% of all patients undergoing orthodontic treatment, its prevalence being highest in mandibular and maxillary incisors (pipette-shaped roots are the most frequently affected). The dental history and dental treatments, related systemic conditions, and medical details of patients could cause the pathogenesis of EARR but genetic tendencies and history of trauma appear to be most often associated with this pattern of resorption. To monitor EARR the standard procedure is a radiographic examination after 6 months of treatment. The fundamental principle related to management of any resorptive lesion is to halt the activity of the osteoclastic cell. In cases of resorption due to pressure it may be possible to remove the stimulus; for example extraction of the impacted canine or to halt active orthodontic treatment. When root resorption is detected during active treatment, a decision must be made as to whether to continue, modify or discontinue the treatment. Extremely heavy forces should be avoided, since they have been shown to produce greater resorption activity.
Conclusions: The etiology of root resorption associated with orthodontic therapy is complex. Root resorption may compromise the continued existence and functional capacity of the affected tooth, depending on its magnitude. However, the process of root resorption during orthodontic treatment is usually smooth and stops when the force is removed.

Traumatically injured permanent front teeth: intrusive luxation: a systematic review

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Aim: To provide short guidelines for the management of intrusive luxation.
Methods: A systematic analysis of the materials has been carried out through the search engine PubMed (Medline), with the use of the following key words <<traumatic dental injuries and orthodontic treatment>> - <<management of traumatic dental injuries>> - <<intrusive luxation and orthodontic management>> with no limit in terms of the date of publications or type of study. From a total of 778 articles, 369 have been discarded since they were replicated, 399 since they were not relevant. 10 articles have been selected based on focus approach (intrusive luxation).
Results: According to Andreasen classification of dental injuries intrusive luxation can be defined as the displacement of the tooth axially into the alveolar bone. A multidisciplinary approach is needed to treat such injuries. Increased anterior overjet, incompetent upper lips and mouth breathing are considered predisposing dental factors. Diagnosis involves clinical examination, radiographic examination and sensibility tests. Xray examinations include a 90° horizontal angle with central beam through the tooth in question, an occlusal view and a lateral view from the mesial or distal aspect of the tooth in question. Sensibility tests (heat and cold tests and electric pulp testing) must be done to determinate the condition of the tooth pulp. Initial tests following an injury frequently give negative results, but such results may only indicate a transient lack of pulpal response. Follow-up controls are needed to make definitive pulpal diagnosis. The treatment options may include: Observation for spontaneous eruption (Passive Repositioning); Surgical crown uncovering;

Orthodontic extrusion (Active Repositioning); Surgical extrusion (Immediate Repositioning). In patients with incomplete root formation, spontaneous eruption should be expected. If no movement is detected within 3 weeks, a rapid orthodontic repositioning is recommended. In patients with complete root formation (range age of 12-17) spontaneous eruption can still occur. In older patients with complete root formation, either surgical or orthodontic extrusion should be attempted. In these cases root canal treatment is recommended. Orthodontic extrusive forces can be applied a minimum of 24 hours and a maximum of 3 months after of the traumatic event. When an anterior tooth has been vertically luxated, using the adjacent teeth as anchorage for the extrusion should be avoided because of the difficulty in assessing how much these teeth might have been damaged. A conventional fixed multibracket system with flexible wires would seem to be inappropriate. This approach generates unwanted tipping and intrusive movement of the adjacent anchor teeth. In patients which more than one tooth requires extrusion a removable plate with a self-supporting spring or elastic module applying vertical extrusive force is a suitable method. The reactive force is absorbed by the palatal mucosa. Alternately, a palatal arch soldered to molar bands with a self-supporting labial arch can be used. The orthodontic treatment is characteristically short ranging from 3 weeks to 5 months. Relapse might follow the extrusion, so a retention period with bonded wire fixed to the adjacent teeth is indicated. For intrusive luxation injuries the IADT guidelines recommend a flexible splint for 4 weeks where the intruded tooth/teeth have been repositioned.

Conclusions: The management of intrusive luxations requires a multidisciplinary approach. The orthodontist plays a key role in the success of the treatment.

The use of a questionnaire for early detection of pediatric sleep-related breathing disorders

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Aim: The scientific community is now in agreement in considering the dentist as an epidemiological sentinel with the task of early interception of the cranio-facial risk factors suggestive of sleep-related breathing disorders (SRBDs). The aim of this study was to evaluate in the pediatric patient the usefulness of a validated questionnaire for the early detection of SRBDs in the clinical practice of the dentist and whether its use allows to identify, already at the first orthodontic examination, subjects worthy of diagnostic in depth analysis.

Methods: The Pediatric Sleep Questionnaire (PSQ) was proposed in its short formulation with 22 items to the parents of forty children (20 males and 20 females) aged between six and fourteen (mean age of 8.9 ± 2.2) who referred to the Section of Orthodontics of University Hospital Policlinico of Bari from January 2019 to October 2019 for a first orthodontic visit. The 22 questions can be answered with a "yes", a "no" or a "I don't know". The PSQ is considered positive when at least 33% of the answers are "yes". The questions investigate various symptoms and signs suggestive of sleep disorders such as snoring, nocturnal breathing pauses, nocturnal enuresis, overweight, growth delays, dry mouth on waking, headache, hyperactivity, attention deficits. An anamnestic phase, aimed at identifying any associated systemic pathologies, preceded the administration of the PSQ. After that the patients underwent an orthodontic examination, paying attention to all those factors that could potentially cause an airway obstruction such as hypertrophy of the palatine tonsils or the excessive lingual volume.

Results: In our pediatric patient cohort, 10 cases had a previous diagnosis for tonsil and adenoid disorders and 2 of them underwent medical therapy with corticosteroids, while none of them underwent surgical treatment. 50% of the patients tested positive for PSQ. Night snoring was present in 45% of cases, respiratory pauses in 7.5%, sleepiness in 57.5%, morning headache in 30%, growth alterations in 10%, overweight in 25% and neuro-behavioral changes in 75%. The evaluation of the malocclusions showed that in PSQ+ subjects, Class II malocclusion is the most frequent with a prevalence of 42.5%, followed by the open bite (32.5%), Class III (10%), crossbite (10%) and Class I (5%). In PSQ- subjects the following prevalences were found: Class I 50%, Class II 15%, Class III 10%, open bite 10%, deep bite 10%, crossbite 5%. Finally, we observed a positive correlation between the number of malocclusions and the number of positive answers to the questionnaire (Pearson correlation, r = 0.7834).

Conclusions: During our orthodontic visits, we found out many PSQ positive cases. This can be explained by the positive correlation between SRBDs and malocclusions. Since children with severe malocclusions are more likely subject to a dental examination, we consider the role of the dentist as a key professional figure to identify high-risk patients and to direct them to a multidisciplinary team for further investigations. In this contest, the PSQ has proved to be a useful and simple tool to help us to reach this goal.

Class II malocclusion due to mandibular retrognathia in non-collaborative patients: Forsus appliance tips and tricks

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Aim: Angle's II Class is one of the most prevalent malocclusion in the Caucasian race; it can be both skeletal and dental and it can occur with different clinical manifestations. Since 80% of the II skeletal classes depends on a mandibular retrusion component, there is a need for functional treatment aimed at stimulating mandibular growth correcting the convex profile together with the occlusal relationship. There are numerous devices for treating this malocclusion in a growing patient. The aim of this work is to present the skeletal Class II malocclusions resolution protocol, in absence of compliance, through Forsus device, a fixed functional appliance, illustrating tips and tricks designed to improve the efficiency and effectiveness of the appliance used and the management of the lower anterior incisors.
Methods: As part of the orthodontic treatments carried out in the department of Dentistry of Vita-Salute San Raffaele University, we present a representative case report. The patient, Caucasian and female, is 11.5 years old. After collecting and analyzing the entire photographic and radiographic documentation (OPT and TRX-LL), a skeletal Class II malocclusion due to mandibular retrognathia diagnosis was made, II division (SNA=79; SNB= 74; ANB=5); in particular, Arnett cephalometric tracing was performed with Fastlight triangle. Aesthetic diagnosis confirmed mandibular retrusion and therefore the need for a treatment phase with functional appliance. The analysis of the cervical vertebrae also revealed that the patient is in the growth phase (C3). The treatment plan provided for the application of a pre-adjusted fixed appliance (straight-wire) with a bite plane to release the occlusion and speed up therapy. In order to counteract unwanted dental movements, a lingual arch, brackets with negative torque for the lower incisors, torque of the labial root in the rectangular wire and bend-backs distal to the molars were used in the management of the lower incisors with functional appliance. Forsus device was worn by the patient for a period of 8 months. Subsequently, the finishing phase of the treatment was carried out.
Results: At the end of the orthodontic treatment photographs and end-of-care radiographs were taken again. From the overlaps of the cephalometric traces, obtained according to the ABO rules, we found a valid improvement of skeletal and aesthetic parameters.
Conclusions: Forsus device is an effective alternative in the treatment of moderate Class II skeletal malocclusions in uncooperative patients. In addition, through the creation of particular tips and tricks, the efficiency and effectiveness of the Forsus device and the management of the lower anterior incisors can be improved in order to speed up therapy and counteract unwanted dental effects.

Correlation between dental arch form and width and obstructive sleep apnea syndrome in adult caucasian subjects

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Aim: Obstructive Sleep Apnoea Syndrome (OSAS) is a chronic respiratory sleep disorder characterized by repeated episodes of partial (hypopnea) or complete (apnoea) obstruction of the upper airways during the inspiratory phase. OSAS etiopathogenesis resides in functional factors -loop gain, arousal threshold, muscle responsiveness- and anatomical factors, including pharyngeal morphology and all those circumstances that lead to a narrowing of the caliber of the upper airways. The pathophysiological consequences of untreated OSAS is caused by fragmentation of sleep, respiratory effort increasing, intermittent hypoxia and hypercapnia which lead to the onset of heterogeneous clinical conditions characterized by complications expressed in the short term (excessive daytime sleepiness, reduced quality of life, cognitive and sexual dysfunction etc.) and in the long term (cardiovascular mortality and morbidity, metabolic dysfunctions, stroke etc.). Obesity, age, male gender and anatomical conformation of the head-neck district are directly related to OSA. Craniofacial characteristics associated with OSA include hyoid position, micrognathy and mandibular retroposition, narrow upper airway space, tongue volume, upper airway soft tissue size. Several authors have investigated the influence of palatal morphology and dental arch form on adult and paediatric OSAS. In the face of a proven role about narrow arches in paediatric OSAS, the role of dental arch form and interdental width in adults with sleep apneas is less clear. The aim of this study was to evaluate the hypothesis that inter-canine, inter-premolar, inter-molar distances and dental arch morphology differs between typical OSA patients and non-snoring, non-apnoeic controls.
Methods: The sample consisted of 100 patients, 50 OSAS patients and 50 non-snoring, non-apnoeic

controls, equally divided by gender and age. All the subjects of the sample had not history of orthodontics, maxillofacial surgery, dental prosthetic and no craniofacial syndromes. After obtaining digital models, through Dolphin Imaging, we measured the inter-canine, inter-premolar, inter-molar width of both arches, both for the OSAS group and the control group. To evaluate the dental arch form, we designed a curve by connecting the buccal cuspids of the molars and premolars, the canine cuspid and the incisal edges of incisors of the lower arch and we compared the arch shape obtained with a digital template (OrthoForm™ templates by 3M Unitek).
Results: To define the method reliability among the arch form and the interdental width, the evaluations and measures were repeated twice by three expert clinicians in orthodontic. There was no systematic error between repeated measurements. OSA patients had a reduced inter-canine, inter-premolar, and inter-molar distances for both arches compared to controls. OSA patients had a greater number of tapered arch form (54%) and a minor number of squared arch form (9%) compared to control group, which showed, respectively, a 35% and 25% of tapered and squared arch form. Ovoid arch form did not differ between the two groups.
Conclusions: These results suggest that OSA patients have narrower and more tapered arches than non-snoring, non-apnoeic controls. Thus, maxillary morphological differences do exist between OSA and control subjects, supporting their role as an etiological factor.

The effect of magnetic resonance imaging (MRI) on metallic orthodontic wires

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Aim: Magnetic resonance imaging (MRI) is a non-invasive technique used to evaluate lesions, particularly those involving soft tissues. It doesn't involve the ionizing radiation and for this reason it can be used for both young and aged patients. MRI on patients wearing orthodontics appliance is not uncommon. The purpose of the present study was to assess the effects of MRI at two different powers (1.5 T and 3 T) on the orthodontic wires temperature.
Methods: A total of 220 bovine lower incisors were collected and stored in thymol at 0,1% weight/volume. The teeth were collected and randomly divided into 8 groups, as follows:
Group 1: 1.5 T MRI-0.014 inch stainless steel wire;
Group 2: 1.5 T MRI-0.019 x 0.025 inch stainless steel wire;
Group 3: 1.5 T MRI-0.014 inch nickel titanium wire;
Group 4: 1.5T MRI-0.019x0.025 inch nickel titanium wire;
Group 5: 3 T MRI-0.014 inch stainless steel wire;
Group 6: 3 T MRI-0.019x0.025 inch stainless steel wire;
Group 7: 3 T MRI-0.014 inch nickel titanium wire;
Group 8: 3T MRI-0.019x0.025 inch nickel titanium wire.
Specimens were left at room temperature for 12 hours. For each tooth the temperature of the wire was measured with a contact thermometer probe (PeakTech® Digital Thermometer 5135/5140 Prilf und Messtechnik GmbH, Ahrensburg, Germany), on the vestibular wire surface, 2 mm mesial to the bracket slot. Temperature measurements were performed immediately before (T0) and after (T1) the MRI exam. Groups 1 to 4 underwent MRI at 1.5 T power while groups 5 to 8 underwent MRI at 3 T power (Magnetom Verso A Tim System, Siemens, Munich, Germany). The total scanning time was approximately of 20 minutes for each group.
Results: Linear regression models showed that the wire temperatures were significantly affected by MRI Power ($P<0.0001$), wire material ($P<0.0001$), and wire size ($P<0.05$). ANOVA showed the presence of significant differences among the various groups ($P<0.05$). When evaluating wire temperatures after 1.5 T MRI, the Tukey test showed a significant temperature increase under all conditions tested ($P<0.05$). The highest temperatures ($P<0.05$) were recorded for the 0.019"×0.025" stainless steel wires (group 2). Significantly lower values ($P<0.05$) were reported for the 0.014" stainless steel wires (group 1). The lowest values ($P>0.05$) were found for the 0.014" nickel titanium (group 3) and 0.019"×0.025" nickel titanium wires (group 4). Conversely, after 3T MRI exposure, a significant wire temperature increase between T0 and T1 was reported under all the conditions tested ($P < 0.05$). No significant differences were found among the various groups at T1 ($P>0.05$). After the MRI exams, no significant differences were reported between the 1.5 T and 3 T powers for wire temperatures ($P>0.05$), except for the 0.014" nickel titanium wires, which showed significantly lower temperatures at 1.5 T when compared with 3 T ($P<0.05$).
Conclusions: A significant increase in temperature was found for all the wires, even if the increase was clinically insignificant (from 0.39 to 1.74°C). Therefore, the removal of orthodontic wires before a routine MRI is not recommended but can be necessary in case of possible interference in image quality.

Magnetic resonance imaging's effects on metallic orthodontic brackets

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Aim: To evaluate the effects of MRI at 1.5 T and 3 T on brackets' temperature. Magnetic resonance imaging (MRI) is a medical radiologic diagnostic technique which allows to obtain body's images using magnetic fields, magnetic fields gradients and radio waves. MRI use is common on patients wearing orthodontic appliances, and the request for them temporally removal is frequent in the orthodontist's clinical practice. This request is made to avoid any metal heating and bracket detachment, even if no clear guidelines are available for this process.
Methods: 220 bovine lower incisors were collected and stored in thymol at 0.1% weight/volume. The teeth were cleaned and randomly divided into 11 groups of 20 specimens each, as follows:
Group 1: No MRI + No Wire;
Group 2: 1.5 T MRI + No wire;
Group 3: 1.5 T MRI + 0.014 inch stainless steel wire;
Group 4: 1.5 T MRI + 0.019 × 0.025 inch stainless steel wire;
Group 5: 1.5 T MRI + 0.014 inch nickel titanium wire;
Group 6: 1.5 T MRI + 0.019 × 0.025 inch nickel titanium wire;
Group 7: 3 T MRI + No wire;
Group 8: 3 T MRI + 0.014 inch stainless steel wire;
Group 9: 3 T MRI + 0.019 × 0.025 inch stainless steel wire;
Group 10: 3 T MRI + 0.014 inch nickel titanium wire;
Group 11: 3 T MRI + 0.019 × 0.025 inch nickel titanium wire.
The brackets of Groups 1, 2 and 7 were control groups, and no wire was secured. The samples were left for 12 h at room temperature. For each speciment, the temperature of the bracket was measured in Celsius by a contact thermometer (PeakTech® Digital Thermometer 5135/5140 Prilf und Messtechnik GmbH, Ahrensburg, Germany), by contacting the thermometer probe with the upper right brace wing. Measurements of the temperature were performed immediately before (T0) and after (T1) the MRI exam. Group 1 was the control and it was not submitted to any MRI exam. Groups 2 to 6 underwent MRI at 1.5T power, Groups 7 to 11 underwent MRI at 3T power (Magnetom Verso A Tim System, Siemens, Munich, Germany). The MRI time was about 20 min for each group.
Results: Linear regression models showed that bracket temperatures were significantly affected by the MRI Power ($P<0.0001$). ANOVA showed the presence of significant differences among the various groups ($P<0.05$). The Tukey test showed that there were no significant differences between group no wire (group 2) and groups engaged with nickel titanium wire (groups 5 and 6) ($P>0.05$). But, a significant temperature increase was measured in groups engaged with 0.014" and 0.019"×0.025" stainless steel wires. After 3T MRI exposure a significant temperature ($P<0.05$.) increase of the brackets was reported under all the conditions tested.
Conclusions: The increase in the temperature for brackets in all groups was found numerically significant but not clinically relevant, as it was limited to a few degrees (from 0.05 °C to 2.4 °C); so the present report demonstrated that the tested orthodontic materials are safe during MRI. However, these orthodontic appliances can have a detrimental effect on the final image quality depending on the anatomical district being studied with the radiologic exam.

Management of anterior and posterior open bite due to aligner therapy

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Aim: One of the main problem of aligner therapy is occlusal finishing. Posterior open bite is usually present at the end aligner orthodontic therapy. Not so many authors have studied and wrote papers about this aspect, but on simple internet search this topic is very common. The most important causes of posterior open bite are: lack of root control during expansion of the arches, lack of sufficient overjet with occlusal contacts between anterior teeth, light posterior contact points. In this clinical case in shown how to solve this tipical problem, using correct aligner planning with right attachments on posterior teeth and overcorrection of some movement that is difficult to achieve.
Methods: A 38 y old female patient with I Class malocclusion with crowding of upper and lower arches and anterior open bite was treated with aligner therapy. First set of aligners was performed with anterior inferior Interproximal reduction and the use of optimized attachments on the surfaces of only anterior upper teeth, without any attachment on the surface of posterior teeth. First set of aligners was enough successful to correct dental crowding. Otherwise, it was evident no resolution of anterior open bite. Furthermore, it was present a dental posterior open bite. The patient was treated with an additional set of aligners to correct successfully the anterior open bite. In this case, optimized extrusion attachments were positioned on lateral incisors.

Posterior open bite lasted until the end of last set of aligners.
Results: The last set of aligners was characterized by an overcorrection of radicular position of posterior teeth and the control of this movement by the use of conventional attachment, horizontal and gingivally beveled. Indeed, it was useful to program strong posterior contacts to garantee better posterior occlusion. After 1 year therapy the malocclusion was solved with correct posterior and anterior occlusion.
Conclusions: Usually aligner therapy tends to be tought as a simple therapy, without complication and with simple results. The truth is that is very difficult to achieve a correct posterior occlusion with aligner therapy because many orthodontists don't know the right biomechanics and limits of aligner therapies. It is necessary to follow the right procedures and control the results without panici if the things are not going in the correct way. It is important to control anterior occlusion and program a correction of overjet to be sure to achieve an overjet of at least 1,5 mm. Every light or strong contact on anteriors will probably cause posterior open bite. Furthermore, we have to thing about that aligners work better on crown movements than radicular movements, so we have to thing about this aspect at the start of any case.

Maxillary transverse expansion in no compliance patient

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Aim: Maxillary transverse deficiency is often associated with the occurrence of impacted maxillary canines in adolescent patients. Many orthodontic devices have been developed for the correction of maxillary transverse deficiency but most of them require a good cooperation of patients. In special needs patients compliance can be a major obstacle. The Leaf Self Expander is a new type of orthodontic expansion device that requires zero patient compliance and zero clinical activation. The design of the Self Expander is similar to that of Leaf Expander. The Self Expander is equipped with three pre-activated nickel titanium double springs, which are compressed during fabrication and release predetermined, controlled and continuous forces as the springs decompress. The Leaf Self Expander is available as part of the NiTi-Memoria Leaf Spring Series Line, in either 6 mm or 9 mm, with a force selection of either 450 g or 900 gr. Once in mouth leaf springs generate a calibrated expansion, employing light and continuous forces without the need of periodic reactivation. Several study have shown successful orthodontic, orthopaedic or mixed maxillary expansion by the Leaf Self Expander.
Methods: This case report describes the use of the Leaf Self-Expander appliance to correct a transverse maxillary deficiency in a patient affected by Attention Deficit Hyperactivity Disorder. This 12-year-old male patient had maxillary transverse deficiency with a lack of space of his upper canines and was treated by fitting the Leaf Self Expander. The Leaf Self Expander was anchored on the upper first permanent molars and metals ligatures blocking the screw were removed. The patient has been monitored monthly for oral hygiene and expansion without the need of reactivation.
Results: Complete correction was achieved on average in 6 months. The Self Expander was left in place for three months of retention, until the eruption of the upper canines. The results remained stable nine months after treatment.
Conclusions: This case report confirms the efficient use of Self Expander in correcting maxillary deficiency with no need for patient compliance. Controlled tooth movement was achieved painless without undesirable side effects on the permanent teeth.

Association between obstructive sleep apnea syndrome and periodontal disease: an update of literature

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Aim: Obstructive sleep apnea syndrome (OSAS) is a chronic sleep-related breathing disorder affecting at least 2-4% of middle-age females and males. It is characterized by a partial or total obstruction of the upper airways resulting in a reduction of airflow during sleep. This leads to a lower oxygen saturation, sleep disruption and daytime sleepiness. The purpose of this study is to evaluate a possible association between periodontal disease and obstructive sleep apnea syndrome (OSAS)
Methods: We carried out a research using the National Library of Medicine (Medline-PubMed). We used as key words Periodontitis, Obstructive Sleep Apnea (OSAS

and OSA), Periodontal disease. Any work prior to 2009 was excluded. The studies taken into account were of different types and included case-control studies, cross-sectional studies and meta- analysis.

Results: In the studies analyzed the diagnosis of OSAS was realized through polysomnography (AHI>5), while validated questionnaires as Epworth Sleeping Score (ESS) and Berlin Questionnaire (BQ) were used to estimate the risk of OSAS. To establish the presence of periodontal disease Clinical Attachment Level (CAL), Bleeding on Probing (BoP), Pocket Depth (PD), Gingival Recession (REC), Plaque Index (PI) were used; in some studies salivary cytokines and the radiographic alveolar bone loss (ABL) were also used.

In the first study realized about the topic, they found that the prevalence of periodontitis was 4 times higher in the OSAS group than the general population; this increased prevalence could be due to either a real association between the two conditions or shared etiological factors. A higher prevalence of periodontitis in the OSAS subjects was confirmed by other following studies, even though the evidence was lower than the first study that shows some limits such as a small sample size. In other studies, instead, they didn't find any association between periodontal disease and OSAS. Five years ago Nizam et al. evaluated the concentration of some salivary cytokines (IL-1β, IL-6, IL-33, IL-21 e PTX-33) in OSAS and non-OSAS subjects; the concentration of IL-6 and IL-33 was significantly lower in non-OSAS group than the OSAS group; they also found a statistically significant relation between IL-21 and CAL and PI. The increased concentration of these cytokines could have a role in the pathogenesis of periodontal disease in OSAS subjects.

Conclusions: There are evidences of a plausible association between periodontal disease and OSAS, but it is still unclear if there is a linking physiopathological mechanism or if there is a cause-effect relationship between OSAS and periodontal disease. A higher prevalence of periodontitis in OSAS subjects could be due to some shared risk factors and to a systemic inflammation condition caused by these two diseases. In conclusion, further studies are surely needed to analyze the relation between OSAS and periodontal disease; these studies should use a precise classification of OSAS subjects and the new classification of periodontitis from the World Workshop of Chicago 2017.

Individualization of the positioning of orthodontic attachments: proposal of a new method of indirect digital bonding

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Aim: The goal of this work was to clinically validate a new orthodontic digital indirect bonding procedure. This procedure allows individualized positioning concerning size and morphology of the patient's teeth. The clinical validation of the procedure will take place through the presentation of a clinical case treated with this methodology.

Methods: The clinical case we selected is a 27-year-old male patient. Patient evaluation showed the following orthodontic problems: dental crowding of the upper and lower anterior sector; deep bite; misalignment of the upper and lower midlines; mild Class III molar on the right side of the arches; mild Class II canine on the left side. The patient's arches were digitized with the following extra-oral scanner: Maestro 3D scanner. The digitized arches were imported into the Master 3D Studio V5 - Orthodontic module software. Through the software, the dental arches were segmented and a pre-treatment set-up was performed to improve treatment objectives pre-evaluation. Through a specific software function, virtual copies of the brackets were imported into the software environment (Forestandet, Minisprint brackets series on the digital models obtained at the end of the virtual set-up execution). The brackets were positioned so that all the slots were parallel and positioned symmetrically to a plane parallel to the occlusal plane. The position of the single bracket concerning the clinical crown of the tooth was transferred from the set-up model to the pre-treatment model using a specific software function. The execution of indirect bonding involved the design of specific transfer jigs. These Jigs have been individually designed through Cad Design software (Fusion 360, Autodesk), to be perfectly complementary to the design of the brackets applied during the bonding of the arches. Once the jigs were designed they were exported in STL format, and finally imported in the Maestro 3D software interface. Subsequently, an occlusal bite was also designed and manufactured that was able to anchor to the occlusal surface of the dental elements and that allowed the housing of the horizontal portion of the jigs. Jigs and transfer bites were made using 3D printing using specifically certified resins for indirect bonding (Surgical Guide Resin, Formlabs Ohio Inc., Millbury, OH, USA). During bonding the etching phase was carried out with 37% orthophosphoric acid, and Transbond XT 3M resin applied on the bases of the brackets. Once the bonding of both arches was completed, two Ni. Ti orthodontic wires with a diameter of 0.16 were positioned to begin the process of alignment.

Results: The proposed method has been clinically validated. This procedure seems to have two advantages: the pre-visualization of the clinical results we want to achieve and the precise and targeted positioning of the brackets to achieve this clinical objective. Furthermore, the jigs guide

splints, during the clinical bonding phase, give us the possibility to keep the arches spaced and block the tongue posteriorly, limiting salivary contamination, making the adhesion system more effective. Also, the positioning of the brackets through dedicated jigs allows us to have a complete view of the base of the attachment, facilitating the removal of excess adhesive resin.

Conclusions: The proposed method offers the opportunity of providing an individualized treatment according the anatomical characteristics of the orthodontic patient: moreover, it guarantees a direct approach towards the defined treatment objectives, in order to have a more effective and efficient orthodontic treatment.

Oral microbiome and orthodontic therapy: changes in fixed therapy

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Aim: Although periodontal diseases during fixed appliance treatment are a common issue, few studies have focused on the oral microbioma modifications associated with fixed orthodontic appliances. We investigated changes in the oral microbiome and their association with periodontal changes at the early stage of fixed appliance treatment.

Methods: We selected 14 patients who need fixed orthodontic therapy, with traditional brackets and metallic ligatures. Inclusion criteria: female or male, 10–20 years old, no periodontitis, good oral hygiene, no smoking, not pregnant, no intake of antibiotics or hormones 1 month before joining the study, no chronic disease and no oral hygiene 1 month before joining the study. Exclusion criteria: patients with missing first molars or first central incisors (index theets), or with crowns or fixed bridges. We performed the periodontal examination (BOP, PI and PPD) and the subgingival plaque sample collection of the index teeth at three time points: before the placement of the brackets (T0), 1 month after the placement of brackets (T1), 3 months after the placement of the brackets (T2). After clinical examination and removal of supragingival plaque, we will collect subgingival plaque sample immediately from the labial or buccal surfaces of index teeth with a sterilized periodontal curette. After we isolated DNA from subgingival plaque samples using a commercial bacterial DNA mini kit. We performed 16S rRNA gene sequencing according to standard protocols and we analyzed the sequences and evalueted the differences of microbial diversity (alpha diversity and beta diversity) at different time points. The statistical significance of differences in relative abundance among groups were determined following the Metastats method. $P < 0.05$ was accepted as statistically significant.

Results: At T2 there were improvements of clinical parameters. The bleeding has changed from 25.38% at T0 to 8.80% at T2, with a decrease statistically significative, while the decrease of the PI was just nearly the statistical significance and it is diminished from the 65.38 at T0 to 44.27 at T2. There were also some changes in the organization of the oral microbiome, as demonstrated by the changes in the relative abundaces reported in the sample of beta diversity at different times. They highlighted the decrease of Fusobacteria and Actinobacteria phyla, while the phyla of Firmicutes and Bacteroides have increased.

Conclusions: The organitation of the oral microbiome and the oral health are related. Our study, according to the literature, has demonstrated how the introduction of a fixed orthodontic appliances can changes the oral microbiome and consequently the clinical parameters. In our study there were a simultaneous increase of Prevotella and a decrease of Fusobacterium, both potentially pathogenic species that has allowed the establishment of a new balance related to a good oral health conditions. These results demonstrate that the introduction of the fixed orthodontic appliance necessarily induces changes in the structure of the oral microbiome but that they do not necessarily have to be pathological and that the correct oral hygiene can prevent the switch of the oral microbiome towards a pro-inflammatory structure.

One year treatment of Class II patient with elastodontic appliance: Healthy Start®

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Aim: To describe a case of a patient in dynamic-growth with mixed dentition with dento-skeletal Class II malocclusion, deep bite, increased overjet and upper incisors protrusion. The patient was treated with an elastodontic appliance, Healthy Start® (Sweden and

Martina). In this particular case, the objectives of first phase of our treatment were: to correct the dento-skeletal malocclusion, to obtain a correct overbite and overjet, to control the permanent teeth in a good eruption and to improve aesthetical conditions and to maintain clinical results.

Methods: The patient came to our department in June 2018 with Orthopantomography, Latero lateral and Postero anterior Teleradiography. The patient, who was in the active growth phase (13 years old without menarche), presented a severe deep bite, skeletal Class II, excessive overjet (12 mm), lip incompetence with lip strain, canine inclusion element 1.3, dental transposition of elements 2.3 and 2.4. We decided to start with orthopedic treatment to stimulate and guide mandibular growth. She was treated with an Healthy Start® device for almost one year. The patient was instructed in wearing the appliance every night and at least 2 hours during the day. The cooperation of patience was satisfactory. The patient underwent periodical orthodontic visits (almost every two months) in our department, in order to check the clinical response of our treatment and the compliance of our patient to our orders. Subsequently we will continue treatment with rapid palatal expander, multibrackets therapy and possible disinclusion of canine.

Results: Treatment with the elastodontic appliance resulted in clinical and radiographic improvement of the malocclusion. After one year of treatment, we did Cone Beam Computed Tomography (justified for included canine 1.3 and transposition 2.3-2.4) and we noticed that we obtained a correction of dento-skeletal malocclusion, a correction of overjet (3 mm), a correction of overbite, improvement of proinclination of upper incisors and aesthetical conditions.

Conclusions: Healthy Start® was the indicated appliance to obtain all the objectives requested to solve the malocclusion. In this case the early therapy with Healthy Start® was easy and effective: in our opinion Healthy Start® therapy can be a valid treatment option when indicated by diagnosis; for example in our case elastodontic therapy was very useful for the resolution of skeletal Class II deep bite in a growing patient.

Complications associated with the clinical use of orthodontic miniscrew implants: a systematic review

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Aim: The purpose of this systematic review was to evaluate the complications associated with the clinical use of orthodontic miniscrews implants-temporary skeletal anchorage devices(TADs).

Methods: An electronic search in database was conducted by two independent reviewers to identify relevant articles published up to March 2020, through the Cochrane Database of Systematic Reviews, MedLine, Web of Science, LILACS, BBO, ClinicalTrials.gov. Additional searching for on-going and unpublished data, hand search of relevant journals and grey literature were also undertaken, and reference lists of selected articles screened, without restrictions relating to publication status or language of publication. Clinical studies on humans or case reports or case series reporting complications associated with the use of orthodontic miniscrew implants were included. Two authors performed independently study selection, data extraction, and risk of bias assessment. The following variables were recorded for each article: author, year of publication, type of study, sample size, mean age, sex , insertion site, compication type, observation period, type of implant, surgical insertion procedure and quality of the articles on the New Castle Ottawa Scale.

Results: Initially we retrieved 1980 articles. The selection process finally resulted in 24 articles for detailed analysis. The risk of bias assessment revealed low methodological quality for all the studies included. The included studies were designed as case report (11), case series (1), retrospective study (8), prospective study (3), preliminary study (1). The most frequent complication reported was root injury (5 cases, 127 screws) after inter-radicular miniscrews placement with associated periradicular lesion (4 cases, 4 screws), vitality loss (7 cases, 7 screws), pink discoloration of the tooth and transitory loss of pulp sensitivity (1 case, 1 screw). Chronic inflammation of soft tissue surrounding the miniscrew, both in alveolar and extra-alveolar region, with formation of granulation tissue or mucosa overgrowth (6 cases, 15 screws) was also reported in some studies. Other complications reported were alveolar bone exostosis (1 case, 2 screws), lesion of buccal mucosa at the insertion site (44 cases, 98 screws), necrotic mucosa (2 cases, 2 screws) traumatic lesion of the upper inter-incisal frenulum (1 case, 1 screw), protusion of the miniscrew in the maxillary sinus (4 cases, 60 screws), Complications were also found immediately after miniscrew removal such as perforation of nasal floor (3 cases, 3 screws), secondary bleeding (7 cases, 7 screws) and miniscrew fracture (3 cases, 3 screws).

Conclusions: Despite the low level of evidence arising from the studies included in this systematic review, the documented complications would suggest that a preliminary evaluation of the patient-related risk factors for miniscrews insertion is clinically advisable. More high-quality studies on this issue are necessary to enable drawing more reliable conclusions.

Impacted incisor and upper midline correction with a modified rapid palatal expander and utility arch

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Aim: To describe a case report of an impacted dental element treated with a modified rapid palatal expander and an utility arch.
Methods: A 11 years old male patient, who was non-compliant and non-collaborative, came to our attention and he presented the 1.1 impacted. The parents stated that the patient had no pre-existing diseases, no allergies and that he had any hospitalization. The patient had an orthopantomography of the dental arches, an orthodontic cephalogram in lateral projection of the head and a cone beam computed tomography already, which were prescribed by the dentist. We decided to expand the upper maxilla with a modified rapid palatal expander (RPE). This device was designed and constructed with bands with tubes on the upper molars, palatal harms and a metal vestibular harm, welded on the band of 2.6 and bonded on the 2.1. This contributed to create space and correct the dental midline, which was deviated towards the right. After this phase, we removed the vestibular harm and bonded 1.2, 2.1 and 2.2 and we inserted an utility arch to proceed with the orthodontic traction of the 1.1. The sequence of the arch wires were .014 NiTi, .016 NiTi, .019 x. 025 NiTi and .018 x .025 SS. After 4 months the 1.1 erupted in the oral cavity.
Results: The association of a modified rapid palatal expander and the utility arch allowed the eruption of the tooth in 10 months of therapy. The surgery was performed by the dental surgeon. Brackets were bonded on 1.2, 2.1 and 2.2 and we used the tubes weldered to the bands of the RPE. The 1.1 presented an abnormal shape of the crown, an augmented negative torque and a non-keratinized gingival shape, which caused hygienic problem to the patient. This aspect contributed to the formation of dental plaque.
Conclusions: This case shows a minimal orthodontic approach for the 1.1 impacted. This therapy allowed us to threat a non-compliant patient in a relatively short time. At the end of the therapy the patient had his tooth in the oral cavity, even if it presented problems of torque and soft tissue in correspondence of the gingival margin. In any case, the patient and his parents were happy and satisfied.

Beauty development in the twentieth century: morphometric analysis of the lower third of the face

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Aim: Aesthetic evaluation for an orthodontist is essential to decide on the right treatment plan. The debate on "beauty" has always been central for orthodontic treatment and universal parameters of beauty have been created to help in treatment planning. The purpose of this study is to evaluate whether, in the course of the twentieth century, there have been changes in the parameters aesthetic profile, especially the lower third of the face.
Methods: A sample of 200 photos of female profiles of the twentieth century reported in fashion magazines were collected according to the following inclusion criteria: excellent visibility of the lower third of the face and competent lips. Exclusion criteria were profiles that show a smile and profiles not perfectly orthogonal. A self-referencing method was chosen, following Nguyen's guidelines to quantify the lip area (area A) and the nose-labio-mental area (area B) with the High Design TM Software. Values of the profiles ranging from 1920 to 1949 were compared with those from 1990 to 2009. The values relating to the decades between 1950 and 1989 were excluded in order to collect two homogeneous groups of data that could be different from one another and as much representative as possible of the population of the era they belonged to. The student's T test was used to study the difference between the two groups ($p<0.05$). The ratio between area A and area B was used as the reference index.
Results: The lip area (area A) increased during years with a linear progression. The comparison between the first period (1920 to 1949) and the second (1990 to 2009) showed a statistically relevant difference considering area A. The nose-labio-mental area (area B) seemed to remain almost the same, no relevant difference has occurred in the years. The ratio between area A and area B increased in the years, starting from 0.15 and ending to be 0.45.
Conclusions: The result of this research has shown that there is a statistically significant difference between the values relating to the areas examined in the models of the early decades of the 1900s and those of the "current" models. Even the averages of values gradually increase throughout the twentieth century. Further studies conducted on a larger sample could be useful for further statistical confirmations.

Reliability of clinical and instrumental parameters for the pretreatment evaluation of periodontal support for a safe planning of dental-alveolar orthodontic expansion: review of the literature

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Aim: Orthodontic correction of crowded arches may be achieved either by expanding the dental arch and widening the intercanine distance, or by providing compensation for the missing space by reducing the existing tooth volumes via extraction of teeth or interproximal enamel stripping. The decision to extract, in turn, may be downright inevitable in cases of severe crowding, but the decision is often extremely difficult to make in moderate cases. Orthodontic tooth movements may affect periodontal tissues, sometimes to the point of inducing marginal bone or gingival- tissue loss and promoting recession. The purpose of the study is to identify clinical and instrumental parameters that help clinicians to predict a periodontally safe dental alveolar expansion of the arch.
Methods: A literature search was performed using the following databases: PubMed and Scopus (from 2000 to week 1 of February 2020). To identify articles reporting periodontal support loss related to orthodontic tooth movements. All articles were found using MeSH searches with the MeSH terms "Gingival recession", "Tooth Crowding", "Cone-Beam CT", "Periodontal bone loss" and the following keywords "Dental arch dimension", "Extraction", "Non-extraction", "Orthodontic treatment", "Keratinized gingiva". Articles in any language were considered. To complete the search, references of each selected publication were hand searched.
Results: Research indicates that gingival morphology plays an important role in orthodontic treatment decisions. In literature predisposing factors of periodontal support loss in orthodontic patients are still not clear. Periodontal conditions such as decreased keratinized gingival thickness and height (<2 mm), gingival thickness (<1mm), reduced alveolar bone thickness, presence of dehiscence/fenestration, mandibular symphysis width and final incisal lower inclination (>95°) are common risk factors for gingival recession. Anterior-posterior or labial movement of incisors demonstrated by the change in arch depth was found to be statistically significant with gingival recession. Although several studies have been carried out about the efficacy of CBCT investigating bone thickness, no specific predictors of the risk of periodontal support loss were found. Anyway, in literature this exam seems to improve diagnostic acumen of alveolar bone alterations before orthodontic tooth movement and can influence decision making. The integration of CBCTs scans into digital models seems to have a potential clinical impact in simulation of root alignment and position during and after orthodontic treatment, eliminating the necessity of multiple radiation exposures, supporting the concept of moving from "As Low As Reasonably Achievable" (ALARA) to "As Low As Diagnostically Acceptable" (ALADA).
Conclusions: This research highlights the gap of targeted studies about the correlation of dentoalveolar expansion and periodontal consequences. It is necessary to deepen the relationship between orthodontic treatment and the effect it has on periodontium. Every clinician should pay attention to these considerations before starting a therapy, to plan safe and predictable movements. Other studies setting reference parameters should be performed to try to predict and standardize the periodontal effect of orthodontic treatment.

Influence of breastfeeding on the development of occlusion: a systematic review

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Aim: The main objective of this systematic review of the literature is to evaluate the influence of breastfeeding on the development of stomatognathic system structures and their association with the development of dental occlusion. The secondary objectives are: study the importance of nutritional suction for the development and growth of the individual, compare the mechanisms of natural breastfeeding compared to artificial feeding, relate breastfeeding to the prevention of malocclusions, relate artificial feeding as an etiological factor and promoter of malocclusions and harmful oral habits.
Methods: A systematic review of the literature was performed in the Medline, Pubmed, Google Scholar. Predetermined Medical Subject Heading Keywords were used: "maxillofacial development", "feeding methods", "breast-feeding", "breast-feeding duration", "bottle-feeding", "malocclusion", "occlusion", "breast-feeding and habits leading "," sucking habits ", " finger sucking "," infant swallowing ".The languages included in the bibliographic search have been mainly English, and as a second language Spanish. From the different databases have been obtained a total of 44 articles,

of which 24 are systematic reviews, 20 clinic cases, 4 case-cohort studies, 10 cross-sectional studies and 6 case-control studies.
Results: The process of sucking differs between children who are breastfied and those who are fed from a bottle. The scientific literature reports that breastfeeding influences the adequate growth and development of the stomatognathic system of the baby, since it stimulates muscular activity during breast suction, it promotes mandibular advancement, act that is positively associated with the development of dental arches in the temporal dentition in the anterior transverse and sagittal plane. Moreover, this great effort required by the baby during suction covers the basic sucking needs preventing so bad oral habits such as atypical swallowing, digital sucking, pacifier suction, lip sucking and sucking other objects, habits that they can be deleterious for proper craniofacial growth and depending on the time, intensity and frequency of the habit may facilitate the development of malocclusions. During artificial lactation there is a lower functional requirement at the time of feeding, and consequently the buccal musculature will become hypotonic and atrophic and will generate growth deficiencies of the structures of the oral cavity, all this will result in the mandible remain in a distal position with respect to the maxilla, which in turn has an impact on dental occlusion, causing the development of malocclusions among which we highlight: posterior cross bite, anterior open bite, crowding, increased protrusion, among others. Moreover differents studies have showed that the bottle-feeding may be responsible of the establishment of non-nutritive sucking habits and predisposes to the development of malocclusion, being time, the factor that most influences their development. Studies have been conducted where it is observed that children who were fed through the bottle for a period of time greater than 18 months have a risk greater than 1.6%, 1.16% and 1.43% of having respectively posterior cross bite, maxillary compression and Canine Class II that children who received such food until 18 months.
Conclusions: According to the literature reviewed it can be affirmed that prolonged breastfeeding for a period equal to or greater than 6 months have a protective effect on development of malocclusions, while artificial feeding is considered as an etiological factor and promoter of malocclusions and harmful oral habits,being greater the risk in those children who received artificial lactation for long periods.

Case report: orthodontic intrusion in a patient with cronic periodontal desease

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Aim: In periodontally compromised adult patients, the application of intrusion forces could cause periodontal tissue negative reactions. In a large percentage of cases, intrusion forces cause a deterioration of the patient's periodontal status, with an accelerated loss of support structures and bone pockets progression.
The purpose of this study was to illustrate a case of intrusion of parodontopatic incisors by the application of light orthodontic forces without periodontal adverse side effects.
Methods: This case report describes a female patient, 37 years of age, affected by diabetes, hypertension, hyperchosterolemia, thyroid disease, depression and chronic generalized periodontitis. The patient presented upper incisors (2.1,2.2) with vertical bone defect, pathological gingival probing, bleeding on probing and suppurative probing, Miller grade 2 tooth mobility, and an extruded position in comparison of contralateral incisor. The maxillary incisors (1.1,1.2) and canine (2.3) were used as experimental control teeth. Orthodontic teeth movements were strictly controlled by diode laser therapy using "sterilization bone pocket" and "biostimulation" programs. Sterilization bone pocket program consisted of application of H2O2 and discontinuous activation of laser with 0,8 W power with 300 diodes fiber. Biostimulation program was performed with continuous 0.1 W power using 300 diodes fiber. In each orthodontic appointment the patient was assessed periodontally with diode laser, exactely twice a week for the first 2 months of treatment, once a week for the next 3 months, and once a month until the end of the treatment. The orthodontic treatment plan consisted of placement of low friction multibracket appliance; the alignment and leveling phases were performed with 0.15'' and 017'' nickel titanium heat activated archwires, up to 016'' stainless steel. For the final phase 016x022'' NiTi and 017x025'' Niti archwires were used. For retention fixed retainer (from 1.3 to 2.3) and Essix were placed.
Results: The results showed favourable changes of clinical and radiological parameters, increase of tissue attachment, reduction in depth of periodontal pockets and of bleeding, reduction of the mobility of the teeth and the improvement of gingival tissue aspect accompanied by a good displacement of teeth. Anyway, the patient will undergo surgical treatment of periodontal gingival regeneration.
Conclusions: Orthodontic treatment in periodontally compromised adult patient has proven to have

aesthetic and functional success combining the use of light and continuous forces and proper plaque control using sterilization and biostimolation diode laser programs.

Overall health improvement in a growing patient after orthodontic treatment: case report

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Aim: With the presentation of the following clinical case, characterized by a progressively aggravating malocclusion, we want to emphasize the importance of the orthodontic treatment, aimed not only at the correction of the malocclusion, but also at patient's global wellbeing.
Methods: A 9 years-old female patient sent by the pediatrician comes to our attention. The medical anamnesis shows a long history of upper respiratory infections, oral breathing, persistent thumb sucking, snoring and occasional sleep apnea events. The orthodontic problem list shows a functional mandibular sliding on the right side, a certain degree of dismetry between left and right side, an increased dimension of the inferior third and the typical "facies adenoidea". The skeletal frame highlights skeletal Class III and an hyperdivergent pattern of growth. The intraoral evaluation shows: a lateral posterior cross bite on the right side, a reduced overjet and a negative overbite. With reference to the patient's medical history and on the base of the orthodontic problem list, the goals of our treatment are: the interruption of the oral habit, the improvement of breathing and sleep, the correction of the malocclusion. In particular orthodontic phase 1 involves: on the transversal plane: the orthopedic upper arch expansion to correct the lateral cross bite, on the vertical plane: the upper incisor extrusion to reduce the open bite, on the sagittal plane: the maxillary orthopedic stimulation to correct the skeletal Class II. This first phase starts with a rapid palatal expansion aimed not only at cross bite correction but also at achieving a greater effect on the nasal cavities and at promotion of a harmonious craniofacial growth. Considering the failure of the cognitive behavior therapy, we develop a no compliance treatment plan for the suspension of the thumb sucking by using an anterior palatal crib. After 6 months, once obtained the elimination of the bad oral habit and the reduction of the open bite, we decide to perform a second cycle of orthopedic therapy with upper protraction face-mask (9 months) to encourage the sagittal growth of the upper jaw. At the end of these two treatment cycles, the health balance appears very good; in particular we can highlight: improved oral breathing, the disappearance of snoring and sleep apnea events. Follow up is conducted until 14 years old, when phase 2 begins with fixed orthodontic appliance and ISW approach for the recovery of a vestibular ectopic canine.
Results: Phase 1 orthodontic therapy allowed not only an harmonic facial growth but also the improvement of patient's global health. In addition, therapeutic synergy between phase 1 and phase 2 allowed a subsequent dento-alveolar correction.
Conclusions: In order to promote the patient's global health it is essential to place the malocclusion in the bio-psycho-social context of the subject and to develop the following particular skills. Knowledge: to study in deep the associated pathology. Management: to properly manage the disease and to individualize the approach. Counseling and engagement: to gain patient and parents' therapeutic alliance by explaining and sharing goals of care.

Dento-alveolar lateral-posterior orthodontic expansion and peri-radicular bone morphology and thickness variations: a review

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Aim: The dento-alveolar expansion in the latero-posterior sectors represents an option in orthodontics as a solution for the crowding problems. The arch width increasing using the dento-alveolar expansion can really provide an additional amount of space for the alignment of the teeth. An important drawback is its effect on the periodontal bone tissues. The purpose of this study is a review on the effects of fixed orthodontic treatment of dento-alveolar transverse expansion on periodontal bone tissues, in the latero-posterior area of the upper jaw.
Methods: A review on these aspects was performed concerning the alveolar transversal expansion dental treatment performed on adolescent or adult patients and assessed by CBCT tests. We included clinical studies published on Pubmed using the following key words: orthodontic treatment, adult, posterior upper jaw, bone thickness, CBCT.
Results: We didn't find many clinical studies. A significant reduction in vestibular bone thickness was obtained after a dento-alveolar transverse expansion, especially at the mesio-vestibular level of the upper first molars, of the premolars and at the

level of the canines. On the other side, an increase in bone thickness was observed in the disto-vestibular regions of the upper first molars. In addition, severe bone dehiscences have been observed in some cases of the mesio-vestibular roots of the molar elements. The two main risk factors for the dehiscence during orthodontic expansion therapy dento-alveolar transverse are the severity of crowding and initial bone thickness. The more severe the crowding and the lower the initial bone thickness, the greater is the bone dehiscence at the end of treatment. These results can be explained biologically by the presence of a thin cortical bone quantity. These is related with the poor quantity of osteogenic progenitor cells unable to form new bone during the orthodontic transverse movements. This aspect is not shown in other orthodontic movements.

Conclusions: The upper jaw dento-alveolar expansion in the latero-posterior area was analysed by CBCT scan at the end of the transverse displacement. It causes significant changes in the thickness of the vestibular alveolar bone. The presence of severe initial crowding and thin initial bone tissues has been associated with greater reduction in vestibular bone thickness. It can be related with the bone dehiscence too. Indeed, these results do not take into account any long-term changes that may occur as a result of bone remodeling. This was because they were evaluated at the end of the expansion movement.

Analysis of the miniscrew insertion torque values in different customized composite analog bone models

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Aim: Primary stability is one of the most important factors influencing the success of miniscrew. In this study, insertion and removal torque were investigated for miniscrews inserted in artificial bone blocks (Sawbones, Pacific Research Laboratories, Vashon, Wash) with various bone densities to determine the relationship between implant torque and bone density. We also analyzed miniscrew's surface before insertion and after removal.

Methods: Twenty self-drilling miniscrews (Leone S.p.A. ø 1,75 mm, L 8 mm) were inserted into bone blocks that mimicked different stability conditions (Density: 20 PCF (Pounds per Cubic Foot), 40 PCF, 30+50 PCF with 2 mm of cortical bone, 30+50 PCF with 4 mm of cortical bone). All mini-implants were examined, before their insertion and after their removal, under a stereomicroscope 5x and a SEM to detect possible microscopic cracks. During implant insertion the maximum insertion torque value was recorded using an electronic surgical motor (W&H Dentalwerk Bürmoos GmbH, Austria).

Results: Stereomicroscope and SEM analysis show no morphologic and surface structural alterations of miniscrews, regardless of the density of the bone in which they were inserted. Results show that the insertion/removal torque increases as bone density increases.

Conclusions: According to the present study, morphostructural analysis shows the adequate mechanical properties of the self-drilling miniscrews in each artificial bone block with various bone densities. Results from our insertion torque measurements show that torque values obtained for blocks with 30+50 PCF density are between 6 and 10 Ncm, the recommended values are within the range from 5 to 10 Ncm.

Maxillary molar distalization with TAD-supported devices in the treatment of Class II malocclusion

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Aim: Extra-oral devices have always been used for molar distalization in non-extractive treatment of Class II malocclusion. However, these devices need patient compliance. To overcome this problem, intra-oral non-compliance devices such as Pendulum and Distal Jet have been developed. Anyway, side effects of these devices include anchorage loss, molar distal tipping and extrusion with subsequent clockwise mandibular rotation. In order to reduce these side effects, temporary anchorage devices (TADs) were introduced to obtain molar distalization. The aim of this systematic review was to examine the efficacy of TAD-supported devices used for maxillary molar distalization in the treatment of Class II malocclusions.

Methods: The electronic search was conducted on PubMed database using specific key terms. The selection process was conducted independently by two researchers and their results were compared to identity discrepancies. The following inclusion criteria were adopted: (1) clear description of the TAD-supported distalizing device; (2) TADs positioned in the palatal area (3) only subjects in permanent dentition (4) minimum size of the sample

of 10 subjects. From the included studies, these data were extracted: study design, year of publication, sample size, medium age and sex, evaluation method, statistical analysis conducted, type of distalizing appliance, TAD's diameter and lenght, mean molar distalization and tipping, mean premolar distalization and tipping.

Results: A total of 119 subjects were analyzed. Medium age at treatment beginning ranged between 13.7 and 30.9 years. All subjects included presented permanent dentition. In all studies, two or three miniscrews were positioned in the anterior region of the hard palate. Four out of five distalizing appliances were provided of rigid arms reporting a mean 3.8 mm distalization. In just one study the device was an implant supported Pendulum showing 3 mm distalization. Treatment duration lasted from 3.2 to 12.5 months. Molar distal movement ranged between 3.0mm to 4.5mm with similar values between studies. Molar distal tipping ranged -1.2 mm to 8.8 mm with variable results between studies. Premolar distal movement was reported in two studies providing a mean 2.4 mm distalization.

Conclusions: In permanent dentition patients, non-compliance TAD-supported devices are effective in maxillary molar distalization. In fact, mean distalization amount showed greater values with respect to conventional appliances. These bone anchored devices minimize molar distal tipping and prevent molar extrusion during distalization. No anchorage loss was observed since a spontaneous distal premolar migration occurred.

Correlation between DTM and functional device therapy in growing patients: use of Andresen activator in Class II malocclusion

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Aim: The relationship between orthodontics and temporo-mandibular disorders has been analyzed in several studies with uncertain results. Some authors suggest that orthodontic treatment can cause temporo-mandibular disorders (TMD), while other studies affirm that there is no correlation. The aim of this study was to investigate the effects of Andresen activator on the temporomandibular joint of growing patients by comparing the prevalence of signs and symptoms of DTM in Class II malocclusion subjects who have used this device with those who have never undergone an orthodontic-orthopedic treatment.

Methods: The treatment group consisted of 18 patients (N=5 females and N=13 males) with skeletal Class II malocclusion evaluated according to cephalometric value of ANB and treated with Andresen device in the Department of Orthodontics of Policlinico of Bari; the control group comprised 32 subjects (16 females and 16 males) in dental Class II without history of orthopedic-orthodontic treatment selected from E. Fermi high school in Spinazzola. The inclusion criteria were age range from 13 to 19 years and no medical history for facial trauma, craniofacial syndromes and rheumatic systemic diseases. Each of 50 selected subjects completed an anamnestic questionnaire and was clinical examined according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD). The anamnestic questionnaire investigates on Axis I (clinical TMD conditions) and Axis II (pain-related disability and psychological status) assessments. During the clinical visit opening, end-feel, protrusion, laterotrusion and the presence of pain and noise during these movements, were evaluated; masticatory muscles (masseter, temporal, internal and external pterygoid, digastric and styloid) and the poles of temporomandibular joint were also palpated. All of these informations were digitized using the Google Modules software and the statistical analysis was carried out using the software State/MP 12. The statistical significance of the results was based on the Chi Square Test (p-value < 0,05 was considered statistically significant).

Results: The evaluation of positivity for DTM was 34,35% in the study group and 44,04% in the control group; indeed more painful palpation points were found in the control group than the case group. Moreover, in this study was observed anteromedial disc displacement in 56% of controls and 83% of cases but there was no evidence of increased signs and symptoms in patients in treatment with Andresen appliance. The study shows a prevalence of positive clinical history for limitation of mandibular movements and tinnitus for both groups but in the group of subjects treated was found a significantly reduction of these problems at the end of treatment.

Conclusions: According to the literature revision no statistically significant differences between the groups could be detected. After the treatment there was a significant improvement in muscle health and subjective symptoms, and no worsening of joint disease. Some authors showed that similar benefit were also produced by various functional appliances. However, we can assess the importance to make a correct gnatological evaluation of patients before starting a functional-orthodontic therapy as well as with Andresen device.

The use of new technologies, from research to clinic: sagittal spine posture and related cephalometric features

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Aim: The relationship between posture of spinal column and craniofacial morphology is still controversial. Evidence-based results are difficult to obtain and scientific studies are inhomogeneous. The aim of this study was to investigate the difference of spine posture and cephalometric values comparing two groups of adolescents with different cephalometric features in the sagittal plane. The hypothesis was that the spine posture is different when considering different cephalometric features.
Methods: Eighty-one subjects with malocclusions, 38 males and 43 females, out of 200, referring to the Orthodontic Department of the University of Turin, Italy, for orthodontic diagnosis were consecutively selected and divided into two groups, on the basis of their cephalometric craniofacial values described by the orientation of the condyle-orbital plane (CoOr) with respect to the superior maxilla (SpP): Group1: 49 subjects (11.6±2.1years) showing posterior-rotation of CoOr (SpP^CoOr ≤-2°, mean value±SD: -4.1°±2.1); Group2: 32 subjects (12.9±2.3years) showing anterior-rotation of CoOr (SpP^CoOr ≥2°, 3.7°±1.9). Before entering the study, informed consent was obtained from all the patients' parents. The patients met the following inclusion criteria: SpP^CoOr≤-2° or SpP^CoOr≥2°. The exclusion criteria were: any previous orthodontic therapy, any prosthesis, any motor or neurological problems, any internal diseases, any orthopedic trauma or impairments, any spinal pathology, presence of congenital and hereditary pathologies and any signs or symptoms of cranio-mandibular disorders. Each patient underwent cephalometry of the skull for orthodontic diagnosis and cephalometric evaluation and, in blinding, Spinal Mouse recording for spinal column posture analysis.
Results: Group 1 showed a significant forward tilting of the spine in the sagittal plane (4.4°±1.8) with respect to Group 2 (2.4 °±1.3) (p<0,0001) and higher values related to the vertical dimension of the skull: higher maxillary divergency (p<0.0001), steep occlusal plane (p<0.0007), higher gonial angle (p<0.001).
Conclusions: The hypothesis that the spine posture is different when considering different cephalometric features has been confirmed and the results of this study highlighted that the group with a posterior-rotation of the condyle-orbital plane showed a higher anterior inclination of the spine. The orientation of the condyle-orbital plane with respect to the upper maxilla may be considered a reliable cranial reference related to the spine inclination in the sagittal plane and to the vertical dimension of the skull. The achievement of this outcome is important to improve our knowledge of the role of the skull on body posture in the field of multidisciplinary relationship.

In vivo molecular evaluation of tissue proteins during controlled orthodontic movement

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Aim: Orthodontic tooth movement has determined a biological response of tissues surrounding the teeth which force is applied. Periodontal ligament and alveolar bone change abruptly thanks to the biochemical adaptive response. There is a modification of the local vascularization which stimulate a cascade production, synthesis of proteins like cytokines and growth factors. Production of proteins by modulating the direction and the intensity of the force can be changed but above all the duration.
Methods: 20 teenager patients of both sexes, were selected for orthodontic treatment who needed dental extraction, for a total of 40 premolars. Patients were randomly divided into two groups; group one was treated with NiTi coilspring 50 grams; group two with another coil 30 gr. Two groups were divided into five subgroups depending on time of applyed force for 1, 7, 14, 21, 28 days. Depending on application of spring, each patient underwent the extraction of the two premolars, right one where the force was applied and left one with no strength. After extraction, periodontal ligament was removed by scarifying root surface from the pressure side and from the tension side; placed in different test tubes. Results were compared with

periodontal ligament samples of the homologous contralateral teeth. Periodontal ligament was carried out to effect indirect immunofluorescence and the sections were photographed using a Zeiss LSM DUO confocal microscope and META using laser Argon.
Results: Immunofluorescence reactions were performed to verify immunolocalization patterns of type I collagen, type IV collagen, fibronectin and VEGF in human periodontal ligament and after 1, 7, 14, 21 and 28 days after orthodontic treatment both groups. To check presence of tested proteins a display profile software was applied. Data confirmed that collagen I shows a 1-day reduction in protein from the site-of-tension treatment until day 14. After that, at day 28 it quickly rises to a return to the same starting point as T0. The reactions of the type IV collagen confirm an intensity of fluorescence values at 14, 21 and 28 days in pressure and tension sites of the orthodontic treatment. Instead, these fluorescence peaks are considerably reduced at the beginning of treatment, at days 1 and 7, both at pressure and tension site. Results obtained from VEGF display profile confirm that the data of anti-VEGF immunofluorescence reaction show peaks like anti-collagen IV antibodies. Display profile related to fibronectin confirms previous data, compared to control group, especially at 21 and 28 days after orthodontic treatment, in pressure side. Biologically more active force was observed in group two, where cellular protein activity was greater.
Conclusions: This study evaluates effects of pre-calibrated orthodontic light force, applied on premolars of patients requiring extractions. At 28 days there is a restoration of the normal periodontal ligament structure which leads to reorganization of fibers and their orientation. The vascular component of periodontium, after an initial slight suffering, shows a tendency to normalization. It's therefore important that orthodontist considers these differences in both cellular and tissue responses due to orthodontic force in order to obtain a rapid tooth displacement without damage like root resorption and pulp necrosis,with maximum comfort for patient.

Instagram analysis of the effect of orthodontic treatment with the support of artificial intelligence

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Aim: The main reasons that lead people to share an image on a Social Network are: surveillance/public relations, documentation, fashion/popularity and creativity. Instagram® is a popular Social Media founded in 2010, based on photo and video sharing and involves users between 18 and 29 years old. There is a relationship between the psychological need of the individual to be seen, to be judged and the patient's need to contact an orthodontic specialist. Chief complaint is usually a treatment that improves the smile and face of the patient. This need influences the "Oral Health Related Quality of Life"(OHRQoL) which examines how oral clinical conditions have functional and psychological repercussion in life. The aim of this retrospective observational study was to analyse the possible increase in self-esteem and self-perception linked to orthodontic therapy using the patients' Instagram® profiles.
Methods: The contents published on Instagram® of 17 patients (4 M, 13 F, mean age 19 ±7 years) were studied considering the photos posted 6 month before (T1), during (T2) and 6 month after (T3) the orthodontic straight wire or Invisalign® treatment for each. 2676 photos were analysed through the facial recognition software Amazon Rekognition. The first evaluation was to observe the presence or not of the patient in the considered photo; once the subject was identified, the evaluation was to identify the height and width parameters referred to the space occupied by the subject, calculating the percentage of area corresponding to the patient in relation to the dimensions of the entire image. The overall area had to be greater than 30%, considering it as significant presence of the patient, and the testing therefor proceeded with the analysis of facial expressions and the presence or absence of the smile. The percentage of relevance of the subject's smile was calculated using the Rule of Thirds. Results were calculated with the Test of Shapiro-Wilk and the level of significance was set at $p<0,05$.
Results: Statistically significant differences were observed between T1,T2 and T3 values in terms of the patient's presence in the photo. Moreover, the probability of posting a photo with the patient during the treatment was approximately 3 times higher comparing T2 to T1. Focusing on the relevant presence of the patient, it was possible to observe a statistically significant increase in T3. No difference was found in the amount of smiling photos and in the analysis of facial expression between the three periods.
Conclusions: This study aimed to evaluate the impact of orthodontic treatment on self-expression through Instagram®. The orthodontic experience of the

patients proved to be positive in terms of self-esteem and personal satisfaction. It was possible to observe a statistically significant relationship between the overall area of the patient in the picture and T1,T2 and T3. The considered variables are dependent on age and gender. A wider range of sample will be necessary for future qualitative research to identify larger models.

Mandibular second molars impaction: a case report

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Aim: To treat the second mandibular molar impaction by using two miniscrews and two button attachments linked by elastic chains, underlining both advantages and limits of this treatment option which involves a skeletal anchorage.
Methods: An 11 year old male patient clinically in mixed dentition with maxillary constriction associated with deviation of the lower interincisive midline, crossbite of the elements 2.6 and 3.6, overjet and overbite increased and the elements 3.7, 4.6, 4.7 impacted in an ectopic vestibular position. A I skeletal Class malocclusion and an increased divergence result from cephalometric analysis. The treatment plan, according to the patient's request, was to solve the second molars impactions. At first, orthodontic up-righting of the elements 3.7 using miniscrew (FIRMA 11x1,80 mm SWEDEN e MARTINA), placed on the anterior border of the mandibular ramus, as skeletal anchorage, was chosen as a treatment option, after the third molar extraction. During the same surgery, the crowns of the second molars were exposed, and the buttons were bonded on the distal part of the occlusal surface. After one week the mini-screw was inserted and an elastic chain was applied between the button and the mini-screw. After 15 days the same treatment was carried out on the right side, with extraction of the element 4.8, exposure of the second molar impacted, positioning of the orthodontic button, and after a week an elastic chain was placed.
Results: The patient underwent periodic monthly visits and the elastic tractions were activated every 2 months. After 4 months, a control orthopanoramic was performed that showed the distal uprighting of the elements 3.7 and 4.7., clinically it was possible to appreciate the spontaneous eruption of 4.6. After another 2 months, complete disinclusion of the dental elements had been achieved. We then proceeded to apply a rapid palatal expander, activated with a rapid expansion protocol, followed by the removal of the two orthodontic miniscrews in the same session. Six months after the expansion ended, a new control orthopanoramic was carried out.
Conclusions: With the proposed treatment option, it is possible for specific teeth to be moved with only one mini-screw and one button attachment. Furthermore, it is also possible to eliminate the reaction forces which usually are unavoidably released on the anchor teeth. Moreover, it is possible to minimize the patient's discomfort and also reduce chair time compared with the more complex indirect anchorage. In addition, the present method is effective in order to reduce treatment duration and is appropriate for patients who do not require a fixed appliance or any other appliance, since patients are usually more satisfied for every invisible treatment. Using this technique also has some drawbacks because it does not allow both vertical and vestibular-oral force control, therefore the second molar can rotate or have an extrusion out of control. In such a case it may be necessary for a subsequent positional adjustment. Finally, the mini-screw placement one week after the third molar extraction allows for better soft tissue healing while avoiding the elastic chain incorporation into the soft tissue and consequently allows for better management of elastic traction reactivation.

Preformed orthodontic appliance: Occlus-o-guide

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Aim: To describe different uses of preformed orthodontic appliance: Occlus-o-guide.
Methods: An electronic database search was conducted via MEDLINE, PubMed, abstract and citation database in order to find the significant literature. Case reports, clinical trials and literature reviews were evaluated.
Results: Preventive and interceptive orthodontics involve treatments in early age, during the most active stages of dental growth and the craniofacial skeleton. These interventions are aimed at removing factors believed to be responsible OF dental malocclusions and restoring normal growth, making possible the correct and functional dental alignment. When the patient is younger, it is easier to remove factors which cause malocclusions, exploit the natural forces of growth and obtain a balanced profile before the eruption of permanent teeth. Elastodontic preformed

orthodontic appliance, like Occlus-o-guide, can be used in primary or permanent dentition to intercept early orthodontic and functional problems. These devices are preformed, in soft plastic material, built strictly respecting the fundamental keys of a functional occlusion and suitable for carrying out both a skeletal and dental action. These appliances act simultaneously on both dental arches (upper and lower) making the duration of the treatment shorter and the correction more stable. Occlus-o-Guide is a preformed interceptive orthodontic device, suitable for children aged between 8 and 12 years old, designed to prevent the development of malocclusions, to guide the eruption of canines and premolars towards a perfect occlusal relationship and at the same time to align the anterior teeth. The appliance can correct overbite as long as sufficient vertical growth is in progress; overjet as long as sufficient horizontal growth is underway; a maximum crowding of 4 mm in mixed dentition. Occlus-o-Guide is designed to provide depressive forces to the anterior teeth and, at the same time, to encourage the posterior teeth to erupt in their optimal vertical position, so that a minimal vertical anterior overbite stabilizes. Occlus-o-Guide also acts as an activator, encouraging mandibular growth and inhibiting jaw growth and creating permanent change of the skeleton in the horizontal overjet. It is a myofunctional regulator that tends to properly rebalance muscle forces: rehabilitates the posture of the tongue, re-educates atypical swallowing and stimulates proper breathing. Occlus-o-Guide can be used to treat malocclusions at any age, including adults. After the eruption of the second molars, the "G" series is replaced with the "N" series. Appliance must be used all the night and during the day from 1 to 4 hours according to operator indications. Correct and constant collaboration of the patient is essential for obtaining clinical results.

Conclusions: The early interceptive orthodontic phase involves treatments undertaken in early age, before the pubertal growth spurt, aimed at eliminating unfavorable exogenous etiological factors and the aggravating dysfunctional component of the intrinsic exogenous factors responsible for dental malocclusions. In this orthodontic phase, elastodontic appliances are indicated to help limit or eliminate these deleterious factors and also functional recovery in cases where it is compromised.

Orthopedic treatment of a skeletal Class III malocclusion: case report

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Aim: To highlight the importance of orthopedic therapy for the correction of the skeletal Classes III malocclusion.

Methods: The study examined a 9-year-old male patient with a skeletal and dental Class III malocclusion with anterior crossbite. Once compiled the informed consent, the case study was started: impressions were made on which the plaster models were developed, an occlusion wax, intraoral and extraoral photos, orthopantomography and teleradiography in lateral projection. A pre and post treatment cephalometric tracing was performed using the Steiner and Cagliari school analysis. At the end of these investigations, the diagnosis of skeletal Class III was postulated, with hipoplasia of the maxilla, hypodivergence with mandibular anterotation and subsequent anterior crossbite. The treatment plan involved the use of a palatal expander with bands anchored to the second deciduous molars for the duration of 9 months, then the rapid palatal expander was removed in order to insert a ferrule with bands on the first molars permanents to which the Delaire mask was anchored externally. The bands were cemented with glass ionomer cement. The orthopedic therapy with Delaire mask lasted about 12 months, at the end of which everything was removed and a functional Frankel III type device was delivered as a restraint therapy until the dental exchange was completed.

Results: The results obtained through rapid expansion of the palate and the use of the Delaire mask were: resolution of the transverse relationships of the maxilla and resolution of the crossbite with normal overjet and overbite ratios

Conclusions: The treatment of the skeletal Classes III malocclusion diagnosed very early, can help to minimize the adaptations and limitations that often lead to severe malocclusion in late adolescence and that direct patients to surgical treatment. The Delaire orthopedic facial mask is a device that allows to apply extra-oral orthopedic forces in the posterior or anterior direction, urging the perimaxillary sutures, allowing the achievement of a satisfactory maxillomandibular balance. Orthopedic treatment with rapid palatal expander and Delaire mask can be considered decisive in very young patients with Class III skeletal malocclusions.

Neuro-occlusal rehabilitation: diagnosis and treatment of patients with deep bite

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Aim: Neuro-occlusal rehabilitation is "the part of stomatognathic medicine that studies the etiology and genesis of morphological and functional alterations of the stomatognathic system. Its aim is to research the causes of these alterations, to eliminate them and, if possible,to rehabilitate the organ or decrease the severity of the injuries as soon as possible, even from birth" (NOR, Pedro Planas). This study examined a group of patients with Class II malocclusion and deep dental bite and treated with Planas functional appliances and compared the effect of these devices in hypo divergent and hyper divergent subjects.
Methods: Eleven patients (6 M and 5 F) with ages ranging from 8 to 14 years, referred to the Department of Orthodontics of Policlinico of Bari and different private clinics, were enrolled. Inclusion criteria were: II dento-skeletal Class, deep bite, pre-treatment and post-treatment check-up, growing patients, collaborating patients without history of orthodontic treatments. For each patient, a latero-lateral radiograph of the head was taken and cephalometric measurements were calculated: SNA angle, SNB angle, ANB angle, Cranio-Mandibular angle, Intermaxillary angle, overbite and mandibular length. The patients were divided into two subgroups: hypo and hyperdivergent group. The follow-up was at 18-24 months.
Results: After treatment it was observed a reduction of SNA angle in the hypodivergent group and a small increase of this angle in the hyperdivergent one. SNB angle was greater in both subgroups but retrognathia persisted. ANB angle decreased beyond the physiological value, mostly in hypodivergent patients. The mandibular response to treatment was also confirmed by the linear Co-Gn value that increased in both groups. In addition, the hyperdivergent group showed a significant decrease in cranio-mandibular angle with mandibular anterotation, while in the hypodivergent group patients cranio-mandibular angle was increased. A statistically significant difference between the groups was found also in the intermaxillary angle: it was greater in hyperdivergent group subjects and decreased in the other group. OVB significantly improved in all patients.
Conclusions: After treatment, all patients achieved a I molar and canine Class and correct values of overjet and overbite. They also showed an improvement in the sagittal relationship between the maxilla and the mandible. On the base of this findings, we can assess that Planas appliances are effective in the treatment of growing patients with II Class and deep bite, also in hyperdivergent subjects.

Patient's compliance in functional orthodontic treatment with Planas appliances, monitored by Theramon® microsensors

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Aim: The objective measurement of wearing times, the evaluation of patient's compliance and the treatment efficacy of expansion with removable Planas functional appliances, using a microsensor. The TheraMon® microsensor (Dentaurum Italia S.p.A.) is the most recent device, developed to measure the wear-time of removable appliances. This electronic system allows to monitor and record the use time of removable orthodontic appliances.
Methods: A control system is currently available in clinical practice, which is based on a microchip integrated in the plate. The system is called TheraMon® (Therapeutisches Monitoring). In this way the thermosensitive microchip records the time spent in the oral cavity and the result is read by a reading station. The microchip is heat sensitive and reacts to the temperature of the oral cavity. Since the physiological variation interval is also considered, it would not make sense to simply keep it under a constant heat source. Daily wearing times, measured in hours, of five patients were recorded with the aid of the TheraMon® microsensor. Patient compliance was assessed relative to medical wear prescription. Wearing time of five patients in treatment with Planas functional appliances were analysed using TheraMon® microsensors. Patients were followed up for a period of 12 months, and visits were made every month to download the wear time data from the microsensor to the software and to assess wearing behavior.
Results: Patients wore their devices on average 16.3 h/d. Wear Time was unrelated to age and gender, but it was positively influenced by the microsensor. Treatment efficacy in terms of intercanine and intermolar expansion was respectively 4.6 mm and 4.8 mm for the maxilla, and 5.4 mm and 4.8 for the

mandible.
Conclusions: Patients should exhibit sufficient wear time to allow maxillary expansion. Perfect compliance is necessary to achieve treatment success.The TheraMon® microsensor offers a new perspective and aid to individualize treatment prescriptions.
Compliance with removable orthodontic appliances is often suboptimal, and patients overestimate the duration of wearing appliances. Techniques for improving compliance have a future in increasing patient's motivation and in remote controlling.

Dento-skeletal effects produced by rapid versus slow maxillary expansion using fixed jackscrew expanders: a systematic review and meta-analysis

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Aim: To evaluate the transverse dental (upper intermolar width, inclination of the upper molars) and skeletal (transverse skeletal width of the maxilla) effects produced by rapid maxillary expansion (RME) and slow maxillary expansion (SME) in growing patients with maxillary transverse deficiency treated with the same conventional fixed jackscrew expander activated with different activation protocols. Additional outcomes were other dento-alveolar effects (transverse intercanine and interpremolar widths, arch depth, anterior crowding), sagittal and vertical skeletal effects, patient subjective outcomes (such as pain or discomfort during expansion) and complications.
Methods: Systematic review and meta-analysis of articles published in English and other languages using PubMed (MEDLINE), Cochrane Controlled Trials Register, Scopus, Embase and OpenGrey. No language or publication date restrictions were placed when searching in electronic databases. Only randomized controlled trials (RCTs) that compared the effects of RME vs SME using conventional fixed jackscrew expanders with different activation protocols in growing patients were included. Independent selection of study data was performed by two examiners using predefined fields including study quality criteria. The authors of the included studies were contacted for missing data and for clarification. The quality of the included RCTs was assessed according to the Cochrane risk of bias tool for randomized trials (RoB 2.0). The retrieved data, if possible, were subjected to meta-analysis using the RevMan 5.3 software (Cochrane IMS). For the aggregation of continuous data, the averages of the differences (MD) between the treatments and the standard deviations (SD) reported in the studies were used. A random effect model was applied and the 95% confidence intervals (CI 95%) were reported. The results were also shown with forest plot graphical representations. Heterogeneity was assessed statistically by means of a Chi2 test, in which a P value <0.1 indicated statistically significant heterogeneity. We also quantified heterogeneity using the I2 index. Values above 50% represented substantial heterogeneity.
Results: We included two studies (one at unclear risk and one at high risk of bias) in both the systematic review and meta-analysis. Three main outcomes (upper intermolar width, inclination of the upper molars, transverse skeletal width of the maxilla) and two additional outcomes (sagittal skeletal effects – ANB difference and vertical skeletal effects – SN-GoGn angle) were statistically pooled. Both RME and SME produced orthopedic expansion and were both effective in increasing the transverse skeletal width of the maxilla. Both RME and SME induced an increase in the upper intermolar width and in the angle of the facial divergence (SN-GoGn), without significant differences between the two groups. Both RME and SME led to an increase in the inclination of the upper molars that was significantly smaller in the SME group.
Conclusions: RME and SME produced similar transverse dento-skeletal effects.SME induced a significantly smaller inclination of the upper molars.

Bone-borne vs tooth-borne maxillary expansion, a literature review

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Aim: To investigate dentoskeletal effects of maxillary expansion in adolescents with transverse maxillary deficiency using bone-borne expanders compared to tooth-borne expanders.
Methods: The research was made on Pubmed (Medline) using the keywords "bone-borne" AND "tooth-borne" AND "maxillary expansion", with no limit in terms of publications date. Inclusion criteria were: methodological reliability and reproducibility studies, non-syndromic subjects treated for transverse maxillary deficiency, studies comparing bone-borne and tooth-borne expansion using cone-beam computed tomography for dentoskeletal changes assessment. Exclusion criteria were: animal studies, case reports, reviews and opinion articles, studies including surgically assisted rapid maxillary expansion.
Results: the amount of records identified through

database searching was 59. The selected studies, after excluding non-pertinent records and applying inclusion and exclusion criteria, were 10. Lin. et al. found that bone-borne expanders produced greater transverse skeletal expansion, less alveolar bending and less dental tipping compared to tooth-borne expanders. The research of Tugce et al. showed that the group treated with bone-borne expansion had greater expansion in the midpalatal suture compared to the tooth-borne. Moreover, the author didn't observe differences in root length between the two groups. Kavand et al. analyzed volume increase of nasal cavity and nasopharynx produced by both bone-borne and tooth-borne expansions and found no statistically significant difference between the two methods. In addiction the study displayed that tooth-borne expansion group showed a greater buccal tipping of maxillary molars compared to bone-borne expansion group. Mosleh et al. observed similar basal bone expansion at the level of the hard palate both in patients treated with bone-borne expansion and in the ones treated with tooth-borne one. Furthermore, the authors found that tooth-borne expander produced more dental expansion and buccal rolling and a greater increase in nasal width. Other two studies from Lagravère et al. reported similar results, affirming that bone-borne maxillary expansion produced a lower component of dental expansion. The research by Davami et al. didn't encounter differences in dental and skeletal results between the expanders and observed greatest changes in the transverse plane, while the modifications occurring in the vertical and anterior-posterior planes were negligible.

Conclusions: Both bone-borne and tooth-borne maxillary expansion generates transverse skeletal expansion. Bone-borne expansion seems to produce greater transverse skeletal expansion and less dental side effects such as buccal tipping of the maxillary first molars; however further investigations are needed.

Alt-RAMEC protocol, a literature review

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Aim: To investigate treatment effectiveness of alternate rapid maxillary expansions and constrictions (Alt-RAMEC) protocol in Class III growing patients.

Methods: the research was made on Pubmed (Medline) using the keyword "Alt-RAMEC", with no limit in terms of publications date. Inclusion criteria were methodological reliability and reproducibility studies and non-syndromic subjects treated for skeletal Class III malocclusion using Alt-RAMEC protocol. Exclusion criteria used were studies in animals, case reports, reviews and opinion articles and studies with a sample size undergoing rapid maxillary expansion and constriction treatment inferior to 20 subjects.

Results: The amount of records identified through database searching were 30. The selected studies, after excluding non-pertinent records and applying inclusion and exclusion criteria, were 6. Gandedkar et al. research examines Alt-RAMEC effects on the alveolus surrounding the anchor teeth, founding that buccal alveolar bone thickness reduction is within the scope of initial alveolar thickness of the expander's anchor teeth. Ozbilen et al. compared changes in pharyngeal airway, maxillary sinus volume and skeletal parameters after RME and Alt-RAMEC followed by facemask therapy. The study showed that Alt-RAMEC group presented greater distance between the anterior nasal spine and the horizontal reference plane and a major increase in maxillary sinus volume. Similar results were obtained by Ylmaz, consisting in an increase of the upper airway volume, in an expansion that also involved the neighboring sutures and in a forward movement of point A. Maino et al. reported positive skeletal and dentoalveolar changes in growing Class III patients treated with a rapid maxillary expander with hybrid anchorage according to the Alt-RAMEC protocol, followed by facemask therapy. In another study, by Masucci et al., this protocol was compared to RME/FM procedure, concluding that Alt-RAMEC/FM protocol showed more favorable maxillary skeletal effects leading to greater improvements in sagittal skeletal relationships than the RME/FM protocol. Canturk et al. investigated treatment's results using facemask in different moments: during Alt-RAMEC procedure or after, Class III malocclusion and negative overjet were improved in both groups, however no statistically significant differences were found.

Conclusions: The application of the Alt-RAMEC protocol before maxillary protraction seems to be a valid tool for early treatment in patients with Class III malocclusion. It appears to be more effective than RME/FM therapy; however further studies are needed.

Assessment of orbital volume and morphological changes after rapid maxillary expansion performed with tooth-bone and bone-borne devices. A retrospective study using surface-to-surface matching technique

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Aim: The effects of RME not only involve dental arch width and maxillary vault area but also associated maxillofacial structures. Displacement can be observed at the level of the frontal, zygomatic, and parietal bones, supporting the contention that the zygomaticomaxillary sutures, can be influenced by maxillary expansion. It would seem reasonable to assume that the orbits also may be affected by RME orthopedic treatment. The aim of the present study was to 3-dimensionally evaluate and compare the volumetric and morphological changes of the orbital cavity after RME performed with tooth-borne (TB) and bone-borne (BB).
Method: CBCT scans from previous published material (TB group=18 subjects, BB group=18 subjects) were included in the present study according to the following criteria: 1) age between 11 and 15 years, 2) CBCT scans of good quality taken prior to the placement of the maxillary expander (T1) and 6 months after its removal (T2), 3) no caries, dental restorations or endodontic therapy of the upper first molars and the first and second premolars, 4) no artifact, 5) absence of pulpal calcification, 6) no previous orthodontic treatment, 7) no systemic disease or usage of medication. Slicer 3D software was used to generate a mask including soft tissues of the orbital cavities and create 3D rendered models from T1 and T2 CBCT scans (.stl). The .stl file including both right and left orbits was imported into Mimics software in order to exactly separate and delimit the orbital volumes by using specific planes cut and landmarks. Finally, the obtained 3D rendered models of T1 and T2 were imported into Geomagic Software in order to perform super-imposition and surface deviation analysis. Volumetric data of right and left orbital cavity at T1 and T2 were also recorded and Student's T test was preliminary used to assess difference in orbital volume changes between both sides. Student's T test was used to compare the volumetric dimension of the orbits between T1 and T2 in each group as well as the difference in the volumetric dimension the orbits from T1 to T2 between TB and BB.
Results: Data of left and right orbits were merged in both groups since no differences were found in volumetric changes between both side ($p>0.05$). TB and BB group showed no significant changes in orbital volume between T1 and T2 (TB=0,14 cm^3, BB=0,18 cm^3) ($p > 0.05$). According to the surface deviation analysis, the percentage of matching between orbit T1 and T2 orbit models were respectively 88,5% for TB group and 89,7% for BB group (range of tolerance 0,6 mm).
Conclusions: RME therapy in both form, i.e. with tooth-borne and bone-borne expander, did not affect volumetric and morphological changes of orbital cavity.

Comparison of two protocols for early treatment of dentoskeletal Class III malocclusion: modified SEC III versus RME/FM

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Aim: To compare the short-term cephalometric outcomes of the protocols modified splints, Class III elastics, chincup (SEC III) and rapid maxillary expansion and facial mask (RME/FM) for the early treatment of growing subjects with Class III dentoskeletal malocclusion.
Methods: This retrospective observational study included 20 patients (11 males, 9 females) treated with the modified SEC III protocol and 31 patients (16 males, 15 females) treated with the RME/FM one. The sample was evaluated before (T1, mean age 7.9±1.0 years) and at the end of treatment (T2, mean age 9.0 ± 1.0 years). Statistical comparisons between the two groups were performed with independent sample t tests.
Results: Both the modified SEC III and the RME/FM sample groups showed significantly favorable effects in terms of maxillary advancement (SNA +1.3° and +1.5°, respectively), control of mandibular projection (SNB −0.5° and −0.8°, respectively), and intermaxillary relationships (ANB +1.8° and +2.3°, respectively; Wits +3.4 and +1.9 mm, respectively). The modified SEC III group showed a significantly greater control in the intermaxillary divergency (−2.2°). The main limitations of this study are its retrospective nature and the short-term outcomes.
Conclusions: Early treatment of growing patients with dentoskeletal Class III disharmonies is efficient using either modified SEC III or RME/FM protocols. However, a higher vertical control is achieved with the modified SEC III.

The impact of Covid-19 pandemic in a sample of Italian patients suffering rheumatoid arthritis

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Aim: To provide new data about the risk of Covid-19 infection in rheumatic patients and to evaluate the influence that their relatives/cohabitants may have on these subjects.
Methods: We have distributed a survey to the rheumatic patients followed up at three different clinics (Orthodontics Department, IRCCS Fondazione Cà Granda, University of Milan; Department of Rheumatology, G. Pini Institute – Unit of Pediatric Rheumatology, Milan; Pediatric Nephrology and Rheumatology Unit of the AOU Policlinico G. Martino, Messina) and to their closest relatives. It is divided into three sections, for a total of 50 questions. The first section includes 13 questions about socio-demographic characteristics, the second one comprises 11 questions about home environment and lifestyle and the third one includes 26 questions on clinical features. The patients or their relatives, after authorizing the use of their personal and clinical data, were asked to answer both multiple choice and open-ended questions, which aimed to collect their general data, life habits, risk of infection and clinical conditions. At this regard, we have gathered information about general health status and other particular conditions (e.g. surgical treatments); the survey then included some questions about their drug therapy. As far as regarding Covid-19, we have also investigated any symptoms suggestive of this disease, diagnostic tests, vital parameters, swab results (if performed).
Results: We have included a total of 84 patients (65 F and 19 M) and 205 relatives or cohabitants (111 F and 94 M) for a total of 289 subjects. As far as concerning patients, the analysed sample had an average age of 14,59. Only 6 of 84 had a direct contact with subjects infected by SARS-CoV-2, none of them carried out Covid-19 swab, although 25 of 84 patients reported symptoms related to the Covid-19 virus. During the epidemiological investigation 59 of the total number of patients were on pharmacological therapy for Juvenile Idiopathic Arthritis; more specifically, 37 of them took csDMARD and 40 bDMARD. Only 3 took FANS and only 1 other drugs. 25 patients did not take any therapy at the time of the investigation. As regards relatives/cohabitants, 15 of them had a direct contact with Covid-19 infected subjects, but only 7 performed swab and 3 of them resulted positive. Only 39 relatives reported suspected Covid-19 symptoms.
Conclusions: We observed some of Covid-19 related symptoms among ARG patients, but no one was submitted to a swab test because it was unavailable. An investigation about their serological profile is highly suggested and further studies are recommended.

Comparison between different protocols to manage orthodontic disinclusion of maxillary canines

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Aim: The canine is a fundamental tooth both for its aesthetic and functional role for lateral movements. It is the second most frequent type of inclusion, after the third molar, with an incidence between 1 and 5.9%. The prevalence varies according to ethnicity, from the lowest in the Japanese population to the highest in the Caucasians (5.9%). It has a higher prevalence in females, with a 3:1 ratio compared to males, more unilateral in 3:1 ratio than in bilateral, palatal in 3:1 ratio compared to vestibular and at the level of the upper jaw in 10:1 ratio compared to the lower one. The diagnosis can be made both with an objective examination and through radiological examination, through orthopantomography (Ericson and Kurol and Crescini technique), teleradiography, occlusal radiography, intraoral radiography and reduced fov CBCT. The therapeutic possibilities are extraction, osteomucosal retention or orthodontic-surgical disinclusion. The purpose of this study is to evaluate the state of the parodontal area after using rotating instruments compared to piezolectric instruments during orthodontic-surgical disinclusion.
Methods: The sample consists of 24 patients, 16 females and 8 males, aged between 14 and 30 years, with at least one of the two canines impacted palatal. Inclusion criteria were: absence of orofacial trauma, of systemic disease and of pre-pubertal periodontal disease. All the patients had completed the orthodontic alignment treatment to create the space necessary for the positioning of the canine in the arch. The sample was then divided into two groups: in the first disinclusion was carried out with rotating instruments, in the second one it was obtained with piezoelectric instruments. At the end of the alignment, the level of clinical attachment (CAL), gingival recessions (REC), plaque index (PI), bleeding on probing (BOP), bone loss, obliteration of the pulp canal and / or root resorption were evaluated.
Results: Results showed that the CAL was slightly higher in the test group. 3 patients reported a gingival recession of about 3 mm with a weak alveolar bone loss attached. The bleeding and plaque index were positive in 4 patients.
Conclusions: In this study it was demonstrated that there is no statistically significant difference between the two orthodontic-surgical techniques and the periodontal status was acceptable in both cases. However, the use of piezoelectric instruments is preferred to the use of rotating ones due to the simplicity of execution, the

respect of sensitive structures as vessels and nerves, better visibility of the operating field, reduced healing times and postoperative discomfort thanks to minimal soft tissue damage and high cutting precision.

Cephalometric evaluation of andresen appliance's effects on pharyngeal airway dimensions in skeletal Class II growing patients

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Aim: Skeletal Class II pattern with retrognathic mandible is considered as a risk factor for Sleep Breathing Disorders and pharyngeal airway deficiency. Functional appliances aiming at correcting mandibular retrusion could increase pharyngeal airway dimensions. The aim of this study was to evaluate the effects of Andresen appliance on sagittal pharyngeal dimensions in growing skeletal Class II patients.
Methods: The patients enrolled in the present study in number of sixteen (12 M and 4 F) with ages ranging from 7 to 13 years (mean 11±1,5 years) were affected by dentoskeletal Class II. The group was referred to the Department of Orthodontics of Policlinico of Bari. For each patient, a lateral cephalometric radiograph of the head was taken and each cephalogram was traced, at the beginning (T0) and at the end of treatment (T1) with Andresen appliance. The measurements used were: angular and linear values on sagittal and vertical plane, growth prediction, soft palate length, hyoid bone position and linear measurements of pharyngeal airway. The statistical analysis was carried out using T-test in order to analyze the cephalometric differences between T0 and T1. The level of significance was set at $p<0.05$. Then, a simple linear regression was conducted to identify a correlation between sagittal and vertical changes and pharyngeal dimensions at five different levels (P1, P2, P3, P4, P5).
Results: Cephalometric evaluation revealed a significant increase of sagittal mandibular dimensions (Go-Me) and of SNB angle, indicating a significant mandibular advancement. After treatment hyoid bone was located more anteriorly and superiorly as determined, respectively, from the distances aC3-H and H-H'. In addition, subjects demonstrated an increase in length of soft palate, the oropharyngeal and hypopharyngeal airway space. It was also found a statistic significant correlation between the changes in mandibular length and the changes in the volume of the airway at the tongue base (P4) and hypopharingeal level (P3).
Conclusions: This study reported that sagittal pharyngeal dimensions have a significant relation with sagittal position of mandible. The anterior displacement of the mandible by Andresen activator influences the position of hyoid bone and, consequently, the position of the tongue and thus improves the morphology of the airways. In conclusion, the treatment of mandibular retraction, with functional appliances produces significant favorable changes on oropharyangeal and hypopharyngeal dimensions in dentoskeletal Class II growing patients and might reduce the predisposition to OSAS and the risk of developing respiratory problems in adulthood.

Maxillary transversal changes evaluation after expansion using a hybrid expander

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Aim: In presence of maxillary transversal deficit the preferred treatment is rapid palatal expansion. However in post-pubertal patients the use of devices with skeletal anchorage is required such the Hybrid and Bone-Borne expander. The purpose of this study is to evaluate the expansion, and if any, the differences in the extent of the expansion based on the skeletal age of the patient at the start of the treatment.
Methods: This is a retrospective study on 68 patients. The criteria adopted for the inclusion in the study were: presence of maxillary transversal deficit, no previous orthodontic treatment, no orthognathic surgery performed, no extraction performed, absence of agenesis, congenital pathologies and cranio-maxillofacial malformations, use of an Hybrid device by the same operator. The sample was divided into 3 groups based on skeletal age at the start of treatment: group 1: n=21 patients in phase CS1/ CS2 (mean age 10.21, 9 females, 10 males); Group 2: n=28 patients in CS3/CS4 (mean age 13.37, 18 females, 10 males); group 3: n=19 patients in CS5/CS6 (mean age 17,14, 12 females, 7 males). For each patient we obtained a TeleRx and STL models of dental arches, both at the beginning and the end of the treatment. All the TeleRx and the scanned models were transferred to OnyxCeph program (Image Instruments, Chemnitz). All patients were treated with a Hybrid palatal expander. The following dental elements of the upper jaw were considered: III, IV, V, VI. For each element

we considered three points: cups, centroid and lingual point. Then the distance in millimetres were calculated between the respective points on the teeth of the contralateral arch on the 3D models pre and post-treatment.
Results: Palatal expansion was achieved in all treated patients. Significant intragroup differences in expansion were found for all parameters in all groups. Significant intergroup differences based on the skeletal age of patient were found at baseline. No significant differences in amount of expansion based on the skeletal age of the patient at the start of the treatment were found at the end of the treatment.
Conclusions: The study shows that it is possible to obtain significant palatal expansion in patients with different skeletal age using an Hybrid expander and the amount of expansion was not different among 3 groups evaluated.

Maxillary and mandibular dental crowding treated with self-ligating fixed appliances: a case report

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Aim: Presentation of a case of maxillary and mandibular dental crowding treated with self-ligating fixed appliances used on both dental arches for a period of 2.5 years with optimal results.
Methods: The present case is about a young male patient of 13 years old, during his full permanent dentition. The following essential clinical data were collected during the visit: personal medical and dental history, clinical oral investigation, model casts, OPT, L-L and P-A teleradiography with subsequent cephalometric analysis and intra- and extraoral photos. A diagnostic evaluation was made based on all these clinical data collected on first orthodontic visit to decide how to resolve the case. At the cephalometric examination it was possible to observe a hyperdivergent patient (SpP^GoGn=27,91°) with basal Class II (A:Po=7,58 mm), bilateral molar Class I, left canine class was not evaluable due to the significant dental malposition, instead on right side the patient was in I Class. Anterior dental crowding is present in both superior and inferior arches due to the lack of space. With all those data it was decided to treat the patient with only self-ligating fixed appliances. The cardinal feature of a self-ligating bracket is an inbuilt metal labial face to the bracket slot, which is referred to as a clip or slide. Several studies have shown very low levels of archwire friction for self-ligating brackets when compared to conventional ligation methods, this system offers quicker and arguably more efficient wire removal and placement for most orthodontic treatment stages. Orthodontic therapy with fixed appliance, within this clinical case, lasted 2,5 years.
Results: After 2,5 years of therapy with self-ligating fixed appliance the maxillary and mandibular dental crowding is corrected and the occlusion is harmonious with healthy periodontal criterions. First molar and first canine class is obtained on both right and left side.
Conclusions: When the patient, even though the young age, has already a permanent dentition, it is possible to have a good correction of dental crowding using only orthodontic fixed appliances such as self-ligating brackets. It will be appropriate to periodically monitor the patient because third molars are not erupted yet and since there is evidence of dental crowding relapse, more follow-ups will be done to monitor the future changes of the obtained results.

Variations of bone morphology subsequent to vertical dento-alveolar movement: literature review

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Aim: The orthodontic-periodontal correlation is becoming increasingly significant for the recovery of dental elements or the modeling of soft and hard tissues. Vertical dento-alveolar movement takes place with the bone and not in the bone. The aim of this literature review is to investigate the biological variations of bone morphology after vertical dento-alveolar movement.
Methods: An internet-based search was performed on PubMed, Scopus, Web of Science databases looking for articles published between January 2008 and August 2018 using keywords periodontal accelerated orthodontic tooth movement, corticotomy, bone grafting, tooth movement, and treatment duration.

Out of the total number of articles obtained from the research were selected and considered those regarding dento-alveolar intrusive/extrusive levelling; recovery of dental elements in ectopic position without osteoplasty-ostectomy; recovery of impacted teeth with or without osteoplasty-ostectomy.
Results: From the resulting articles extrusion represents as a way to increase the amount of bone and soft tissue for implant rehabilitation while intrusion is described as a system to reduce periodontal defects. However there is a lack of articles concerning the dentoalveolar intrusive/extrusive orthodontic movement in terms of curve of Spee levelling. No articles were found regarding the bone modification related with the recovery of an ectopic dental element or regarding a typical situation like as the buccal and high position of the canine. When considering the periodontal implications of surgical exposure and subsequent alignment of an impacted maxillary canine, it is necessary to differentiate between a palatally and buccally impacted canine. Labial impaction is more challenging to manage because the labial alveolar bone is usually insufficient for the impacted canine to move over the adjacent tooth. Moreover, a labially impacted canine is covered by thin oral mucosa, which indicates that there is a thin alveolar plate that is susceptible to dehiscence and gingival recession. A lot of reviews and clinical trials focus on the orthodontic-surgical recovery of impacted teeth, in particular the impacted maxillary canine. Two surgical techniques are routinely used to expose an impacted canine: the closed technique and the open technique. It does not seem that one surgical technique is better than the other one for moving displaced teeth into the correct position, but this finding is uncertain because the quality of the evidence is low.
Conclusions: Starting from the previous orthodontic literature it seems that intrusive/extrusive moments are related with an increase of the bone level, but there are but there is poor evidence in the literature of this. In our clinical experience we know that the vertical orthodontic movement is possible. We can do a leveling of the curve of Spee, the recovery of a tooth in a high position, the alignment of an impacted dental element. But what about the biology? The evidence is weak. Studies on the biological and quantitative variation of bone morphology are required.

Clinical approach of malocclusion in mixed dentition with interceptive therapy. A case report

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Aim: The National Health and Nutrition Estimates Survey states that malocclusion in mixed dentition is present in one above two children, mostly represented in the female sex at the level of the mandibular arch. Leighton in 1969 and Bushang in 2014 highlighted how medium-severe crowding conditions in mixed dentition, if not treated early, tend to worsen in the years following the completion, making orthodontic therapy more complex, longer and less effective. The main factors that determine this negative response to treatment are: the physiological reduction of the arch length (Silmann 1964; Leighton 1975) and the reduced ability of the body to respond to orthodontic forces with aging. The origin of these forms of malocclusion can be genetic or functional. Preventive and interceptive orthodontics are therapies aimed at removing the factors believed to be responsible for dental malocclusion and restore normal growth making possible a dental alignment correct and functional. The aim of the following clinical case is to present orthodontic treatment and management in mixed dentition through preventive and interceptive therapy.
Methods: The patient c.v. (8 years old) appears to our observation at the department of odontostomatological and maxillofacial sciences, Policlinico Umberto 1° in Rome in november 2017. The patient presents the following characteristics: female, dolicofacial type, flat profile, normotonic musculature, 2 dental and skeletal classes, overjet and overbite increased, upper and lower median lines deviated to the left by 2 mm, nasal breathing, typical swallowing, normotonic and normo inserted frenula, severe crowding, upper and lower incisors rotated and endo-inclined, eruptive delay of 22 and maintained on 52 in arch. The therapeutic path undertaken involved the use of a rapid expander of the palate (rep), 4x2, lip bumper, extraction of 74 and 84 and schwarz plate.
Results: The orthodontic treatment was carried out from december 2017 to november 2019, on 23 december 2017 the rep was cemented, having created the space by expanding on, the 22 erupted palatal ectopic. Then were utilized 4x2 brackets a lip bumper and, once removed the rep, a schwarz plaque was used to obtain space through the dental vestibularization and finally 74 and 84 were extracted.
Conclusions: At the end of the treatment it can be observed how this therapy has allowed to avoid the worsening of a clinical situation of malocclusion with crowding in a hyperdivergent patient with second skeletal and II dental Class. With simple devices, in a short time, malocclusions can be resolved and dysfunctions improved.

Dento-skeletal comparison of removable functional therapies for Class II growing patients

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Aim: The purpose of this cephalometric study was to compare the skeletal and dental effects in Class II growing patients treated with 2 removable functional appliances: the Elastodontic appliance and the Twin Block. Class II is one of the most common dentofacial malocclusion and it affects one-third of Caucasian population. Many therapeutical options exist in order to treat Class II patients: functional jaw orthopedics, including fix and removable functional appliances, is one of the recommended therapeutic approaches.
Methods: 20 subjects (7 males and 13 females) with Class II malocclusion consecutively treated with a functional appliance were evaluated. Patients were included in the study considering the fllowing inclusion criteria: patients with a bilateral Angle Class II division 1 malocclusion, ≥1/2 cusp width, permanent dentition, overjet greater then 5 mm, ANB>4. The Elastodontic Group (EG) (3 males and 7 females, mean age 12,10±1,3 years) was treated with the Elastodontic appliance. The TwinBlock group (TBG) (4 males and 6 females, mean age of 12,15±1,3 years) was treated with the Twin Block appliance. The SO-cephalometric analysis of Pancherz and angular values analysis was carried out for each patient before (T0) and at the end of Class II treatment (T1) to analyze skeletal and dental changes Measurements were compared using the T student test The value for significance was set at 0.05 ($p<0.05$).
Results: Mandibular advancement was observed in both groups. In both group was obtained the overjet correction with a minimum retroinclination of upper incisors. Twin Block appliance showed greater skeletal effects in Class II patient. In particular in TwinBlock group was observed a greater advancement of Pg-Olp (TBG 5,6±0,55mm; EG 4,68±2,47 mm) and a greater improvement of ANB (TBG -2,2±1,09 mm; EG -2±1,22 mm) with a minimum proclination of lower incisors. Lower molar showed an advancement in both fuctional treatment (TBG 5,2±2,49 mm ; EG 5,8±1,2 mm). No significant baseline differences were observed among groups.
Conclusions: Both removable appliances, lead to a correction of Class II Division 1. Twin Block appliance is more efficient in correcting skeletal Class II malocclusion. More reliable results can be obtained with the continuation of the study and the acquisition of new data.

Nanotechnology and orthodontics: a literature review

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Aim: Nanotechnology is a science that has been very successful in recent years, the innovations that concern this area have proved very useful in various fields, especially in the scientific one: this doctrine deals with studying matter at the nanoscale level; materials with components less than 100 nm in at least one dimension are called nanomaterials.
Medicine and dentistry are revolutionizing in many aspects, the modern era offers the possibility of using the latest generation materials and techniques. This study aims to analyze what are the innovations in the dental field compared to nanotechnology (nano-dentistry), focusing mainly on orthodontics: the new materials find many uses, they are especially used in the realization of products for clinical practice; the most important characteristic of these new particles is that of significantly modifying the physical and chemical characteristics of the materials: novel mechanical properties of nanomaterials are the object of this research. The common interest is to improve patients' oral health, decreasing the invasiveness of treatments and increasing compliance with doctors.
Methods: The authors used the "Pubmed" website as a search engine for keywords that were useful for finding the latest articles in this area. Among these words were: "nanotechnology", "nano-dentistry", "orthodontics", "nanomedicine", "nanomaterials in dentistry", "nanobiomaterials", "silver nanoparticles", "fullrene nanoparticles". The aim was to research the latest innovations in this field, to create an article that revises the most modern literature.
Results: Many articles have been found about nano-dentistry, the literature on which this review is based is extensive. The main field of application of nanotechnology in orthodontics is that of the realization of different materials: nanoparticles are used for the realization of orthodontic elastomeric ligatures, orthodontic power chains, orthodontic bands, orthodontic miniscrews and coated orthodontic arcwires. Particular attention is also paid to the use of nanoparticles for the control of oral biofilm.
Conclusions: Nanotechnology is one of the latest innovations in the dental field, the search for new materials and technologies useful for improving dental performance is consistent. The recent positive results must be a stimulus for future research, in

particular regarding orthodontics: the new materials have useful characteristics to improve the quality of clinical practice. However, nowadays more research is needed and the potential of this science has yet to mature, there are still production technical difficulties and engineering problems. Further studies are needed regarding the complete biocompatibility and safety of new materials.

Sequential treatment in dental articulator of dysfunctional extractive patient: multidisciplinary finalization

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Aim: Temporomandibular disorders (TMD) represent a heterogeneous group of diseases affecting the masticatory muscles and/or temporomandibular joint and related structures. The recent literature review excludes occlusion as a major factor in the onset of TMD and recognizes major risk factors such as trauma, emotional stress and bruxism. However, it remains important to ensure that patients requiring orthodontic treatment have a stable occlusion in balance with the entire stomatognathic system in order to allow proper function.
Methods: The case of a 23-year-old female patient is examined; she reports an articular click at the right temporomandibular joint and complains about the presence of a static occlusal precontact on the right side. The patient also declares previous orthodontic treatment lasting five years and has been wearing a preformed bite for about two years. On objective and radiographic examination, the absence of elements 3.6 and 2.8 was found following extraction, ankylosis and infraocclusion of elements 1.6, 4.6 and 3.7 and the presence of elements 1.8, 3.8 and 4.8. Clinical gnathological examination shows a 1.7-4.8 supporting disclosure. Given the complexity of the clinical picture, a multidisciplinary approach for the occlusal rehabilitation of the patient is considered. Elements 3.8 and 4.8 were extracted. The proposed treatment involves the evaluation of the models in the articulator to proceed with selective grinding of the contact points. Therefore, once the models have been examined, a first selective grinding of elements 1.7 and 2.4 is performed. At this point of therapy, the patient reports an important regression of pain symptoms. The treatment continues with the acquisition of new models mounted in the articulator and with a second selective milling involving elements 2.4, 2.5 and 3.5. At the next reassessment, the extraction of element 1.8 was decided and to mount the new models in the articulator and then the last selective milling of elements 2.4, 2.5, 3.4 and 3.5 is performed. Finally, a prosthetic set up is programmed and a rehabilitation of the ankylosed and infraocclused elements by means of onlays is decided, within the replacement of missing element 3.6. with an implant. At the end of the prosthetic rehabilitation, the anterior diastemas are closed conservatively. The total duration of treatment was 3 years and at the follow up; after one year the patient is stable and does not complain of any symptoms or limitations in the mandibular movements.
Results: The correct initial assessment of the case and the multidisciplinary approach allowed an excellent overall result. The complete remission of painful symptoms was observed and the result is stable over time.
Conclusions: Therefore, it is believed that, although the correct functionality of the stomatognathic apparatus is not to be found in a precise occlusal configuration, factors such as occlusal stability and its correct balance should always guide the clinician during orthodontic and prosthetic rehabilitation.

Orthodontic study model: digital vs plaster model

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Aim: Orthodontic therapy requires a stage of diagnosis and treatment planning that includes clinical examination, evaluation of photographic records, X-rays and analysis of dental models. The plaster models represent the current Gold Standard. Around 1980 systems for the digitization of impressions were introduced in dental practice. The intraoral scanner is a tool that allows you to obtain a color 3D impression with immediate accessibility to perform diagnostic or treatment simulations and be easily shared with other professionals. Unlike the dental cast it has no risk of breakage, loss of material, reducing physical storage demand and inaccuracies, such as air bubbles, due to the cast of the impression in alginate with conventional material (gypsum). The digital models of the jaws do not require disposal and the packaging of the impression materials and plaster models and are an Eco Green technique. Also, they reduce the problems of cross-infection in the study-laboratory chain. The objective of the study is to evaluate if there is a significant difference between digital dental models, generated by commercial intraoral scanners, and plaster models in measuring the inter-molar distance of the upper first molars.

Methods: Thirty sets of plaster casts and thirty sets of digital models, taken from the same subjects, were available for the study. All models had the first right and first left upper molar erupted in the arch without tooth decay or crown defects that adversely affect the morphology. The models had no imperfections. The intraoral 3D scan was performed using 3Shape® Trios 3 (Copenhagen, Denmark). The plaster models were obtained from traditional alginate impressions. The following measurement was made: inter-molar distance measured as the distance between the mesio-buccal cusps tips of the upper first molars.
Results: All digital measurements were made with the OrthoAnalyzer® software (3Shape®, Copenhagen, Denmark); all plaster measurements were made with an electronic digital caliper to the nearest 0,01mm. Dependent t-tests were used to compare statistically equality between the two sets of models; the results were considered significant at $P<0.05$. The t-test produced a p-value of 0,33, it means that the inter-molar distance measurements on the digital model did not show statistically significant differences when compared to the measurements made on the plaster model.
Conclusions: In this paper, we aim to demonstrate the reliability of the usage of digital models for orthodontic treatments. According to with results, we confirm our initial theory, the digital model, generally, is revealed a valid alternative to the older dental cast solutions integrating other important features such as the speed to take the cast or the high-level of comfort felt by patients during the treatment. Moreover, digital models are valid solutions even for planning orthodontic treatment, helping the physician with digital tools that in some case reveals more accurate. Cross evaluation is relevant for physicians that want to evaluate palate features using digital models. This is a preliminary work with the aim to study deeply digital solution for enhancing the quality and the reliability of orthodontic treatments.

Electromyography in patients affected by juvenile idiopathic arthritis treated with rapid maxillary expander: creation of a correct myofunctional balance

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Aim: In the Orthodontic Department of the Maggiore Hospital IRCCS Fondazione Cà Granda, patients suffering from Juvenile Idiopathic Arthritis (JIA) with fixed orthodontic therapy using rapid palate expander (RPE), undergo electromyography, thanks to which we have the analysis of muscle activity and the study of motor conductions. The aim of this work is to highlight alterations in the neuromuscular system and myofunctional balance.
Methods: JIA patients with rapid palate expander therapy were evaluated using the electromyograph at three different times: T0 before the start of orthodontic therapy by REP; T1 after mounting the REP; T2 at the end of the median palatine suture expansion. The expander consists of a central screw placed under the palate, welded to 2 orthodontic bands, with the help of two or four metal arms that rest next to the premolars. By releasing the force only on the anchor teeth, it does not cause irritation to the palate. It can be anchored on the first permanent molars or the second deciduous molars. The screw must be activated with a special key by the parent of the young patient in the way described by the orthodontist. There are different activation protocols, depending on the different patient conditions and the actual bone discrepancy. The electromyographic evaluation was carried out by standardized electromyography and by analysis with DAQ software. The recordings were performed by placing the patient in a seated position, using disposable bipolar electrodes pregeled in Ag/AgCl. The test included one measurement in maximum clench and two in occlusion on cotton rolls to determine the Percentage Overplaning Coefficient (POC). The POC obtained allowed the evaluation of joint symmetry during muscle activation. In addition, the two measurements allowed to calculate other indices, such as: the asymmetry index, the activation index, the torsion index and the impact index.
Results: The first evaluation showed that JIA patients with TMJ pathologies have increased temporal activity and/or hypoactivity of the masseters, a symptom of neuromuscular imbalance. Immediately after setting up the expander there are no particular improvements. At T1 there is a worsening of the myofunctional balance caused by the presence of the orthodontic device inside the oral cavity, which has not yet been activated. At T2, when the expansion is completed, there is an improvement in the POC and the various indexes analyzed.
Conclusions: In all patients treated with fixed orthodontic therapy with REP we have observed an improvement in muscle balance in centric occlusion due to an increase in the transverse dimension of the palate. This allows a correct mandibular repositioning for those patients with a reduced mandibular length and a more acute upper gonian angle, having the possibility to improve the II molar Class after maxillary expansion. A stable and functional occlusion is achieved and a better neuromuscular structure for myofunctional balance.

Vacuum-formed plaque in patients affected by juvenile idiopathic arthritis: posturometric evaluation for a correct realization

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Aim: A stabilometric analysis has been carried out in patients affected by JIA, in order to evaluate the efficiency of treatment with protrusive vacuum-formed plaque. The stabilometric analysis has been executed in order to guide the plaque's correct realization.
Methods: The plaque involved is made by acrilic resin, built in mandibular protrusion, widely used in patients with juvenile idiopathic arthritis, in order to reduce the articular deformation and furthermore a circa-total remission of the symptoms. The analysis was carried out using the Lizard Ultimate® bipodal stabilometric platform, consisting of two separated platforms with three vertical force detectors each, through which detections were realized, each lasting 51.2 seconds, with open and closed eyes, in an environment free of visual and auditory stimulations. The patients were positioned in an orthostatic position with the arms at their sides, with their gaze parallel to the horizon and their feet aligned according to the indications marked on the platform, with a reciprocal angle between the teeth of 30°. Two JIA affected patients were selected, both female, and the plaque effects along with the modifications applied were evaluated on them.
Results: Patient A presented an important improvement, instantly visible after the modifications applied to the plaque. Her center of gravity resulted as better aligned, especially in the detection realized with her glasses on, and smaller oscillation in the one carried out with the eyes shut, indicating a better postural stability. The heel loading angle showed a massive improvement, especially in the detection realized with her glasses on, which passed from 9.95°/9.98° in overpronation to 0.54°/1.88°. Patient B has been analyzed even during the plaque's correction, identifying the necessity of a greater elevation in the most affected side (the right one). This was identified thanks to the initial aggravation registered in the heel loading angle. Two different detections were carried out, with different plaque thickness, identifying an improvement with a smaller elevation on the left foot and with a higher on the right one. At the inspection made after this corrections, the patient returned to a good stability in the plantar support, in the center of gravity and in the heel loading angle. In addition to this, the patient reported better comfort after the modifications.
Conclusions: The vacuum-formed plaque enormously reduces the JIA-correlated pain and reduces the condylar consumption associated the arthritis. It's also clear that the postural analysis' help is necessary to guide to a correct construction of the plaque.

Assessment of mandibular changes after rapid maxillary expansion. A CBCT study in subject with unilateral posterior crossbite using deviation analysis

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Aim: The existing relationship between PUXB and mandibular morphology is still controversial and no definitive conclusion has been reached. This may be due to the methods used in the past to assess the skeletal asymmetry which were mainly based on 2-dimensional (2D) radiographs. The purpose of this study was to evaluate mandibular asymmetry in youngsters with posterior unilateral cross-bite (PUXB), by means of cone-beam computed tomography and reverse engineering technique, before and after rapid maxillary expansion (RME) treatment.
Methods: The sample consisted of 20 subjects (10 boys, 10 girls) with a mean age of 13.8±1.1 years. The appliance used was a tooth-borne hyrax expansion appliance with bands on the permanent first molars and first premolars. Forty cone-beam computed tomography (CBCT) images were obtained from all patients at 2 time points, namely T0 acquired before the placement of a Hyrax expander and T1 after appliance removal. Each mandibular jaw was segmented and volume rendered into a surface there-dimensional (3D) mesh model. The protocols used in this study for segmentation, model rendering and deviation analysis, were previously validated and included the following steps: generation of the mandibular segmentation mask (Step 1), 3D model rendering, duplication and mirroring (Step 2), final registration, surface-based (Step 3), 3D deviation analysis (Step 4), matching percentage calculation (Step 5). According to the deviation analysis, the percentages (%) of all the distance values were calculated within the selected tolerance ranges (0.4 mm, 0.6 mm, 0.8 mm). These values represented the degree of matching and symmetry between the pairs of mandibular 3D

models. Total volume and hemi-mandibular were also calculated. Surface and volumetric changes, between T0 and T1, were compared by using Student's t tests.
Results: A slight increase of 0.45 cm^3 of mandibular total volume was found at T1 when compared to T0 ($p<0.001$). Mean mandibular hemi-volumes on cross-bite side (CB) were slightly smaller than non-cross-bite side both at T0, with a mean difference of 1.29 cm^3. However, such difference decreased of 0.26 cm^3 ($p<0.001$) from T0 to T1. Findings for the surface-to-surface deviation analysis, demonstrated a fine percentage of matching at T0 which slightly improved at T1 ($p<0.001$).
Conclusions: Youngsters affected by PUXB showed a slight volumetric and morphological asymmetry between CB side and non-CB side which improved modestly after RME therapy.

New opportunities for clinical and orthodontic collaboration with the laboratory within the digital path

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Aim: This work want illustrate some of the new opportunities provided by the advent of the digital technology within the relationship between the clinician and the orthodontic laboratory. This work will be divided into three sections which analyse the different working solutions.
Methods: Three types of treatments will be illustrated. The first one is full digitally, the second from analogic to digital, the third from digital to analogic. The first one is a full digital processfor the preparation of one rpe. It start with a digital impression, it was processed and the band are built in a castom made, after that the dental technicion built in a cad system the rpe, send the project for the creation in a milling centre, the device was poliched and send at the orthodontist. The second one is from analogit to digital, for explain this opportunity we want to present a new coustomized retainer built after a scan a cast model, when the virtual model was ready the dental technicion built with a cad design the project and send it for the cam realization. The tird is from digital to analogic and the aligner is the right example, because the orthodontist project the mouvement and the dental technicion with the help of the specific sofwere built a model and after that over the model the aligners.
Results: Today we can use every opportunity for the realization of our device in orthodontics. The new digital technology is very important for the relationship with the clinicians and the orthodontic laboratory. In this little presentation we want explain how we can improve the collaboration between dental technicion and the orthodontist.
Conclusions: Today we are into the digital revolution. We are thinking it will be more important for our next future and for the close collaboration within the lab and the clinics. Today we can choose the best device in all over the world and send the digital impression in real time and have the answer immediatly. This is thenew revolution

The effect on the first permanent molars of a rapid maxillary expander anchored on deciduos teeth

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Aim: Rapid maxillary expansion is a safe and well-documented procedure which, when performed in early stages of growth, can effectively improve dental and skeletal transverse deficiencies of the maxilla. Numerous expanders with different designs are available for such procedure. In the present study we used an expander anchored on the second decidous molars, with a baby screw (A0620-11 Leone of 11 mm) and only anterior arms. The aim was to evaluated its effect on the first permanent molars in mixed dentition patients.
Methods: A total of 30 patients, 20 males and 10 females with a mean age of 7±6 years, were selected for this study. The inclusion criteria were: transverse maxillary deficiency of 5 mm or more, the presence of healthy second deciduos molars, deciduos canines and first permanent molars in parcial eruption in both jaws. The activation protocol included a series of 24 activations, twice a day, with a total screw expansion of 4.8 mm. The parameters measured were: intercanine width, primary intermolar width and intermolar width and the timeline for the measurements was: T0: start of treatment, T1: after 24 activations, T2: six months after T1. The t-test was used for the statistical analysis.
Results: The intercanine width increased from 28.67±2.31 mm in T0 to 33.67±3.2 mm in T2, but the difference was not significant; the primary intermolar width increased from 38.00±2.00 mm in T0 to 43.67±2.08 mm in T2, and the difference was significant; the intermolar width increased from 44.00±2.83 mm in T0 to 46.00±4.24 mm in T2, but the difference was not significant. No buccal tip was evidenced on the first permanent molars which were spontaneously adjusted in a stable occlusion. The deciduous teeth with the length of root equal to that of the crowns (confirmed by OPT of the patients), can effectively support the load of the RPE.
Conclusions: With the present study we confirm the

efficiency of a rapid palatal expander anchored on the deciduous teeth. The intermolar width was increased without buccal tipping of the first permanent molars. All possible side effects on first permanent molars, such as external root resorption, periodontal damages or white spots, were avoided. We conclude that the present design and protocol for the rapid maxillary expansion is a valid alternative for the clinician. Further long-term studies and with a larger sample size are encouraged in order to improve the current evidence.

The role of the cervical vertebral maturation method, age, and gender in predicting mandibular growth

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Aim: To develop a prediction model that combines the information derived from chronologic age, gender, and the cervical vertebral maturation (CVM) method to predict mandibular growth.
Methods: From a parent sample of 1151 subjects a final sample of 50 subjects (29 females and 21 males) was derived. The sample was selected from the records of the Fels, Iowa, Mathews and Oregon Growth Studies that are available through the American Association of Orthodontists Foundation (AAOF) Craniofacial Growth Legacy Collection Project (www.aaoflegacycollection.org). Moreover, the complete records of the University of Michigan Growth Study (after having removed the 30 subjects that were used in the previous study by Baccetti et al, 2005) and of the Denver Child Growth study were screened. Inclusion criteria were: availability of a series of at least 6 consecutive annual lateral cephalograms from the age of 7 years to 18 years; the bodies of the second, third, and fourth vertebrae had to be visible in all films; the interval between 2 consecutive cephalograms had to range from a minimum of 6 months to a maximum of 18 months; the first cephalogram of the series had to show CVM stages 1 or 2; the last cephalogram of the series had to show at least CVM stage 5. A total of 456 lateral cephalograms was analyzed. A multilevel logistic model was applied. The outcome variable was the annualized increment in total mandibular length (Co-Gn) during the year following the lateral cephalogram on which the cervical stage and age were evaluated. The predictive variables were chronologic age up to the fifth order, gender, cervical stage, interactions between age and gender, age and cervical stage, and gender and cervical stage.
Results: The mean number of cephalograms per subject was 9.1 ± 1.2 (minimum 6 and maximum 12 cephalograms. The mean age at the first cephalogram was 8.2 ± 0.5 years while the mean age at the last cephalogram was 16.5 ± 1.1 years. The mean interval between 2 consecutive cephalograms was 1.0 ± 0.1 years. Cervical stages, for age up to the fourth order, for gender, and for the interaction between age and gender were significant predictors of annualized increment in Co-Gn. The annualized increment in Co-Gn was significantly greater for CS 3 when compared to all other cervical stages. The annualized increments in Co-Gn for CS 1 and CS 2 were significantly greater when compared to CS 5.
Conclusions: Cervical stage, age, and gender can be used jointly to predict the annualized increment in mandibular growth. Cervical stage 3 exhibited the greatest annualized increase in Co-Gn.

Relationship between the position of the mandibular third molar and the degree of dental crowding in the antero-inferior sector

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Aim: To determine the association between the position of the mandibular third molar as a factor of dental crowding in the antero-inferior sector.
Methods: The study was observational and transversal. The samples were 80 study models of dental permanent obtained from subjects of the Orthodontic Dipartment of the National University of Trujillo, Peru. In this study was used a digital calibrator (in millimeters) to measure the required space (RS) and the available space (AS). The required space (RS) was obtained by adding the mesiodistal width of each tooth mesial to the first molar mandibolar of both sides. While the available space (AS) was determined adding the lenght from the mesial of the lower central incisor to mesial of the lower canine and from mesial of the lower canine to mesial of the first molar; that measurement was carried out on the opposite side and both measurements risulted the AS or mandibolar arc lenght. Then, both risults AS and RS were substracted to determine the discrepancy between the teeth and the mandibular bone. In this study, the degree of the dental crowding was classified in mild (1-3 mm), moderate (3-5 mm) and severe (6 mm or more). Finally, 80 panoramic radiographs of orthodontic pretreatment were observed and the classifications Winter, Pell and Gregory were used to determine the position of the mandibular third molar. The data was acquired in the Microsoft Excel program., the statistics were performed in the StatCal version 8.1.3 program,

and the descriptive statistics were performed and compared using the chi-squared test (Xi2).
Results: 46.2% were mild crowding, 33.2% moderate and 27.3% severe. In all degrees of severe crowding, a higher percentage of mesio-angled third molars (55.8%) was obtained, which were most frequently affected in the area of the apex of the second molar (57.3%). A chi-squared test was performed to determine if the mesioangular position of the mandibular third molar caused any effect on crowding severity. The result was 0.062 greater than the critical test value($p<0.05$), so there is no effect between the severity of crowding and angulation of the third molar.
Conclusions: In the three types of crowding, mesioangulation of the apex of second molar was found most frequently, concluding that the position and retention of the third molar did not affect the antero-inferior crowding

Thermomechanical properties of orthodontic wires

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Aim: To compare thermomechanical properties of Cu-NiTi and HANT (Heat Activated NiTi) orthodontic archwires of different size and section.
Method: Tested wires are Cu-NiTi (Sweden&Martina) .014, .016, .014x.025 and .019x.025 inches and HANT (Forestadent) .014, .016, .014x.025 and .019x.025 inches. Thermomecanical tests have been made using the Instron dynamometric machine 5566 equipped with a loading cell of 10 N and a thermo-resistance for the heating between 30 °C and 50 °C. The first test performed is a three-point bending test with complete loading/unloading cycles at a temperature of 35 °C and then repeated at other temperatures between 30 °C and 50 °C. The second test is always a three-point bending one but with a predetermined deflection of 1,5 mm and carried out while increasing and lowering the temperature during the same loading/unloading cycle. Data concerning displacement, load and temperature has been acquired simultaneously from the DAS (Data Acquisition System) and, through an analog-digital conversion, translated into digital numerical values to be acquired and processed by LabVIEW software. Third and final test is the DSC (Differential Scanning Calorimetry) to investigate the heat flow of each of the two alloys and it was conducted with a differential scanning calorimeter (DSC 2910, TA INSTRUMENTS) on three specimens of the Cu-NiTi wires and three of the HANT ones. Specimens were weighed on a METTLER AE 240 precision balance. Data have been processed using Universal Analysis 2000 software.
Results: The Cu-NiTi wires compared to HANT release slightly higher forces when subjected to three-point bending tests under the same conditions (temperature and load in the first test, deflection in the second one). DSC test, instead, showed for Cu-NiTi wires wider temperature ranges in which transitions from austenite to martensite and viceversa take place: austenite finish temperatures of the wires Cu-NiTi and HANT are respectively 29,72 °C and 25,05 °C.
Conclusions: Cu-NiTi wires, compared to HANT ones under the same conditions, release higher and all above constant forces in a wider range of deflections. The reason is that, as regards the analysis of the thermal flow, Cu-NiTi wires show a lower As (Cu-NiTi 12,47 °C while HANT 18,21 °C) and the lower is As the more austenitic domains will be at a temperature of 35°C. Another difference between the two wires is that, in the deactivation phase, the Sweden&Martina® wires release an almost constant force (plateau), while the Forestadent® ones release a force with a marked slope.

Dentofacial orthopedics with elastodontic appliances in pediatric OSAS: a case report

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Aim: Evaluate the effectiveness of Dentofacial Orthopaedics using preformed functional elastodontic devices in the treatment of Obstructive Sleep Apnea Syndrome (OSAS).
Methods: L.M., a 4-year-old male patient, was referred by his pediatrician for orthodontic evaluation. The patient was uncooperative, and parents reported very restless sleep, bedwetting and frequent inattention and/or uncontrollable impulses in his medical history. Extraoral and intraoral examination revealed dolicofacial cranio-facial structure, anterior open-bite and tendency to bilateral posterior crossbite without mandibular shift. An orthodontic check-up was scheduled: dental impressions and Orthodontic radiographs were taken. The Orthopantomography showed no dental anomalies or missing teeth. The Cephalometric analysis revealed a mild skeletal Class III and Open Bite relationships. The patient was then referred to the Sleep Medicine Centre of San Paolo Hospital for ENT and neurological examination. The patient was diagnosed with hypertrophy of adenoids and tonsils (grade 3 out 4) and sign and symptoms of ADHD (Attention Deficit Hyperactivity Disorder). The Sleep Clinical Score derived from the collection of orthodontic, ENT and neurological data reached

a value of 21. An objective quantification of the respiratory impairment was carried out through cardio-respiratory monitoring performed at the patient's home: AHI (Apnea Hypopnea index) was 1.2 and ODI (Oxygen Desaturation index) was 1.6. Orthopedic-functional treatment was performed using an elastodontic appliances (EFline®, Orthoplus).
Results: After 6 months of treatment, a substantial improvement in occlusal relationship has been observed with a slight reduction of openbite and a good expansion of the maxillary arch. Parents reported less sleep disturbances and no more nighttime bedwetting. During the periodic check-ups the patient was more cooperative. After 8 months a reduction of lingual thrust during swallowing was also observed, together with an improved respiratory pattern. After 1 year a new cardio-respiratory monitoring was performed and new data was collected for the SCS. Both the AHI and ODI indexes were 0.0 and the SCS score was 15. Respiratory parameters remain stable at 2-year and 3-year follow-up as indicated by ODI and AHI index value's of 0.0, meaning that all clinical and instrumental sign and symptoms of OSAS were definitely overcome and no recurrence occurs.
Conclusions: Dentofacial Orthopedics performed with elastodontic appliance has been effective in relief sign and symptoms of mild OSAS in children. The improvement of occlusion and oral function lead to the resolution of respiratory impairment and to a valuable improvement of behavioral distress. The elastodontic devices are adapted to the various stages of dentition in a growing subject, particularly in preschool children. They are comfortable, easy to use and effective in improving malocclusion together with oral dysfunction such as oral breathing and/or atypical swallowing. For this characteristics, elastodontic devices could play an important role in validating a dental approach to pediatric OSAS.

Carriere Motion® 3D™ appliance followed by Carriere® Slx® brackets system in the correction of Class II malocclusion: skeletal and dentoalveolar effects compared to the use of Class II elastics in Damon system and SWM

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Aim: The purpose of this study was to evaluate skeletal and dentoalveolar effects of a group of patients characterized by Class II malocclusion treated with Carriere Motion® 3D™ Appliance (CMA) followed by Carriere® SLX® Brackets System. The final clinical and cephalometric outcomes were compared with the ones of two groups treated with Class II intermaxillary elastics followed by, respectively, Damon 3X brackets and SWM brackets. Moreover, we made a comparison between in-out, tip and torque values of the study group and the ones reported by Andrews' publication.
Methods: We have selected 15 patients treated with CMA followed by Carriere® SLX® Brackets System (group 1), 15 patients treated with Class II intermaxillary elastics followed by Damon 3X brackets (group 2) and other 15 patients treated with Class II intermaxillary elastics followed by SWM brackets (group 3). For each patient we have collected post treatment .stl files and pre- and post-treatment cephalometric values. VAM software (Vectra, Canfield Scientific, Fairfield, NJ, USA) was used to determine first, second and third order values for each tooth from the final dental casts. All values were compared by means of Two-tail Student t test, in order to study statistically significant differences between Class II groups of patients treated with different appliances. The same test was used to analyzed dento-alveolar outcomes from group one when compared with Andrews reference values.
Results: If compared to Andrews' outcomes, patients from group one exhibit higher third order values in all teeth, confirming that self-ligating brackets have less torque control. Moreover, we found more negative tip in U3 and U6, where the CMA is usually bounded. Statistically significant differences were also found in first, second and third values when group one has been compared to group two and group three. Indeed, it is confirmed that the use of CMA leads to differences in terms of tip in the first upper molar and in terms of torque for all teeth, when compared to conventional brackets. If cephalometric analyses are concerned, no significant changes in ANB were found in any group considered. The third group has registered a great increase of IMPA with respect to group one and group two, in which the incisors' buccal inclination was controlled at the expense of an increase of torque of lateral sectors. No statistically significant increase of U6-ptv was found: the resolution of Class II malocclusion was not obtained by means of upper molar distalization in any of the three groups treated.
Conclusions: Carriere Motion® 3D™ Appliance (CMA) followed by Carriere® SLX® Brackets System is an effective treatment approach of Class II malocclusion, with a prevalence of dento-alveolar effects with respect to skeletal ones. Some differences in first, second and third order values were found between the analyzed groups, related to the different biomechanical approach and brackets configuration.
As for patients treated by intermaxillary elastics combined with fixed appliances, in group one Class I

occlusion was achieved by means of a combination of maxillary and mandibular dental effects.

Correlation between arch shape and facial asymmetry in patients with 2nd Class subdivision malocclusions

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Aim: Angle described Class II subdivision as a separate group of Class II malocclusions characterized by a unilateral Class II molar relationship. This malocclusion account for up to 50% of all Class malocclusions. Depending on the origin , 2 types of Class II sub- division malocclusion can be observed: type 1, characterized by distal positioning of the mandibular first molar on the Class II side, and type 2, characterized by mesial positioning of the maxillary first molar on the Class II side. The etiology of the asymmetry can be complex. The purpose of our research is to evaluate whether there is a correlation between facial asymmetry and arch shape in patients with Class II subdivision malocclusion, the comparing the sample with a control group.
Methods: A preliminary analysis reveled that to observe a difference between the indices of the control group and the study group, 32 subjects for group will be needed, for a total of 64 patients. The Inclusion criteria are a Class II subdivision malocclusion; age between 18 and 40; permanent dentition; crowding <5 mm; absence of systemic problems. Patients with edentulous spaces, previous orthodontic treatments, restorations on the first molars, occlusal interferences and Bolton index altered were excluded indeed. A specific software (Meazure 2.0) allowed us to draw a triangle inscribed inside the arches: a vertex of the triangle was place between the two dental incisors (a angle); the two other vertices lied on the buccal groove of maxillary first molar or the mesiobuccal groove of mandibular first molar (b/ɣ angle). Internal angles of the triangle were measured. 64 couples of dental casts and dental arches on their digital photographs were measured. 3D photographs were acquired for all patients using a stereophotogrammatrical camera set-up (3dMD TrioTM System, 3dMD LLC, Atlanta, GA, USA). Sixteen soft tissue landmarks are manually identified. The neck, ears and hair were removed in 3dMD patient v3.1.0.3 (3dMD patientTM Software Platform, 3dMD LLC) to exclude confounding regions. The sagittal plane will be used to create a mirror 3D photograph. The original and mirror 3D photography will be combined using a complex surface registration algorithm (Iteractive Closest Algorithm Point). Using "Geomagic" programm, a distance map will be calculated. This illustrates the distance between two matching points on both 3D photographs to have a direct measurement of facial asymmetry. This adjusted 3D photograph was imported into Geomagic 3D for a creation of a mirrored 3D photograph.
Results: The correlation between the values of the distances between the photogrammetric points, are statistically significant values at the level of four points: LS_L_Dz , STO_DZ, GON_R_Dz and GON_L_Dz.
Conclusions: From the statistical analyzes carried out on the samples under examination, it can be stated that: there is a correlation between the shape of the arch and facial asymmetry in some points of the face, such as the gonion, the stomion and the upper lip. The entire sample, both the case group and the control group, presented facial asymmetries of different entities. No significance differences were seen between the two sexes.

Effects of osteopatic manipulative treatment (OMT) on patients with maxillary transversal deficiency treated with rapid palatal expander (RPE): a preliminary study

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Aim: Rapid maxillary expansion is a common orthodontic-orthopedic procedure used to treat transversal deficiency of the maxilla by gradually opening the median palatal suture. The therapeutic protocol involves the use of ERP, that may cause pain after its activation. Recently, osteopathy was applied in orthodontics in order to alleviate discomfort during expantion. In this study we aim to investigate a possible effcts of osteopathy on orthodontic treatment. Also a neuromuscular status is monitored and assessed. The objectives of this work are: 1) To correlate the OMT with the orthodontic treatment and to verify if it can improve the comfort of the patient s; 2) To measure postural/neuromuscular alterations in treated subjects; 3) To evaluate if OMT brings some noticeable benefits to the patients who undergo the treatment.
Methods: Five patients were included into the study (mean age 8 years and 1 month), recruited in the Milan Military Hospital Center from January to March 2018. They were randomly assigned to the test (submi[ed to the OMT before the ERP treatment) and control (conventional maxillary expansion by ERP) groups.

Several diagnostic tools were applied, such as: CBCT, 3D cephalometric analysis, the stabilometric platform and the electromyograph.
Results: The collected data showed, that RPE treatment plays an important role in improving the neuromuscular balance and posture of patients with transversal maxillary deficiencies. Moreover, patients from the test group showed a higher increasing rate of the inter - arch transversal width compared to patients from the control group. Patients who underwent OMT experienced less pain than patients in the control group, in all 5 patients in the first activations were more painful than the last ones and in 3 cases the morning activations were less annoying than the evening ones. The examination performed with the stabilometric pla_orm shows a postural improvement in all patients after rapid expansion of the maxillary, without any particular differences between the test group and the control group.
Conclusions: OMT may be applied in association with orthodontic treatment, bringing benefits to orthodontic patients. Being in line with the objectives of this study the obtained results however are not sufficient to demonstrate a relevant statistics. In order to perform statistically significant data, this study continue the recruitment of subjects.

Micro-osteoperforations for acceleration of orthodontic treatment: a case report

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Aim: To perform a clinical case treated with the combination of micro-osteoperforations (MOPs) and clear aligners.
Mmethods: A male patient was sent to the Dental Department of Military hospital for orthodontic treatment. The patient was proposed to undergo a new option of periodontally assisted acceleration of the orthodontic treatment. After clinical data documentation and signing a written inform consent his clinical case was studied and planned. Apart from conventional Invisalign planning this clinical case was assigned for the ClearTPS® treatment plan optimization along with MOP mapping. The first set of aligners (35 trays) were accelerated- means changing trays every 3 days instead of 7-10 days. At the day of the second clear aligner application, after an injection of local anestesia (Articaine 4% with epinephrine) 2-3 consecutive micro-osteoperforations were placed between teeth. After making MOPs a light pressure with a wet gauze for several minutes was provided to control the bleeding. No suturing was needed. Immidiately after procedure the second aligner was applied. After refinement re-evaluation the rest of the orthodontic treatmnet was provided without periodontal acceleration.
Results: After MOPs' placement the healing was uneventful and no painkillers drugs were applied. At all timepoints patient demonstrated a good complience and followed all domiciliar hygiene reccomendations. Full Moush Plaque Score and Full Mouth Bleeding Score were less than 15% at all timepoint. No gingival recessions developed during the treatment and no sites with the probing depth exceeded 4mm were registered. The duration of the orthodontic treatment was shortened to aproximately two months.
Conclusions: Most of the individuals desire a quick orthodontic treatment. Traditional orthodontic therapy in adults often results in protracted treatment time to reduce periodontal tissue concerns. Periodontally assisted orthodontics provided my MOPs has been reported in a few publications, and seems to be a promising adjuvant technique, indicated for many clinical situations in order to facilitate tooth movement and reduce the tretment time. MOPs is a novel technique to achieve rapid orthodontic tooth movement and seems to be proficient from both the patients' and clinicians' standpoints. There is a need in well-designed randomized case-control studies on the topic.

Combined orthodontic and implanto prosthetic treatment ofsmmci syndrome, a case report

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Aim: Solitary Median Maxillary Central Incisor (SMMCI) Syndrome (originally called "solitary median maxillary central incisor, short stature, choanal atresia/midnasal stenosis syndrome") is a rare malformation associated with defects of bone and soL midline tissues, along with an increased risk brain and pituitary malfunction. Sex predominance of SMMCI in female group is stated, but the etiology SMMCI is sll unknown, but it may be related to a dysregulation in premaxillary development during the gesta>onal connected to a missense mutation in the SHH gene (I111F) at 7q36 may be associated with SMMCI. The pathognomonic finding of this syndrome is the single central incisor mid-positioned. The purpose of this paper is to report a case of a female patient affected by SMMCI, treated with a combined orthodontic and implant prosthetic therapy.
Methods: The female 50 years old patient of this case report was randomly recruited in the Milan Military Hospital Center on January 2018. She was searching for a solution to her dental problem (upper central

incisor missing) and associated psychological problem. Several diagnostic tools were used, such as photos, lateral projection of the skull, orthopantomography, CBCT, 2D cephalometric analysis and digital casts to establish the therapy plan. Both orthodontic team of the hospital was involved and proposed different solutions, the patient finally chose freely free to choose the therapy she deemed most appropriate. The chosen therapy was composed of two phases: orthodontic and surgical. First phase was performed with extraction of upper second premolar and root sumps, 18 months of aligners appliances (Invisalign), divided in two steps,, supported by orthodontic accelerator device (OrthoPulse). Second step was implant prosthetic treatment with osteointegrated implant fixture (JD Evolu>on), surgical bone expansion with Magnetic Mallet and bone substitute (Bio-Oss).
Results: At the end of therapy plan the missing central incisor was gained. The patient showed an important improvement in her dento-facial aesthetic and referred psychological enhancing due to related self esteem growth.
Conclusions: This paper demonstrates how, once again, a multidisciplinary team is absolutely necessary to resolve this complex case typology with a high aesthetic value. Combined orthodontic and implant prosthetic treatment (supported by other features) may be a good therapeutic strategy to solve SMMCI Syndrome this complex case typology with a high aesthetic value.

Maxillary and mandibular anterior dental crowding with increased overjet and deep bite treated with fixed appliances: a case report

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Aim: The purpose of this work is to present a case of maxillary and mandibular anterior dental crowding with increased overjet and deep bite. A fixed appliance was used to treat both dental arches.
Methods: The recruited patient was a female, 9 years and 11 months old, with mixed dentition. The following essential clinical data were collected: medical and dental history, clinical investigation, model casts. Orthopantomography, latero-lateral and postero-anterior teleradiography were requested before the treatment and a subsequent cephalometric analysis was performed. Intra- and extraoral photos were taken before, during and after the treatment. A diagnostic evaluation was achieved during the case study of pretreatment dental casts and lateral headfilms. According to the cephalometric values, the patient resulted mesodivergent (SpP^GoGn=23,32°) and was classified as a basal Class II (A:Po=5,83). Moreover, the patient presented maxillary and mandibular anterior dental crowding, deep bite and increased overjet. The treatment consisted in fixed self-ligating devices applied to both maxillary and mandibular arches. All appropriate instructions were provided in order to maintain proper oral hygiene and avoid accidental detachment or breakage of the orthodontic devices. The patient was followed and monitored for 2 years and 6 months of therapy, at the end of which there has been a lack of compliance from the patient. In fact, the periodic follow-up has not been accomplished for 8 consecutive months and the patient kept the maxillary and mandibular fixed orthodontic devices previously applied. Eventually, the patient recovered the compliance and continued the therapy for 1 year and 4 months.
Results: At the end of the therapy there was the correction of both the deep bite and the overjet, as well as the resolution of the maxillary and mandibular crowding. Stable occlusion and good intercuspidation were also found. Although there was a lack of patient's compliance, the results obtained was in any case satisfactory.
Conclusions: A clinically significant correction of the overjet, overbite and maxillary and mandible incisor alignment was observed after treatment with fixed device in early mixed dentition. The stability over time of the obtained results is still unknown: in fact, it is clear that after the end of the orthodontic treatment occlusal changes will inevitably occur also due to the exfoliation of the deciduous teeth. However, the clinical observations of this case are promising and fixed device may be a valid treatment choice for patients with these orthodontic characteristics.

Ultrasound in juvenile idiopatic arthritis: evaluation of thickening of the condylar capsule

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Aim: For some years now, ultrasound has been used in the orthodontics department of the dental clinic of the Polyclinic of Milan for the evaluation of the temporomandibular joint in arthritis patients juvenile idiopathic (AIG). In this study, through the use of ultrasound investigation, we will highlight some pathological changes in the morphology of the temporomandibular joint (TMJ) in a sample of pediatric patients.
Methods: Ultrasound has become a basic diagnostic test to be performed in all children with AIG for evaluate not only the correct morphology of "pathological" condyles but also any alterations concerning the route, therefore the excursus, during condylar movements. We analyzed 100 patients with AIG each of whom were periodically re-evaluated to confirm the therapeutic efficacy of the orthodontic treatment undertaken. The patients in question, including 20 males and 80 females with an average age of 12 and a half years, were therefore subjected to careful clinical examinations and subsequently to the ultrasound examination. The latter was performed using a standardized technique with the patient lying down, on the GE brand Logic E9 brand platform, using transducers from 11 to 18MHz depending on the age of the patient.
Results: Having examined the sample of patients, (suffering from juvenile idiopathic arthritis), we focused particularly on those that had an evident thickening of the joint capsule; this pathological state, in fact, involved about 14 patients (2 males and 12 females) on a sample of 100 patients, we also found that 4.5% of the thickening affects the right joint, 3.8% that left, and 3.0% of patients showed involvement of both joints.
Conclusions: Ultrasound, therefore, is a useful tool for identifying alterations not only of the condylar morphology but also of the condylar route in young and non-young patients, also affected by AIG. In fact, it is well tolerated in young children without sedation, it does not require the young patient to remain immobile, it is also easily repeatable over time since it has no biological costs. It is therefore an examination well accepted by both young patients and parents. Although it does not allow the three-dimensional visualization of the entire structure, the ultrasound examination allows you to view the condylar morphology thus allowing the clinician to make the diagnosis as early as possible and to monitor the growing patients also evaluating the efficiency of the orthodontic treatment possibly undertaken.

Adverse effects of the bite-raised condition: a systematic review

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Aim: Recent studies highlighted the influence of masticatory function on memory and cognition. The relationship between chewing and the central nervous system is of considerable importance, during both growing and ageing. Here we provide a critical review in animals and humans of the effects of the bite-raised condition that abruptly alters the customary occlusion and that is actually a widespread orthodontic technique, both in developing and ageing patients.
Methods: A systematic review of the literature was conducted. Original articles were searched through Pubmed, Cochrane Central database and Embase until December 2018. Additional studies were taken from reference lists of previous review articles. The "related articles" tool was used to improve the PubMed searches. Unpublished studies, grey literature or studies not published in English were excluded.
Results: 242 articles were identified through database searching. After removing the duplicates, 198 articles were screened by reviewing the abstracts. 27 full text articles were assessed for eligibility and, after 6 exclusions, 21 articles were included in the review process. A few articles were excluded because they investigated forms of occlusal instability other than raising the bite; others were excluded because, even though they concerned bite-raised animals or patients, other variables than masticatory muscles electromyography were considered. Studies selected by the review process chiefly concerned animals, with 1 study on human subjects. Histological, molecular, biochemical and electromyographical studies investigating the effects of the bite-raised condition were included, evaluated and described.
Conclusions: In this review of the literature, we evaluated the known effects of the bite-raised condition. This condition abruptly alters the customary occlusion eliminating all dental contact points except for two or three (if a tripod configuration is used). The bite-raised condition has been shown to be a source of stress and to induce hypersensitivity to novel forms of stress, to affect the structure of the hippocampus and its role in memory and spatial orientation, and to disrupt mastication. The results of this review, with a high level of agreement, indicate the importance

of maintaining a condition of occlusal stability in general and during orthodontic treatment, a principle that holds true in adolescent and adult patients alike. Though extensively used, the implications of bite-raising techniques are not yet well known by clinicians; their effects, extending well beyond the boundaries of the oral cavity, constitute a risk, particularly in the care of adolescent patients.

Analysis of tooth movements in patients with pathologic tooth migration

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Aim: This clinical-research study has been designed (1) to evaluate which orthodontic movements are mostly required in patients with healthy reduced periodontium and (2) to establish the relationship between clinical attachment loss (CAL) and specific orthodontic movements performed by clear aligners.
Methods: 96 front teeth were analyzed in patients with pathologic tooth migration (PTM) who had previously received nonsurgical and surgical periodontal therapy. For each tooth probing depth (PD), recession (Rec), CAL parameters were measured during periodontal re-evaluation and 24 orthodontic movements (12 for the crown and 12 for the root) required to restore the alignment were detected through ClinCheck software®. Orthodontic and periodontal data have been later integrated and statistically analysed using R Statistic Software version 3.5.3.
Results: The most frequent orthodontic movements required to correct PTM were intrusion, lingual and distal translation, mesial and distal rotation. A significant correlation (p value<0.05) between CAL and specific tooth movements has been found mainly for angulations and rotations, but not for intrusion even if this was one of the most prescribed orthodontic movement in the analyzed sample. This can be due to the fact that even though periodontal loss seems to be a main factor in the etiology of PTM, other aspects such as soft tissue forces of the tongue, cheeks and lips, or occlusion forces can contribute.
Conclusions: Orthodontics plays an important role in the treatment of patients with PTM when tooth malposition can worse the periodontal status. During orthodontic treatment proper oral hygiene procedures are mandatory in order to maintain periodontal health. Clear aligners generate light forces and controlled movements and can be a valid treatment allowing patients easier oral hygiene procedures.

The influence of vibrational forces on bone metabolism: a systematic review

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Aim: Nowadays, the need to carry out shorter orthodontic treatments and therefore to have techniques that accelerate orthodontic movement is increasingly frequent. Today, there are different techniques that can be used for this purpose, but this study is limited to analyze the additional vibrational force that can be used during an orthodontic treatment. The principal aim of this systematic review is to investigate whether there is sufficient evidence that these vibrational forces have a positive effect on orthodontic treatment.
Methods: A literature review was carried out taking into consideration works that have studied the influence that a vibrational stimulus can have on bone metabolism; attention was therefore focused on the degree of expression (at the level of mRNA and proteins) of the markers of osteogenesis and osteoclastogenesis. We systematically searched databases such as Pubmed, Scopus and Cochrane and we only considered studies carried out after 2015 with an adequate statistical analysis, obtaining a total of 22 studies suitable for the review. These works were then collected in a PICOS table according to the author, the study design, the examined population, the type of intervention carried out and the statistically significant outcomes. Finally, a classification system was used to evaluate the methodological quality of the selected articles and to evaluate the level of evidence of the conclusions of this review (grade A, B, C).
Results: What comes out from this review is that there is no linear relationship between the magnitude of acceleration (vibration) and the cellular response. In addition, many works agree that the response at the cellular or tissue level does not change according

to the extent of the vibration, just as the magnitude of the acceleration had no influence on the anabolic activity of the bone under vibrational stimulus. Still, most studies that focus on mechanical stimuli, including vibrations, suggest that increasing the number of load cycles to just 3 levels increases the tissue / cellular response until it becomes saturated, and then there are no more increases.

Conclusions: The effectiveness of vibrational devices has been tested by a limited number of in vitro studies, in animal and human samples. Although in vitro and animal samples studies have yielded positive results, clinical trials in humans have provided mostly negative results and therefore, the evidence for or against is rather weak. Because of the lack and the shortage of the selected works and the low scientific evidence reported, the next step could be to propose a new study protocol aimed at the specific analysis of biochemical markers not at the level of proteins and mRNA, but of the metabolites that develop in the gingival crevicular fluid (GCF) with the aim of demonstrating that the metabolomics analysis may be better able to report statistically significant results on the positive influence of vibration on orthodontic tooth movement.

Comparative evaluation of the effects of the different PAOO techniques on bone density and thickness: a review of the literature

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Aim: An adverse effect of orthodontic treatment can be loss of the alveolar bone; for this reason procedures such as Periodontally Accelerated Osteogenic Orthodontics (PAOO) have been proposed: they support the combination of flap design, selective decortication, alveolar augmentation, membrane coverage, suture closure and application of orthodontic forces. The aim of this literature review was to evaluate and compare the amount of bone density at the end of the treatment between flapless Micro-Osteoperforation (MOP), PAOO with surgical bur , PAOO with piezocision , placement of recombinant human bone morphogenetic protein-2 (rhBMP-2) and membrane fixation with periosteal sutures.

Methods: The research was conduced by using Pubmed database and Wiley online library with a combination of the following english terms: "paoo" AND "bone density" AND " orthodontics". Only studies from 2018 to 2020 that assessed an association of surgically assisted accelerated orthodontic techniques and bone density and thickness in humans were included. No age or gender restrictions were applied. A total amount of 24 items was found.

Results: Only 5 articles were considered valid because of their specifical focus on bone density and thickness. All the analyzed articles showed increase in bone density and thickness after PAOO treatment. In particular Chandra et Al. in 2018 highlighted that, 6 months after treatment of the two study groups, there was statistically significant positive difference in bone density in the group where BMP-2 was used. The same result was achieved by Liu x et Al in 2020 showing that compared to the traditional technique, the modified PAOO technique with membrane fixation using periosteal sutures provides postoperative improvements in bone augmentation. Even Ma Zhigui et al. introduced a modified new bone grafting technique and showed that this procedure facilitates extensive bone augmentation and allows the simultaneous correction of vertical and horizontal defects in the labial aspect of the mandibular anterior area. Agrawal et al. evaluated the changes in buccal bone thickness after MOP's and compared it with the contralateral corticotomy site : significant increase in buccal bone thickness was found at two levels (coronal, midroot) at the MOP's site. Moreover, when comparing the same with that on the contralateral site, the thickness of buccal bone was significantly more at the coronal level of the corticotomy site as compared to that at the MOP's site. Supreet et al showed with the use of CBCT a statistically significant increase in bone density and thickness in both study groups, 12 months after the surgery using PAOO with piezocision and PAOO with surgical bur.

Conclusions: Currently, the available literature on surgically assisted accelerated orthodontic techniques seems to show an improvement in the aspects of density and bone thickness using those mentioned surgicaltechniques but it is inadequate to conclude for sure absence or presence of clinically meaningful effects. The results of this review should be interpreted carefully due to small sample of patients, and the short-term follow-up. It is recommended that more long-term studies with increased sample size should be conducted to provide strong evidence of these techniques on the periodontal aspect in order to implement their use in everyday clinical practice.

Assessment of chewing muscles with MAGNETIC RESONANCE IMAGING IN PATIENTS AFFECTED BY HEMIFACIAL MICROSOMIA: a preliminary study

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Aim: The Hemifacial Microsomia is the second-most common facial congenital disorder after cleft lip and palate, with a variable incidence of 1: 4000 to 1: 5600 born alive. This condition is characterized by a generally monolateral hypo-development of the skeletal, nervous, muscular and vascular structures that embryologically derive from the 1st and the 2nd brachial arches. Patients are affected by a facial asymmetry with different grade of dysmorphism, from mild to more complex malformations affecting the face involving mandible, ear, orbit and soft tissues, and even growth of the surrounding structures could be affected. A system of classification is necessary to correctly describe the malformation: the OMENS classification proposed by Vento et al. defines with an alphanumerical system the grade of dysmorphism of every anatomical part involved. The aim of the study is to propose a method to study and measure the thickness of the chewing muscles, in all the three dimensions, with Magnetic resonance imaging in patients affected by Hemifacial Microsomia.
Methods: Three consecutive patients affected by Hemifacial Microsomia, two females and one male, were selected for the study in our Unit of Orthodontics. The followed patients completed their consultation with detailed medical history and were clinically classified using the OMENS classification system. Patients were selected according to the following inclusion criteria: patients affected by Hemifacial Microsomia with soft tissues' or muscular deficiency classified as moderate to severe (S2-S3 of OMENS classification), not yet subjected to orthodontic-surgical treatment that had previously been subjected to Magnetic resonance imaging for diagnostic and surgical reasons. Magnetic resonance imaging of three patients affected by Hemifacial Microsomia were studied in order to investigate masseter, lateral pterygoid and temporalis muscles. The vertical, transverse and sagittal dimensions of masseter, lateral pterygoid and temporal muscles were measured. The difference in size was expressed as the affected/unaffected percentage ratio.
Results: There is not a specific involvement of a muscle on the affected side compared to the unaffected side, as they are all reduced in volume compared to the healthy side.
Conclusions: Volumes of masseter, lateral pterygoid and temporal muscles were smaller on the affected versus unaffected side. The muscular deficit could be assessed and correlated with the skeletal deficit classified with the OMENS classification. This preliminary study demonstrates that the muscular deficit can be assessed, objectively measured, and can be correlated with the skeletal deficit classified with the OMENS classification.

Effect of long term brushing on deflection, maximum load and wear of stainless steel, conventional and spot bonded fiber reinforced composites orthodontic retainers

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Aim: Fiber reinforced Composite (FRC) retainers are an aesthetic and metal-free alternative to conventional stainless steel splints. They are generally managed with a full-bonded technique, even if previous studies demonstrated that a spot-bonding technique would significantly decrease their rigidity. However, leaving fibers exposed, can improve their wear. As no studies have been conducted on this topic, the purpose of the present research was to evaluate mechanical and surface properties after long term simulate toothbrushing of different FRC splinting technique and to compare them to stainless steel retainers, in order to propose FRC spot-bonding technique for clinical use.
Methods: Frasaco mandible models were splinted with different techniques simulating a canine-to-canine splint. In order to allow vertical movement of the tooth, element 3.1 was inserted to the correspondent hole without rigid fixation. Frasaco models were prepared cleaning the surface with pumice paste, than etched for 20 second. The metallic and FRC splints were bonded with a one-step self-etch 7th generation bonding agent (G-aenial Bond, GC America) and subsequently fixed with flow composite (G-aenial Universal Injectable A2, GC America). For the metal and FRC spot-bonded groups the composite covered the retainer only in correspondence of each tooth, leaving the retainer exposed in inter-proximal zones. Conversely, inter-proximal areas were covered in full-bonded FRC splints. All specimens were then light-cured with a halogen lamp and left 24h in water in incubator at 37 degrees. In the test groups, the surface of the element 3.1 was subjected to mechanical tooth brushing for 26 minutes (Oral B PRO 670 toothbrush with Oral B Cross Action brush heads) with a 124 RDA toothpaste (MaxWhite white crystals, Colgate-Palmolive). 26 minutes brushing time was the result of a simulated 6 months-tooth brushing. Was considered an average brushing time of 2 minutes 2 times per day: the result was divided by 28, the expected teeth number. Finally, the strength to bend the retainer in correspondence of element 3.1 was measured at 0.1 mm deflection and at maximum load with a universal testing machine (Lloyd LRX). SEM microphotographs

(magnification 35x,100x,250x) were taken using a scanning electron microscope (JEOL 5500, JEOL Ltd) for all the materials tested, both for not-brushed and brushed specimens.

Results: When evaluating both at 0.1 mm deflection and at maximum load, lowest values were reported for stainless steel wires, FRC full-bonded showed the highest forces, while FRC with experimental spot-bonding technique reported intermediate measures.

At 0.1 mm deflection no significant difference was reported between not-brushed and brushed groups of each material tested. Concerning maximum load, no significant difference was reported between not-brushed and brushed of FRCs bonded with conventional technique, while both for stainless steel wires and for spot-bonded FRCs the brushed specimens showed significantly lower values than not-brushed ones. Considering surface wear, when evaluating scanning electron microphotographs, the FRC spot-bonded technique showed a significantly higher level of visual wear after tooth-brushing if compared to the other techniques.

Conclusions: The present study demonstrated that the FRC spot-bonding technique showed a positive lower rigidity if compared to the FRC traditional full-bonding technique. After tooth-brushing, mechanical properties of FRC spot-bonding technique are similar to the properties of stainless steel splints. However, the surface wear of the fibers left uncovered is visually higher than the one of fibers covered with flow composite, this concern should be carefully considered before clinical application.

Evaluation of the effects caused by mandibular advancement devices in the treatment of obstructive sleep apneas on the temporomandibular joint

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Aim: Obstructive sleep apnea syndrome (OSAS) is characterized by repeated partial or total occlusion of the upper airways associated with oxygen desaturation and alteration of normal sleep architecture. It is a pathology with a great epidemiological value and considerable comorbidities. Mandibular advancement devices (MAD) currently represent the gold standard for the treatment of mild and moderate OSA cases and go alongside the use of continuous positive pressure mechanical ventilation (CPAP) in the treatment of the severe OSA. To evaluate the site effects generated at the temporomandibular joint and jaw level by two different types of MAD was the aim of this study.

Methods: A Three-dimensional (3D) reconstruction of the temporomandibular joint and of the jaw was obtained starting from CBCT of the skull and then analyzed with the finite element method (FEM) to discover the kinematics and stress applied at the level of the various structures with two different devices (Herbst and Orthoapnea) considering the head to head position of the incisors and then up to the maximum advancement. The finite element method is an innovative technique used for structural calculation and breaks down a geometrically complex object into a large number of elementary objects. The 3D model of the skull obtained from the CBCT was analyzed and information on the distribution of stresses and deformations were also obtained.

Results: The FEM software simulating the advancement of the mandible imposed by the device gives us information on the glenoid fossa, head of the condyle, disc and joint capsule and periodontal ligaments of the lower teeth. The mandibular advancement devices produce a roto-translation of the jaw. The Orthoapnea device is the only one that causes the intersection of the condyle and joint eminence. As regards the analysis of stress at the periodontal level, the most involved teeth were found to be the first and second molars and in particular the second mandibular molars.

Conclusions: The mandibular advancement devices are useful tools in the therapy of obstructive sleep apneas, but it is important to know the effects on the joint, but especially the dental level to better design the device on the individual patient.

Biometric study of palatal rugae in cleft patients: a morphometric analysis using digital dental casts

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Aim: To detect the morphometric characteristics of palatal rugae in patients affected by different types of orofacial clefts, performing a digital analysis on three-dimensional (3D) models of the palatal vault.

Methods: A consecutive sample of 112 patients referred to the Orthodontic Section of the Academic Hospital of Parma was selected for the present study. Such a sample included 63 subjects with Unilateral Cleft Lip and Palate (UCLP), 27 with Bilateral Cleft Lip and Palate (BCLP), 7 with Cleft Soft Palate (CSP), 6 with isolated Cleft of the Lip (CL) and 7 with isolated Cleft of the Palate (CP). All patients underwent alginate impressions for the construction of plaster models after surgical palatal repair and before orthodontic treatment. Digital dental model were obtained from plaster study casts by using 3 Shape B500 laser scanner. 3D casts in STL file format were converted into a different format (IGES file) by Geomagic Studio and processed by the software MeshLab. The length, shape and orientation of the first three palatal rugae were evaluated according to the classification of Thomas and Kotze, Lysell, Kapali. Twenty days after the initial assessment, the dental casts of 30 subjects were randomly selected to test the accuracy in the measurement technique. The method of measurement was repeated by the principal investigator on the selected casts and the intra-examiner reliability was checked by intraclass correlation coefficient (ICC). Statistical analysis was performed using the analysis of variance (ANOVA), Chi-square test and Tukey post-hoc test to assess differences among all subtypes of cleft (inter-group comparison). In addition, unpaired t tests and Chi-square test were used to compare the same variables between right and the left sides within each group of patients (intra-group comparison). The statistical level of significance was set to $p<0.05$ for all tests.

Results: The ICC performed for intra-examiner reliability showed a value greater than 0.90 for all the measured parameters, which indicated that the digital technique was reproducible. A statistically significant difference was found in the length of the first right ruga between UCLP group (8.11±2.46 mm) and CP group (4.15±1.45 mm); the mean length of the first left ruga was significantly reduced in BCLP patients (5.37±2.39 mm) compared to UCLP patients (7.97± 2.46 mm) and to CSP patients (9.92±2.27 mm). No differences were observed in the rugae shapes, while the parameter "orientation" showed a significant difference between the groups.With regard to intra-group comparison, UCLP patients showed significant differences in palatal rugae length, shape and orientation between right and left sides; BCLP group exhibited significant differences in length and orientation; no differences were found within CL, CP and SCP groups.

Conclusions: The palatine rugae morphology differs considerably in UCLP and BCLP; however the parameter "shape" is consistent with all cleft types and it does not seem to be affected by the congenital defect and the surgical treatment.

Evaluation of changes in the hyoid bone position in adult subjects treated with Herbst miniscope

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Aim: To evaluate wheter there is a variation in the distance between the Hyoid bone and mandibular plane (H-MP) and between the Hyoid bone and third cervical vertebra (H-C3) in adults patients whith skeletal Class II from mandibular restrusion and who refused orthognatic surgery before and after Herbst Miniscope treatment.

Methods: In this retrospective study 18 end-of-growth patients whit a skeletal Class II were treated by Herbst Miniscope appliance for an average time of 12 months. The sample includes 14 females and 4 males. Inclusion criteria: Skeletal Class II malocclusion (ANB>4°) in permanent dentition; CS4-CS5-CS6 end-of-growth subjects; Convex and aesthetically compromised profile; Mesofacial or brachifacial typology. Exclusion criteria: Deciduous dentition; Third Class malocclusion; Periodontal disease and dental mobility; Growing subjects. The teleradiographs were performed in natural position of the head in maximum intercuspidation. Cephalometric analyzes were performed by the same operator through the use of Delta-Dent 2.0 cephalometric software. The positional changes of hyoid bone with respect to the mandibular plane and the third cervical vertebra were evaluated by comparing the lateralis teleradiography performed at T0, just before the start of treatment, with that at T1, after the removal of Herbst Miniscope appliance.

Results: Several studies have linked the position of the Hyoid bone and the presence of obstructive sleep disorders. In particular, it has been seen that an increased distance of Hyoid bone from the mandibular plane and Hyoid bone from the third cervical vertebra is associated with a higher risk of OSAS development and their severity. For each patient, the distances between Hyoid bone and mandibular plane and between Hyoid bone and third cervical vertebra on the pre- and post-treatment cephalometry were measured. The 2 values were compared using the student T-test and the ANOVA analysis. The arithmetic mean and the standard deviation (S.D.) were calculated for each variable and the T-test was performed to compare the initial and final results of the period considered and to ascertain the differences between the 2 groups.

Conclusions: The treatment with Herbst Miniscope causes a change in the position of Hyoid bone, evidenced by a reduction of the distance between Hyoid bone and mandibular plane ($p=0.019$) with an average decrease of the measured values of 2.29 mm, while there is no a statistically significant variation between the values at T0 and T1 for the distance hyoid

bone-III cervical vertebra (p=0.298). Considering that several studies have shown that an increased distance between the mandibular plane and the hyoid bone is a risk factor for the development of OSAS, the Herbst Miniscope device could prove to be an effective aid in the treatment of OSAS in adults.

Effectiveness and efficiency of the box loop in lower arch finishing

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Aim: To evaluate the efficiency of the box loop in case of derotation of both inferiors canines (33,43) after one month from the activation of the orthodontic appliance.
Methods: The study considered 8 patients treated at the Mater Domini university clinic in Catanzaro. Patients at the beginning of the study had a malposition of both mandibular canines (33,43) with rotation of various degrees. For the correction of the discrepancy, box loops were used in TMA 0.017x0.025-inch. Considered as optimal the position that mandibular premolar and lateral incisors presented before the use of box loops, to assess the degree of rotation pre and post treatment of canines have taken as reference two segments and the angle from these formed: the mesio-distal axis on the occlusal plane of the canine rotated and the junction segment of the ideal mesial contact point of the premolar and the ideal distal contact point of the lateral incisor. The numerical evaluation of the degree of rotation of the canine compared to the aformentioned segment of junction of points of contact was carried out through the software Dental-Dent exploiting the occlusal photographic records pre and post box loop of the 8 patients. For each patient was evaluated the degree of rotation pre box loop and post box loop relative to 33 and to 43, deriving the degrees of total rotation induced in the time interval between 2 consecutive appointments, the first intended for the activation of the box loop, the second to its removal and evaluation of the results obtained after one month of treatment.
Results: After only one appointment (about a month) from the activation of the box loop it has been obtained in all the patients considered in the study the correction of the position of the mandibular canines. From the data it is evidenced as the box loop has determined from a minimal rotation of 2.7 degrees to a maximum rotation of 33.9 degrees, denoting its usefulness both in the cases of minimal rotations or rotations of remarkable entities, independently from the sense of the induced rotation. The mean rotation value in absolute value for the lower left canine was 11.025 degrees, for the lower right canine of 15.462 degrees, with a standard deviation in the first case of 7.190 degrees, in the second case of 11.998 degrees.
Conclusions: When maximum control of tooth movement is desired, rectangular loops are the first choice for intrasegmental alignment, given their ability to correct the rotation of the mandibular canines simply and in a short time during fixed orthodontic therapy.

Evaluation of profilometric changes in adult patients treated with Herbst Miniscope

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Aim: To evaluate the effects on the facial silhouettes produced by Herbst Miniscope® appliance in Class II adult patients.
Methods: The sample consisted of 30 (15 initial and 15 final) lateral photos from 15 patients. Of these patients, 10 were girls and 5 were boys, with a mean initial age of x years and a mean treatment period of x years. An album containing the silhouettes of the pretreatment and posttreatment profiles based on the lateral photos of the patients was prepared. Then, 10 orthodontists, 10 dentist and 10 laypeople chose the more esthetic facial silhouette and the amount of alterations they perceived between the silhouettes, according to a numeric scale.
Results: The results showed that both groups of evaluators preferred, in a remarkably greater number, the post orthodontic treatment silhouettes. In the laypeople group, 22,3% preferred the pretreatment silhouettes, and 77,4% preferred the posttreatment silhouettes. The findings were similar for the dentist and orthodontist group: 14,4% preferred the pretreatment silhouettes, and 85,6% preferred the posttreatment silhouettes. Between the pretreatment and posttreatment silhouettes the difference identified by the group of lay evaluators was greater than that of the dentist and orthodontists.
Conclusions: Based on the evaluator's judgments treatment with Herbst miniscope appliance had a positive effect on the facial silhouette, and the laypeople better perceived this effect.

Superior interincisors line deviation treated means TAD's

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Aim: To show the treatment of a patient at the

end-of-growth whowas a II Class subdivison left and consequently a marked deviation of the upper interincisors line treated with TAD'S.
Methods: The patient showed up at our orthognatodontic department at Magna Graecia University in Catanzaro at the age of 27. In addition to a II Class and southern left-hand malocclusion, there was an important ectopia of the upper right canine associated with a 4 mm deviation to the right of the interincisive line higher than the median of the face. The patient was treated by asymmetric extraction upper to the left of element 25 to allow correction of the upper interincisors line by centering it with the median line of the face and at the same time creating space for the repositioning in arched right canine in vestibular ectopia. The treatment involved the use of a classic sequence of arcs followed by the use of power arm (on 24 first and on 23 then) that favored a bodily destalization of the elements considered thanks to the use of a skeletal anchor. The correction of the upper interincisors line was also obtained with the help of a rigid dissecting on the incisors and tad's. At the end of the therapy, an asymmetrical vertical elastic on the left was used to correct the slight tilt of the front segment 12 22.
Results: The treatment lasted about a period of 30 months. The treatment obtained a complete correction of the deviation of the upper interincisors line a second therapeutic class on the left and a I Class on the right in addition to the arched repositioning of element 13 in ectopia. On an aesthetic and profile level, an optimal result was obtained with great satisfaction on the part of the patient. At the end-of-care X-rays, there are no signs of radicular reabsorpy, while there is a good parallel of the same. Three years after the end of therapy, the patient shows a stable occlusion with the maintenance of the orthodontic results obtained
Conclusions: The case shows how it is possible to treat the deviation of the upper interincisors line, of a dental nature, through a therapy that involves asymmetric extraction and the aid of anchoragesor skeletal associated with correct orthodontic mechanics, making orthodontic therapy predictable and effective in these complex cases.

Herbst in osas patients, a new therapeutical approach in adult patients: a case series

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Aim: To show the treatment of patients at the end of growth period with severe Class II skeletal malocclusion from mandibular retrusion and OSA's syndrome.
Methods: The patients had both severe skeletal and dental Class II malocclusion with an overjet of more than 1 cm. In addition, patients complained of continuous nighyly a awakenings associated with air hunger, headache and morning tiredness, swollen eyes, slight headache during the day and reduced ability to concentrate. After a careful medical history and the administration of specific questionnaires, an obstructive sleep apnea syndrome confirmed by polysomnographic examination with a medium severity AHI index. An orthodontic surgical treatment was proposed both to the severity of the malocclusion and the aging of the patients, but was refused. Consequently, was used for about a year a mandibular hyperpropulsion device (Herbst MiniScope), followed by treatment with multibrackets appliance for about another year in order to correct the dento-skeletal malocclusion and the OSA syndrome. Herbst is a device widely used in subjects of Class II skeletal malocclusion from mandibular retrusion but also in subjects suffering from OSA. The active part consists of a telescopic mechanism, which allows the mandible to move forward by the prescribed mm in order to determine the growth of the mandible in subjects of developmental age and in adult subjects to determine a permanent front repositioning of the mandible. In addition, for the mandibular advancement action it stabilizes the jaw and the hyoid bone by preventing the rearrangement of the position of tongue and the post-rotation of the jaw with consequent improvement of the respiratory function.
Results: The treatment lasted approximately 24 months and obtained a complete correction of the malocclusion and in one patient the recovery from the OSA resulting in the AHI after therapy less than 5, and in the other a therapeutic success resulting in a lower AHI a 10. An esthetic and profilometric level has obtained an optimal result with great satisfaction from the patient.
Conclusions: The Herbst MiniScope used in the treatment of the Class II skeletal malocclusion by mandibular retrusion turns out to be a valid device for achieving a greater attractiveness of patient's profile but also to mitigate or solve the OSA problem. Orthodontists play an important role not only in achieving ideal occlusion and optimal aesthetics but also in the diagnosis and management of snoring and OSAS in patients at the end of growth period.

Class II malocclusion due to mandibular retrognathia treatment with the twin block: tips and tricks

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Aim: Angle's II Class is one of the most prevalent malocclusions; it can be both skeletal and dental and it can occur with different clinical manifestations. Since 80% of the II skeletal classes depends on a mandibular retrusion component, there is a need for functional treatment aimed at stimulating mandibular growth correcting the convex profile together with the occlusal relationship. There are numerous devices for treating this malocclusion in a growing patient. The purpose of this case report is to evaluate the treatment skeletal effects induced by Twin Block in the therapy of Class II malocclusion, illustrating tips and tricks designed to improve efficiency and effectiveness of the appliance.
Methods: As part of the orthodontic treatments carried out, at Department of Dentistry, Dental School, IRCCS San Raffaele Hospital Vita Salute San Raffaele University, Milan, Italy, we present a representative case report. The patient, Caucasian and female, 11 years old. After collecting and analysing the entire photographic and radiographic documentation (OPT and TRX-LL), a skeletal Class II malocclusion due to mandibular retrognathia diagnosis was made, II division (SNA=79,5; SNB=74; ANB=5,5); in particular, Arnett cephalometric tracing was performed and Fastlight triangle analysed. Aesthetic and skeletal diagnosis confirmed mandibular retrusion and therefore the need for a treatment phase with functional appliance. The treatment plan provided for the application of the Twin Block. The device was worm by the patient for a period of 9 months and a finishing phase was performed with the Straight Wire "McLaughlin Bennett 5.0" fixed orthodontic appliance.
Results: At the end of the therapy, photographs and end-of-care radiographs were taken again. From superimposition of cephalometric traces, obtained according to the ABO rules, we found a valid improvement of skeletal, dental and aesthetic parameters.
Conclusions: Twin Block device is an effective alternative in the treatment of Class II skeletal malocclusions. The Twin-Block improves facial aesthetics in Class II malocclusion. In Addition, through the creation of particular tips and tricks, efficiency and effectiveness of Twin Block device and management of the lower anterior sector can be improved.

Periodontics

Case report ortho-perio

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Aim: Reduced periodontal support is a challenge that clinicians often face during rehabilitation of compromised dentition. After periodontal treatments it is frequent that an uncontrolled dental movement can lead to a failure of the clinical case. The close and intricate relationship between the periodontal tissues and the processes of tooth movement suggest that adjunct orthodontic therapy may play an important role in overcoming these problems and achieve a better stability of the treatment.
Methods: A 43-year-old female patient, refers a periodontal defects between elements 11 and 21. Medical and dental history were unremarkable and general physical examination did not evidence systemic problems. After clinical examination, a defect of 8 mm medial to element 11 was diagnosed. Treatment plan established hygiene, scaling and root planning sessions with nonsurgical approach. Three months later, it was decided to perform a periodontal regeneration with MPPT technique, modify papilla preservation technique according to Cortellini, since the interdental space was greater than 2 mm. With the aid of enlargers, microblade, the incision was performed and the indications of the papilla preservation technique were followed. After the degranulation of the defect, two biomaterials were used: deproteinized bovine bone as an intern scaffold to achieve clot stability and amelonegine as growth and differentiation factor (Bioss S Geistlich, Emdogain Straumann). Suture 5/0 EPTFE for 15 days crossed horizontal mattress suture and single stitches, we expect a period of 6 months before proceeding to finish the case with orthodontic treatment, with the primary objective of favoring the bone remodeling and secondly improving the aesthetic function, with the aim of closing the diastema between elements 11-21. In agreement with the patient, transparent aligners are programmed with the dual purpose of favoring a slow development of orthodontic forces and at the same time maintaining a suitable home hygiene.
Results: After periodontal treatment with MPPT technique, a gain of 4 mm was achieved within the first 7 months after surgery.
Conclusions: From the indications of the literature it is preferable to apply periodontal therapy first and then orthodontic therapy. Among the various therapeutic orthodontic choices, the one with transparent aligners is chosen because it uses smaller forces, allows better home hygiene and certainly maintains a better aesthetic than traditional treatments.

Longitudinal changes of salivary metabolomic phenotype after non-surgical therapy in generalized stage III-IV periodontitis patients

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Aim: Metabolomic analysis of saliva proved its accuracy in discriminating patients with periodontitis from

healthy subjects by identifying specific molecular signatures of the disease. This study was designed to determine the influence of scaling and root planing on salivary metabolic spectra from stage III-IV generalized periodontitis (GP) patients, in relation to clinical parameters.

Methods: A total of 25 GP patients and 25 healthy controls had unstimulated saliva samples collected at baseline, together with a full mouth periodontal examination. For GP patients, salivary biopsies were taken again 3 months after conventional staged non-surgical periodontal therapy. The metabolic profiling of salivary samples was performed through nuclear magnetic resonance (NMR), followed by a multilevel partial least square (PLS) statistical analysis in order to investigate whether a within-subject change occurred after therapy.

Results: The non-surgical periodontal therapy led to a statistically significant improvement in all clinical parameters ($P < 0.001$). The accuracy of the statistical model in discriminating the metabolomic profile of each patient at two time points was 92.3%. Despite the almost perfect separation in the multivariate analysis, no metabolite appeared statistically significant in the univariate analysis. The post-treatment metabolic profile of GP patients could not be assimilated to that of healthy controls who exhibited different levels of some specific molecules, mainly lactate, pyruvate, and formate.

Conclusions: Based on these findings, it can be hypothesized that the valid classification accuracy for the multivariate analysis arises from variations in metabolites that are comprehensively discriminant, although none of them is per se statistically different. The novelty of the material and the complexity underlying the molecular phenotypes of periodontitis call for clinical trials with larger sample size in order to add consistency and external validity to these results.

Combined therapeutic approach by leucocyte and platelet-rich fibrin (L-PRF) and autogenus bone graft in the treatment of mandibular degree II furcation defects: a randomized-comparative clinical trial

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Aim: Different clinical approaches and bio-materials have been used in the regenerative treatment of furcation defects. Platelet-rich fibrin (L-PRF) is a second generation autologous platelet concentrate, containing a number of growth factors that may improve periodontal regeneration. The use of L-PRF in association with autogenus bone graft (ABG), further increases its effectiveness in bone regeneration procedures. The aim of this study was to evaluate the effectiveness of L-PRF+ABG combined treatment of II degree mandibular molars furcation defects, comparing it with the open flap debridement (OFD) + ABG treatment and with a OFD- alone therapy.

Methods: 54 buccal or lingual II degree furcation defects in mandibular molars were treated 3 months after non-surgical therapy. After local anaesthesia, full thickness flaps were raised, the defects underwent accurate debridement and then they were treated, respectively, by L-PRF+ABG (group I) and ABG (group II); group III did not receive any bio-material. The horizontal clinical attachment level (HCAL) was the main outcome; vertical attachment level (VCAL), gingival recession (GR), radiographic vertical bone level (VBL) and pocket depth (PD) were secondary outcomes. These clinical parameters were recorded at baseline and 6 months after surgery.

Results: A significant PD reduction was observed in both group I (1.72 ± 1.44 mm) and group II (2.16 ± 0.61 mm), but not in the group III. The VCAL gain was greater in group I (1.55 ± 1.09 mm) and in group II (1.94 ± 0.80 mm) as compared with group III (0.94 ± 1.66 mm). VBL gain was significantly greater in group I (1.33 ± 0.59 mm) and in the group II (1.61 ± 0.85 mm) than in group III (0.16 ± 1.75 mm). Not significant GR changes were observed, in all groups. HCAL was showed a greater gain in group I (2.33 ± 0.97 mm) than in both II (1.50 ± 0.70 mm) and III (1.05 ± 0.93 mm) groups.

Conclusions: In general, L-PRF+ABG and OFD+ABG treatments showed better results when compared with OFD-alone treatment. Particularly, our results suggest that the combined use of L-PRF with ABG may produce better clinical when a significant HCAL improvement is the main outcome. We hypothesize, according with the recent literature, that the biological factors released by L-PRF may improve the regenerative potential exerted by ABG.

Clinical evaluation of gingival biotype changes using a coronally advanced flap in combination with leucocyte and platelet-rich fibrin membranes of different thickness for the treatment of Miller Class I gingival recession: a pilot study

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Aim: The purpose of this study was to evaluate if the

different thickness of platelet- rich fibrin (L-PRF) membranes in association with a Coronally Advanced Flap (CAF), for the treatment of Miller class I gingival recessions, may influence the gingival biotype. In particular, this pilot study compares 1mm thick L-PRF membranes with 2 mm thick L-PRF membranes. The definition of "gingival biotype" includes the thickness of gingival tissue (GT) and the apico-coronal keratinized tissue width (KTW). The gingival biotype modification is an important aspect for the long-term stability of the surgical treatment result.

Methods: The patients participating in the study were selected on specific criteria: no smokers, good periodontal and systemic conditions, aged from 18 to 50 years old, having Miller Class I recessions . Twenty-four Miller Class I were treated in this study. Twelve gingival recession, randomly selected, were treated with 1 mm thick L-PRF membranes associated with a CAF (1 mm group); the remaining twelve recessions were treated with 2 mm thick L-PRF membranes with a CAF (2 mm group). The thickness of the membranes was standardized using a digital calibre. The measurements of probing depth (PD), keratinized tissue (KT), clinical attachment level (CAL), recession depth (GR) and gingival thickness (GT) were performed at baseline (T0) and 6 months after surgery (T1). The measurements were recorded by a CP15 periodontal probe and an endodontic #15 k-file. The surgical technique used was the Coronally Advanced Flap (CAF) for single recession modified by Zucchelli and De Sanctis. The L-PRF membranes were realized by a standardized compression of 120 seconds with 130 grams; the membranes were put one on each other till obtaining a resultant membrane of the desired thickness: 1 or 2 mm . The L-PRF membranes were placed onto the root surface immediately before the flap suturing. At 1-3 months after surgery, the patients were re-evaluated for oral hygiene with instructions reinforcement as needed; at 6 months a professional oral hygiene session was performed, and after 15 days, clinical measurements were carried out always by the same operator (G.B.).

Results: At baseline, PD, KT, CAL, GT, GR mean scores were similar in both groups, without any statistically significant difference. From baseline to 6 months after surgery, a significant GR and CAL in both group was detected, but not statistically significant changes were found for PD. At the 6 month examination, a statistical difference between the groups was observed; the greater GR, GT and KT, improvements were obtained using the 1 mm thick L-PRF membranes. In particular, KT changes were 1.75 ± 1.24 mm in 1 mm group and 0.25 ± 0.45 mm in 2 mm group ($p < 0.001$). Similarly, GR, in 1 mm group was 0,00 ± 0,00 while the score of 0,5 ± 0,52 was recorded in 2 mm group. GT changes did not statistically differ when comparing the two groups.

Conclusions: Our results suggest that the thickness of the L-PRF membrane may influence the clinical results of a surgical technique using CAF in association with L-PRF; in fact, best GR reductions and KT increases were observed when using thinner PRF membranes. Surprisingly, thicker L-PRF membranes did not produce thicker gingival tissues covering the exposed root surface.

Association between frequency of supportive periodontal therapy and tooth loss in patients with different periodontal risk levels

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Aim: to evaluate the association between the frequency of supportive periodontal therapy (SPT) and tooth loss in periodontitis patients with different periodontal risk profiles.

Methods: De-identified data were retrospectively derived from the record charts of patients enrolled in a SPT program for at least 3.5 years after the completion of active treatment of periodontitis. All patients were stratified according to the risk level (on a scale from 1 – low risk to 5 – high risk) calculated according to the PerioRisk method (Trombelli et al. 2009) on data from a visit performed within 12 months following the completion of active therapy. Within each PerioRisk group, patients were subgrouped according to SPT frequency, calculated as mean time interval between consecutive SPT sessions (i.e. 2-, 3-, 4-, 5-, 6-, or 12-month). In each subgroup, tooth loss rate (TLR) was calculated as the ratio between the number of teeth lost during SPT and SPT duration (in years), and represented the primary outcome variable of the study. Data were expressed as mean and standard deviation (SD). SPT frequency was considered as "effective" when the associated TLR was lower or similar to the TLR benchmark (0.15 teeth/year) of patients with periodontitis under SPT as reported in the systematic review by Trombelli et al. (2015), while was considered as "not effective" when the associated TLR approximates the TLR reported for untreated, severe periodontitis (0.38 teeth/year) (Needleman et al. 2018).

Results: One-hundred sixty-eight patients (age: 47.0 ±

10.3 years; 72 males and 96 females; 53 smokers, 21 former smokers, 94 subjects who never smoked; 164 non-diabetics and 4 diabetics) were included. Risk 3, 4 and 5 were found in 37, 104, and 27 patients, respectively. A positive association between TLR and risk level was found, with a TLR of 0.07, 0.12 and 0.37 in patients with risk 3, 4, and 5, respectively. Patients with risk 3 and 4 maintained with 3-month, 4-month, 5-month and 6-month SPT frequency showed a TLR similar or lower to 0.15 teeth/year. Differently, patients with risk 5 showed TLR values comprised between 0.15 teeth/year and 0.38 teeth/year (3- and 4-month SPT frequency) or higher than 0.38 teeth/year (6- and 12-month SPT frequency).
Conclusions: PerioRisk represents a valid tool to determine the frequency of SPT sessions aimed at minimizing tooth loss.

Mesenchymal stem cells in gingival recession treatment

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Aim: "Regeneration" is the process of replacing or regenerating human cells, tissues or organs to restore normal function, by replacing damaged tissue or by stimulating the body's own repair mechanisms to heal tissues. About this, periodontal regeneration means regenerating gums, alveolar bone, periodontal ligament and radicular cement previously damaged by the disease. By the way, periodontal regeneration is usually partial for two reasons: biological events' complexity occurring, signals involved in growth factors' synthesis and in specialized cells' induction for periodontal regeneration. After a classical periodontal treatment (that includes also scaling and root planing), we see structures repair: collagen cicatricial tissue, followed by junctional epithelium's apical migration, and only a mild ligament's regeneration, apically and sideways to the lesion. We also always see gingival recession, after healing. The question arises as to how to handle the regenerative healing, through tissue engineering, leveraging these key points. Stem cells can be drawn from different tissues of the oral cavity, giving countless benefits, compared to common treatments, surgical or not, of the periodontal damages. Stem cells would ensure, if used properly, a better healing of the area, with restitutio ad integrum without cicatricial tissue; they would decrease the morbidity related to donor sites relating to homologous grafts; and they would cancel the risk of rejection and of disease transmission relating to heterologous grafts. Nevertheless, in literature, limited long-term data are available about the real effectiveness of stem cells. In this paper, we try to figure out if their usage (after isolation from deep-mucosal withdrawal), when combined with traditional treatments, can improve the healing of gingival recessions, due to traumatic-mechanical or bacteriological-parodontopathic causes.
Methods: We focused on Miller class I gingival recessions, treated with two different techniques, following a split mouth study, where test and control sites belonged to the same patient. In control site, root coverage was achieved with a free graft of connective subepithelial tissue, drawn from tuber maxillae, positioned in an "envelope" previously prepared at the recipient site with a partial thickness engraving, from the gingival margin. Test sites were two areas with gingival recession, treated with tunnel procedure and a free graft of connective subepithelial tissue, drawn always from tuber maxillae, to which we added come micro-grafts full of mesenchymal stem cells, obtained following Rigenera® protocol. We run three and seven months follow-up, evaluating either the functional restoration of the injured areas (as the reduction of thermal sensitivity and probing depth) or the aesthetic recovery: full root coverage (100%, as Miller hoped), marginal height's restoration, gingival thickening, keratinized tissue augmentation and healthy color.
Results: After seven days, either test or control sites looked hyperemic, and both grafts took root. We saw no significative differences between three- and seven-months follow-up, clinically, parameters were fulfilled in both cases. The patient reported a complete functional restoration, with no thermal-pathological root sensitivity. Full root coverage, marginal height, gingival thickening, keratinized tissue augmentation were achieved. Aesthetically, both sites looked better, with a larger layer of attached gingiva and a healthier color. At the same time, tissues were not ripe yet, but they will, in the course of time.
Conclusion: Clinically, in this trial, micro-grafts full of mesenchymal stem cells doesn't significantly change the result of test compared to the control. Both, within the same space of time, result in a comparable functional and aesthetic restoration. We suggest that the benefit using stem cells could be in terms of periodontal ligament, and consequently of tissues quality achieved.

Laterally moved, coronally advanced flap: a case report

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Aim: Laterally and coronally advanced flap is indicated in the treatment of single recessions in presence of anatomical local conditions that don't allow to perform the gold standard, the coronally advanced flap. These anatomical conditions are: absence or inadequate apical amount of keratinized tissue, presence of frenula or muscles insertions displaced too coronal and close to the gingival margin or situation in which the patient refuses to withdraw a connective and epithelial tissue graft. The presence of single recessions, increases the probability that the adjacent teeth (mesial tooth and distal tooth) have a sufficient amount of keratinized tissue to perform a laterally and coronally displaced flap.
Methods: the treatment plan to correct a single recession on element 43, in a 38-years-old patient that reports aesthetic problems and a strong symptomatology of thermal stimuli, starts with the execution of a professional oral hygiene with instructions on effective and non-traumatic brushing technique, followed by a mucogingival surgery through the creation of a laterally and coronally displaced flap. The flap design consists in three incisions: A) a vertical intrasulcular incision performed along the mesial margin of the recession up to the alveolar mucosa; B) an horizontal paramarginal incision on keratinized tissue, that has a mesio- distal extension 6 mm upper respect the size of recession (distance between CEJ and the apical gingival margin);C) a vertical and oblique incision oriented in the direction of the displace of the flap and parallel respect the first intrasulcular vertical incision (incision A). Disepithelialization of the distal receiving bed is performed using a 15C blade and microsurgical scissors. The detachment of the flap is created as a partial and totally thickness: It starts with a partial thickness at the level of the surgical papillae, then moves on to a mixed detachment (first total, then partial again) which guarantees the correct passivation of the flap through the incision of the superficial and deep muscular insertions. At this point, is performed a root planning and the intervention can be completed with the suture using an absorbable purple Vicryl 6.0 suture. It starts with a single point with periosteum anchor on the most apical limit of the distal junction. The suture is performed this way up to the most coronal point of the junction. The anchoring of the surgical papillae to the disepithelized anatomical papillae is done by sutures suspended around the palatal girdle of the tooth. The sutures are removed after 15 days.
Results: from the clinical re-evaluation five months after the surgery it is evident how a good band of keratinized tissue developed on the element 43 and how it remained stable in the time without leaving unsightly scarring results, ensuring a good camouflage of the treated area terms of colour and thickness compared to adjacent soft tissues. It's possible to notice how the root coverage follow the physiological trend of the CEJ already at the time of suture removal.
Conclusions: the root coverage of a single recession using a laterally and coronally displaced flap, can be considered adequate in presence of anatomical local conditions that don't allow to perform the coronally advanced flap.

Multiple bilaminar technique: lateral approach in the lower arch with mesial junction

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Aim: Usually, root coverage in presence of multiple lateral recessions in the lower arch with inadequate apical amount of keratinized tissue, can be a practical problem for the clinician, with the aim of solving aesthetic problems and a strong symptomatology of thermal stimuli. In particular if the recessions are localized in the area of the way out of the inferior alveolar nerve. A therapeutic approach using a bilaminar technique with lateral approach could be a remarkable solution.
Methods: The treatment plan consists first of all, in the execution of a professional hygiene, with instructions about the use of a non-traumatic brushing technique. Followed by a mucogingival surgery made through the creation of a coronally advanced flap with a mesial incision release, associated with the insertion of two connective grafts. From the first molar to the canine all the incisions are executed paramarginal, oblique and convergent towards the line that passes in the centre of the buccal surface of the canine. Each incision ends at a distance from the top of the papilla equal to the depth of the recession, with the addition of 1 mm. A vertical incision is made mesially to the canine and reaches the alveolar mucosa. In the area of the inferior premolars, the incision should not be done as a partial thickness, in order to preserve the integrity of the inferior alveolar nerve emerging in this area. That's why a partial thickness flap should be elevated in papilla areas and a total thickness flap in the buccal tissue. Subsequently, the epithelium-connective soft tissues of the flap are separated from the structures through a superficial incision that runs parallel to the mucous plane. The superficial incision, allows the coronal advancement of the flap without running the risk of damaging nervous structures. Connectival grafts are sutured to the periosteum bed using reabsorbable Vicryl 6.0 sutures. The flap is sutured by detached stitches along the mesial release incision. The anchoring of the surgical

papillae to the disepithelized anatomical papillae is done by sutures suspended around the palatal side of the tooth. The sutures were removed after 15 days.
Results: Clinically, after five months from the surgery, it is evident how a good looking band of keratinized tissue developed on the buccal-apical side of elements 46,45,44 and how it remained stable in time without leaving unsightly scarring results, ensuring a good camouflage of the treated area in terms of colour and thickness, compared to adjacent soft tissues.
Conclusion: Root covering in presence of multiple lateral recessions in the lower arch with inadequate apical amount of keratinized tissue, using a bilaminar technique with a coronal advanced flap, with mesial release incision and insertion of two connective grafts, it can be considered.

Coronally advanced flap technique for the treatment of multiple recession defects

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Aim: The creation of a coronally advanced flap is the gold standard treatment in case of a multiple gingival recessions in patients with aesthetics needs. This surgical approach allows to have a multiple root coverage using the keratinized tissue that the patients already presents, positioned apically to the recession. Usually this kind of approach ends without complicated post-operative disorders.
Methods: A 45-year-old patient, female, reports strong pain symptomatology connected to thermal stimuli and aesthetic request related to recessions on elements 16,15,13. The patient also reported an aggressive way of brushing her teeth with a medium bristle toothbrush, that likely worsen the situation. Between 2014 and 2018, the patient underwent orthodontic treatment and at the end of this treatment she noticed gum problems. The treatment plan is based on the execution of a professional oral hygiene, in adjunction of instructions on effective and non-traumatic brushing technique. Followed by a mucogingival surgery made through the creation of a coronally advanced envelope flap to cover multiple recessions. The creation of the flap begins by creating oblique paramarginal incisions that should converging to the tooth that can be indicated as "fulcrum tooth", usually the canine if involved. The fulcrum tooth is the axis of rotation around which the flap rotates and displaces coronally. The oblique incision allows the apex of each surgical papilla to be moved correctly and respectfully to the apex of the corresponding anatomical papilla. The detachment of the apical gingival tissue is created with a total thickness using a periosteal elevator inserted into the vestibular sulcus up to expose 3 mm of buccal bone, allowing the preservation of the whole thickness and to include an area of periosteum to that portion of the flap intended to cover the avascular root surface. At the apical level the detachment is at partial thickness flap, associated with the incision of superficial and also deep muscle insertions, allowing the coronal dislocation of the flap. It is necessary the root planing of the exposed root surface and the disepithelialization of the anatomical papillae, in order to create a periosteum bed to receive and suture the surgical papillae. The suture (reabsorbable purple Vicryl 6.0) of the flap consists of sutures suspended around the palatal side of the tooth, each of which, allows the anchoring of two surgical papillae to the underlying connective interdental beds. The suture removal was done at 15 days after the surgery.
Results: from clinical re-evaluation, done one year after the surgery, is evident how the keratinized displaced coronal tissue has remained stable over time and has increased in terms of volume and crown-peak amplitude without leaving unsightly scarring results, ensuring a good camouflage of the treated area in terms of colour and thickness compared to adjacent soft tissue.
Conclusions: In case a clinician has to deal with multiple recessions in patients with aesthetics needs, the coronally advanced envelope flap can be considered adequate and satisfactory with a good outcome after an year and few post-operative disorders.

Supportive periodontal therapy results: a 12-year retrospective study

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Aim: Supportive periodontal therapy (TPS) is very important to identify and prevent relapse of periodontal disease. Aim of this study is to assess the survival rate of teeth on long term. It also evaluates the state of health of periodontal tissues. It was analyzed a supportive periodontal therapy (TPS) in a medium-long term.
Methods: Twenty-one patients were enrolled in this study. Middle age was 59.9 years. Periodontitis diagnosis was made for each patient with radiological and clinical evaluations. Patients underwent an active therapy in order to stop pathology progression. Then

patients have been placed in supportive periodontal therapy (TPS) every three or four months according to individual risk.
Results: Supportive periodontal therapy (TPS) has lasted on average twelve years. During the first evaluation (T0) patients had 535 teeth (excluded third molars); 361 had single roots, 174 had multi roots. At first re-evaluation (T1) patients had 495 teeth; 346 had single roots, 149 had multi roots. At last re-evaluation (T2) patients had 464 teeth; 336 had single roots, 128 had multi roots. From the first evaluation (T0) and the last one (T2) patients had lost 71 teeth, 46 in the upper jaw and 25 in the lower jaw. The rate of lost teeth was divided according to the type of tooth: 7% canine teeth, 9.9% incisor teeth, 26.8% premolar teeth and 56.3% molar teeth. Variability between periodontal indexes from T1 and T2 was considered. Data were collected using periodontal chart. Indexes assessed are clinical loss attachment (CAL), periodontal depth (PD), recession (REC), bleeding on probing (BOP) and plaque index (PI). Difference in averages between periodontal indexes from T1 and T2 was evaluated: clinical loss attachment (CAL) 0.02, periodontal depth (PD) 0.18, recession (REC) 0.2, bleeding on probing (BOP) 0.15 and plaque index (PI) 0.01.
Conclusion: This descriptive analysis was found to be aligned with similar study in literature that analyzed tooth loss and maintenance of health of periodontal tissues during a long period of time. The high survival rate in long term observed during supportive periodontal therapy (TPS) confirmed that a correct therapy is extremely important for maintaining of teeth in patients affected by periodontal disease. According to the results it is possible to affirm that supportive periodontal therapy, good motivation, a very good compliance from patients, frequent recall and a constant monitoring of compromised sites allowed to keep e maintain established in a long period of time.

Correlation between oral hygiene, marginal gingival inflammation and IL-6 in children

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Aim: The aim of this study was to evaluate the correlation between marginal gingivitis, oral hygiene parameters and IL-6 levels in forty children saliva. Interleukin-6 (IL-6) is a cytokine with pro- and anti-inflammatory effects, involved in inflammation response but also in regenerative processes. Plaque-related gingivitis is an inflammatory disease involving the gingival tissue. The accumulation of dental plaque is a risk factor for the development of gingivitis and periodontal diseases. The most effective approach to gingivitis is prevention, by applying oral hygiene procedures correctly. The focus of our research was to study the correlation between individual oral hygiene performance quality (PHP) and IL-6 levels in crevicular fluid.
Methods: The marginal periodontal pathology was evaluated by Gingival index (GI). The status of oral hygiene was estimated by using: Patient Hygiene Performance (PHP), Brushing Frequency (BF) and Plaque index (PI). IL-6 levels in gingival crevicular fluid were measured. After calculating the PHP score for each subject, the patients were divided in three groups depending on the PHP ranges: "Good PHP Group" (0-1.7. N = 14); "Fair PHP Group" (1.8-3.4. N = 13); "Poor PHP Group" (3.5-5.0. N = 13). The null hypotheses were that the distribution of IL-6 levels was the same in the three groups based on the PHP ranges and that there was no relation between the oral indices studied and the measured IL-6 levels.
Results: PHP score showed a significant correlation with BF and PI. In 100% of patients with good PHP the plaque amount (PI) is significantly lower (< 0.1). In cases with lower hygiene performance quality (Fair and Poor PHP Groups), the Plaque Index significantly increases. The groups based on PHP ranges were significantly related to GI and IL-6 concentration in crevicular fluid. GI resulted significantly related with IL-6 concentrations in crevicular fluid. Our statistical data showed that the distribution of IL-6 concentrations was significantly different between the three groups (Good, Fair and Poor PHP) when the Bonferroni correction in the Kruskal-Wallis test is applied, so the null hypotheses were rejected.
Conclusions: Our study confirmed that IL-6 is associated to oral inflammatory response. Gingival inflammation, plaque accumulation and a low-quality plaque control can induce an increase of IL-6 levels in crevicular fluid in children. Oral fluid biomarkers could provide a framework of the marginal periodontal inflammatory status.

Periodontal implications in patients suffering from scleroderma

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Aim: Systemic sclerosis (SSc) is a chronic connective tissue disease characterised by the thickening and

fibrosis of the skin and the involvement of internal organs. Face and mouth are frequently involved with reduction of mouth opening, xerostomia and abnormalities in periodontal microcirculation with significant adverse effects on the health of the oral cavity. The aim of this study is to examine the periodontal status in patients with SSc and to investigate the associations between PD and disease characteristics of Scleroderma.

Methods: A total of 50 patients, 20 affected by SSc (mean age 46,5) and 30 non-diseased controls (mean age 48,2) were included in the present study and matched for age and gender. SSc was characterized in subtypes and with the mean duration of disease and the Modified Rodnan Skin Score [mRSS]. Sociodemographic characteristics, lifestyle factors and medical history were collect by a questionnaire. Serological analysis and oral examinations were performed in both groups. Patients were examined through the evaluation of periodontal parameters: measures of plaque accumulation, bleeding on probing, probing pocket depth and clinical attachment loss were taken at six sites per tooth. Cal was considered the primary outcome variable? Characteristics of patients with systemic sclerosis (SSc) and nondiseased controls were compared using the $\chi 2$ test or Fisher exact test (two-tailed) for categorical variables and using Student's unpaired t test for continuous variables. The same methods are used to compare periodontal parameters in SSc patients and controls.

Results: A logistic regression analysis showed that patients with SSc presented a significant median increased odds 2.96 (95% CI 1.24 to 6.87) of PD (defined as clinical attachment loss, CAL) compared to nondiseased controls (6.85, 95% CI 1.93 to 25.22). The main parameters of PD, such as CAL and PPD, were significantly higher in SSc compared to the nondiseased controls (PPD, 4,72 mm of SSc versus 2,68 mm of controls, $p < 0.05$; CAL 3.89 mm of SSc versus 2.46 mm of controls, $p < 0.05$). Significantly higher levels of BOP levels (SSc 77.8% versus controls 40.5%, $p < 0.05$) were significantly elevated in patients with SSc, compared to the levels of the control group. Potential risk factors of PD, such as higher age, low education, smoking, alcohol consumption, major organ involvement, Scl-70, higher BMI, and high PI, were related to higher odds of PD in a univariate analysis, although only the associations for low education, high BMI, and high PI with the odds of PD were statistically significant at a 5% level.

Conclusion: Concerning the systemic conditions of the SSc patients, over 35% of patients in the total SSc group that presented PD and higher mRSS had a various degree of major organ involvement. The magnitude of many periodontal parameters was strongly associated with the mean duration of the disease. During SSc, PD might lead to an abnormal stimulation of PDL fibroblasts via local inflammatory mechanisms that, associated with to the defective vascularity and alterations in the microcirculation of the gingival tissues typically present during SSc, could finally determine the periodontal tissue breakdown. Furthermore a reduced mouth opening might contribute to a limited oral hygiene, increased plaque accumulation and with an increased risk of oral and periodontal disease and alveolar bone resorption. Since there is no cure for systemic sclerosis and taking into account the progressively debilitating character of the disease the prevention and control of periodontal disease should be considered as an integral part of the therapeutic protocol of the scleroderma patient.

The diode laser for the removal of granulation tissue in peri-implant defects

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Aim: The use of the laser has been introduced as an adjuvant of the periodontal pocket surgical therapy since the affinities that some wavelengths have with hemoglobin allow these types of lasers to easily remove the granulation tissue, as well as the infected sulcular epithelium . The aim of this study is to demonstrate the effectiveness of the diode laser to remove granulation tissue in peri-implant defects.

Methods: In the case under examination, a peri-implant defect is treated using the diode laser for the removal of the granulation tissue, followed by a guided regeneration of the tissues with heterologous bone substitute. An access flap is performed to expose the defect and the granulation tissue is removed with curette, ultrasonic scaler and diode laser, used at a power of 2.75 W. In this case the laser tip works at a distance 0.5 mm from the surface to be treated with 30 second cycles. Furthermore, curettes, hydrogen peroxide washes and ultrasonic scalers are used. The use of the laser has an affinity for hemoglobin, discriminating the granulation tissue from the healthy one, reducing bleeding and making the treatment easier. Once the granulation tissue has been completely eliminated, the root surfaces are debridemented and the defect filled with a bone substitute. It is sutured with a modified mattress stitch. The patient returns for a checkup after seven days.

Results: The diode laser has high affinity for blood cells found in large quantities in inflamed tissues, for this reason the granulation tissue represents the target of the laser beam. Furthermore, the surgical time required for complete removal of the granulation

tissue is shorter when using the laser in combination with manual curettage. Another important effect of the laser is the reduction of bleeding due to the effect on the permeability of the lymphatic and blood vessels. All this translates into greater comfort for the clinician as well as for the patient, who perceives the laser treatment as painless, given its different method of use compared to manual instruments.
Conclusions: From the studies and results obtained in this work, the use of the diode laser has proven to be an efficient auxiliary tool for the treatment of peri-implant defects for the following reasons: high selectivity for granulation tissue; the shortest surgical time; reduction of bleeding; the improvement of patient comfort during and after treatment.

Biomaterials in periodontal tissue regeneration

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Aim: Regenerative periodontal therapy includes techniques which are particularly designed to restore those parts of the tooth-supporting structures which have been lost due to periodontitis or gingival trauma. Procedures aimed at restoring lost periodontal tissues favor the creation of new attachment, including the formation a new periodontal ligament with its fibers inserting in newly formed cementum and alveolar bone.
Methods: Deep infra-bony defects associated with periodontal pockets are the classic indication for periodontal regenerative therapy. Additionally, different degrees of furcation involvement in molars and upper first premolars are a further indication for regenerative approaches as the furcation area remains difficult to maintain through instrumentation and oral hygiene. A third group of indications for regenerative periodontal therapy are localized gingival recessions and root exposure since they may cause a significant esthetic concern for the patient. The denuding of a root surface with resultant root sensitivity represents a further indication to apply regenerative periodontal therapy in order to achieve both the reduction of root sensitivity and the improvement of esthetics. Professional periodontal therapy and maintenance, combined with risk factor control, are shown to effectively reduce periodontal disease progression. In contrast to the conventional approaches of anti-inflammatory periodontal therapy, however, the regenerative procedures aimed at repairing lost periodontal tissues, including alveolar bone, periodontal ligament and root cementum, remain more challenging. Periodontal research in the past few decades has attempted to systematically determine predictably successful clinical procedures to regenerate periodontal tissues.
Results: Hence, various methods in combination with regenerative biomaterials, such as hard- and soft-tissue grafts, or cell occlusive barrier membranes used in guided tissue regeneration (GTR) procedures, have been pursued to regenerate lost tooth support . In general, however, the clinical outcome of periodontal regenerative techniques is shown to depend on 1) patient associated factors such as plaque control, smoking habits, residual periodontal infection, or membrane exposure in GTR procedures, 2) effects of occlusal forces that deliver intermittent loads in axial and transverse dimensions, as well as 3) factors associated with the clinical skills of the operator such as lack of primary closure of the surgical wound. Even though modified flap designs and microsurgical approaches are shown to positively affect the outcome of both soft and hard tissue regeneration, the clinical success for periodontal regeneration still remains limited in many cases.
Conclusions: Moreover, the surgical protocols for regenerative procedures are skill-demanding and may therefore lack practicability for several clinicians. Consequently, both clinical and pre-clinical research continues to evaluate advanced regenerative approaches using either new barrier membrane techniques, cell-growth stimulating proteins or gene delivery applications, respectively, in order to simplify and enhance the rebuilding of missing periodontal support.

Mucogingival surgery in the treatment of recessions: comparative evaluation of different techniques and a systematic review of the literature

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Aim: The purpose of this systematic review is to evaluate the clinical efficacy of the different periodontal surgery procedures in the treatment of gingival recessions without clinical attachment loss, and to identify which is the most predictable among these procedure with regards to a complete and medium root coverage.
Methods: the Research is conducted by a search engine operator for scientific articles aimed at identifying randomized and controlled clinical trials concerning the treatment of Miller class I or II recession type defects with a follow up of at least 6 months. The surgical root coverage techniques analyzed had been: the coronally

advanced flap (CAF), CAF with connective tissue graft (CAF + CTG), CAF with enamel matrix derivatives (CAF + EMD) and the Tunnel Technique (TT). The considered results index have been the percentage of sites that had achieved complete root coverage (SCRC) and the average percentage of root coverage obtained (MRC) with the various follow up intervals. The data have been analyzed using the IBM SPSS Statistics Base software, version 20.0, with which the weighted average of the recorded values was calculated, weighted by the number of elements treated. The descriptive statistics have been expressed as averages (confidence interval, 95% CI) and the ANOVA test was used to compare these among the groups.

Results: Thirty-seven randomized controlled clinical trials (41 articles) have been included in this study, for a total of 994 patients (1744 gingival recessions). Regardless of the technique used, general results show that there is a good chance of covering the gingival recessions, and in more than half of the cases, this coverage is complete. The coronally advanced flap technique (CAF) shows the best results either in terms of average root coverage (88.4% at one year) and or in the number of sites that reach a complete root coverage (71.8%). The addition of a connective tissue graft (CAF + CTG) improves the results of coronally advanced flap alone, in terms of complete root coverage and SCRC, the addition of enamel matrix derivatives does not seem to bring any significant clinical advantage. The effectiveness of tunnel technique (TT) is poorly investigated in the literature and data for long-term follow-up are currently lacking. The combination of multiple procedures appears to provide similar or even worse results than simpler procedures. With reference to the use of EDTA as a conditioner of the exposed root surfaces, this systematic review has demonstrated the lack of additional benefits brought by its use.

Conclusion: The bilaminar graft (CAF + CTG) shows better results than all the other techniques either in terms of reduction of the recession and for the number of sites that obtain a complete coverage of the root exposure. Coronally advanced flap with connective tissue graft (CAF + CTG), therefore represents the gold standard for the surgical coverage of Miller class I and II recessions.

Effects of periodontal therapy on epigenetic modifications of oral tissues

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Aim: The aim of the study was to evaluate the influence of periodontal therapy on the epigenetic patterns of specific genes involved in the inflammatory response present in patients suffering from periodontitis, compared to periodontal healthy patients.

Methods: 20 patients were recruited, divided into two groups: a control group, consisting of 10 patients with a healthy periodontium, and a test group, consisting of 10 other patients suffering from periodontal disease. The study was articulated by collecting both clinical parameters and gingival tissue samples in three moments: baseline, 15 days after periodontal therapy and at 2 months. At time zero gingival data and samples were collected for both groups; in the test group, two samples were taken per patient, from a healthy site and from a diseased site of the gingival tissue. In the second phase, 15 days after periodontal therapy, two samples per patient were performed only for the test group: one from a healthy site and one from an affected site. In the last phase, at 2 months only for the test group, two samples were taken per patient: healthy site and affected one. The differences in methylation levels found in the various groups at different times were evaluated using the statistical model of the random intercept. The results were considered statistically significant for $p < 0.05$.

Results: The methylation level of the genes coding for TNF-α, IFN-γ, COX-2 and LINE-1 was assessed. The methylation levels related to cytokines and prostaglandins in the diseased sites have changed, after periodontal therapy, reaching, at T2, values similar to those found in the healthy sites. These results were statistically significant only for COX-2 (p value <0.05). By evaluating the level of methylation of the genome, the DNA was hypermethylated in the sites affected by T0, T1, T2 compared to that extracted from the control group and from the healthy sites. This difference is due to a down-regulation of gene expression that occurs in patients with periodontitis, in order to limit the destruction of the periodontal tissue.

Conclusions: This study has shown that periodontal therapy can change the methylation level of specific genes involved in the inflammatory response related to periodontal disease and that the methylation level of diseased sites can be brought back, after periodontal therapy, to a value similar to that observed in healthy sites. It is therefore our goal, starting from these initial results, to continue with a further analysis that includes updating according to the new classification scheme, the increase of the sample and the analysis of a follow-up with long-term revaluation. Consequently, our new focus will be to confirm the effect of non-surgical periodontal therapy on the modifications of the epigenetic patterns involved, but also to assess

whether and how this therapy is able to restore the initial methylation values present in periodontal health in patients on therapy for 10 years.

Role of ionic dyshomeostasis in periodontal disease: analysis of saliva

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Aim: An increasing number of studies have emerged in recent years to investigate the association between levels of metal and non-metal ions in biological fluids and chronic inflammatory diseases. Even though substantial evidence suggests that metal ions are important modulators of the immune-inflammatory pathways and regulators of the oxydative stress, little is known on their role in the periodontal diseases. Most of the previous studies have focused on the role of single or a few ions simultaneously. The aim of this cross-sectional study was to evaluate how the concentration of metal and non-metal elements in saliva variate in periodontally healthy subjects, patients with active periodontal disease and patients treated by periodontitis using the inductively couple plasma spectrometry (ICP-MS).
Methods: A total of 49 systemically healthy and non-smoker patients (37 males and 12 females) were consecutively selected among those seeking oral health consultation or in periodontal maintenance therapy at the Periodontology Section, C.I.R Dental School, University of Turin. Based on their periodontal health status they were divided into three groups: group A (13 healthy subjects), group B (18 patients affected by untreated severe periodontitis) and group C (18 patients already treated for severe periodontitis and actually in maintenance therapy). Unstimulated saliva samples were taken from each patient in the morning between 8:00 and 10:00 according to the method proposed by Silwood et al. and analyzed by means of the ICP-MS procedure to detect 12 elements including magnesium (Mg), calcium (Ca), barium (Ba), litium (Li), sodium (Na), potassium (K), manganese (Mn), iron (Fe), cupper (Cu), zinc (Zn), rubidium (Rb), and strontium (Sn).
Results: There were no statistically significant differences between the three groups in the gender distribution (p=0.498). With regard to age, healthy controls were younger than pre-therapy periodontitis patients, while there was no statistically significant difference between the patients in the pre-and post-therapy groups(p= 0.277). From the analysis of the salivary ionic composition, it emerges how the elements Li, Mg, Al, K, Rb, Sn and Ca did not have any statistically significant differences between the three groups. Instead the concentration of Na, Cu, Mn and Zn resulted to be higher in patients with active periodontal disease compared with healthy patients or patients that underwent periodontal therapy.
Conclusion: These preliminary data suggest that some ions follow a distinctive trend in different periodontal health conditions suggesting the existence of an altered ion homeostasis inside the oral cavity of patients suffering from periodontitis.

Awareness and knowledge of halitosis among Italian dentists, hygienists and students: preliminary results

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Aim: The term halitosis refers to an odor deemed unpleasant or offensive to others that emits from the oral cavity; it is also known as oral malodor or 'bad breath' and it is a problem that concerns about 30% of population. The pathogenesis of intraoral halitosis is due to sulphur-containing amino acids degradation by oral bacteria in VSC (volatile sulphur compounds). The most important VSCs are hydrogen sulfide (H2S) and methyl mercaptan (CH3SH). It is important to stress that oral bacteria responsible for this situation are normally hosted between tongue buds, also in people without periodontal disease. In fact the tongue represents a well known ecological niche and it's believed that it has the highest bacterial load of the whole mouth. The purpose of this study was to establish the awareness and knowledge of this common oral status among oral practitioners and students.
Methods: This investigation involves 476 people among dentists, oral hygienists and students of these categories. Everyone was sent a web link with a questionnaire on SurveyMonkey.com of 7 multiple-choice questions. The latter are:

- If they were students or graduated.
- If they have studied halitosis in their programs.
- If a patient ever asked them to be visited for this problem.
- If they ever done scaling on a patient with a halitosis.
- If they think halitosis is solvable.
- How often they suggest tongue hygiene at home.
- Which medical device they suggest to a patient with halitosis.

Results: Data currently available cover a sample of 100

applicants. In this subpopulation 63% are graduated practitioners and 37% are students. Only 15% have never studied halitosis in their educational path. 73% have been asked to visit a patient who complains about this problem. 69% have performed scaling on a patient with bad breath. 97% think halitosis is a solvable disorder. 75% always suggest tongue hygiene to their patients. Among the answers of the last question, 2 answers have the highest percentage, they are respectively: 38% equally recommend toothbrush or tongue scraper with a medicated mouthwash (chlorhexidine), 35% exclusively recommend toothbrush for the tongue in association with medicated mouthwash (chlorhexidine).
Conclusion: According to our preliminary results, the majority of people surveyed believe halitosis is treatable as assessed in literature. Whether most of clinicians and students always propose tongue hygiene at home to their patients is heartening, but it reveals that a quarter of them should be made conscious about the need to add this practice to a normal at-home oral care procedure. Even though it is not clearly specified in any answer, it should be noticed the risk of side effects of chlorhexidine and other antimicrobial substances at high percentage for a long period of time and that's way it is recommended low concentration medicated mouthwashes daily used for tongue cleaning in addiction to a mechanical instrument.

Sonic instruments in periodontology

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Aim: The study aims to assess how Komet's Sonic Line instruments® with sonic vibration, can treat, from both a quantitative and qualitative point of view, the compromised periodontal pocket and, in the case of gingival salts, how they can achieve better performance than other ultrasonic instruments, even when their field of action is extended to the treatment of tartar for implanting and root polishing. Sonic and ultrasonic instruments are mechanical instruments used for the removal of tartar from supragingival and subgingival dental surfaces, implant surfaces, concretions, root polishing. Sonic instruments have a vibration frequency generally of 7000 Hz. Sonic vibration tips cover a wide range of indications, thanks to their high removal efficiency ensured by a circular elliptical oscillatory motion.
Methods: 20 patients between the ages of 30 and 45, men and women, were chosen for the study. The selection criteria were based on: filling out the periodontal portfolio according to the University of Bern: six-point periodontal probe survey for each dental element (MV-V-DV-B-DB-MB), recording of probing depth, clinical attack, presence of bleeding, the presence of furcations for multi-rooted elements, dental mobility, presence of gingival recessions;

- recording the presence of dental implants;
- periodontal risk assessment according to the University of Bern (Christoph A. Ramseier).

The subjects selected in this way were treated in two sessions: the first, in which the sonic instruments Komet Sonic Line Scaler ® SF 1- 3- 3, SF1982, SF4, SF10L/R, were used. The second session of recall and controll was set at 40 days after the first one, re-analyzed by means of a millimeter periodontal probe, the periodontal indices compared with the first visit.
Results: The results of the study involved the Komet® SF10 series sonic tips, allowed to scrape the root of the tooth with less invasive movements and with a final clinical result of increased periodontal recovery and reduced postoperative sensitivity. Therefore with the SF10 sonic tips you can remove the plaque from the surfaces of the root, leaving a smooth and clean surface. These sonic tips with the terminal part in shape of a slot, are placed on the roots of the tooth and work with delicate and circular movements. The part in contact with the roots is the one that cuts, while the outer part is passive and can also be used in closed-air mode. They do not require traction movements, so, thanks to only sonic movement, it is possible to work on the roots in a controlled and gentle way. For teeth showing forcation, it is possible to use the SF11 tips which, thanks to its specific shapes, allows to remove plaque in an atraumatic way from the forcation, always in respect of soft tissues. It also does not release unwanted notches or roughness and allows for accurate compensation.
Conclusions: Within the clinical cases covered in this study, sonic instruments allowed a gentle and precise removal of the supergengive and undergengive tartar, with great simplicity of cleaning pockets over 4 mm; while in the treatment of implant prophylaxis and in the removal of subgengive concretions have allowed an accurate cleaning without risk of involuntary abrasions on the neck of the implants.

Efficacy of hyaluronic acid and polynucleotides in residual periodontal pockets: a split-mouth, single blind, randomized, controlled clinical trial

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Aim: Hyaluronic Acid (HA) is a major component of

the extracellular matrix of mineralized and non-mineralized human tissues, including the periodontium. In particular, HA is present to a higher amount in the soft periodontal tissues (gingiva and periodontal ligament) than in the hard ones. It interacts with other macromolecules and plays a predominant role in tissue morphogenesis, cell migration, differentiation, and adhesion. Polynucleotides (PN) are particular DNA fractions, of natural origin, obtained by a complex extraction process. They can bind the A2-adenosine receptors of the gingival fibroblastic cells leading to a stop of the release of pro-inflammatory mediators, such as TNF-α and IL-6, and to the production of the Vascular Epithelial Growth Factor (VEGF) that promotes of wound healing. The aim of this clinical trial is to evaluate the clinical and biochemical effects in residual periodontal pockets of the non-surgical periodontal treatment in conjunction with a sterile viscoelastic gel containing an association of HA and polynucleotides as compared to non-surgical periodontal treatment alone.
Methods: Fifty patients were enrolled in the study. For each subject two residual pockets (probing depth [PD] ≥ 5mm) were selected and randomly assigned to the test or control site. The test site was treated by scaling and root planning in conjunction with a single administration of HA and PN; the control site was treated by mechanical and ultrasonic instrumentation only. The operator who administered the treatment was blind to the examinator (CT). At week 0, 6, 8, 24, 36 and 48, PD, Marginal Bleeding Index (MB), Modified Plaque Index (mPLI) and Gingival Recessions (REC) were evaluated. Multivariate statistical analysis and data management were performed using the exact test of Fisher, Bartlett, Wilcoxon, Kruskal-Wallis, One-Way Anova, Pearson $\chi 2$, Kolmogorov-Smirnov and Cramer's V.
Results: No statistical differences were shown between groups and from the baseline to week 48 in terms of REC and CAL. PI was statistically different at week 6, whereas PD at week 6, 24, 36 and 48 (Cramer's $V > 0,1$) and MB at week 8 and 48 (Cramer's $V < -0.09$).
Conclusion: The additional use of Hyaluronic Acid and polynucleotides allowed a reduction of clinical signs of inflammation and PD after a single administration.

Epidemiological pilot study on the correlations between periodontal disease and type 2 diabetes mellitus

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Aim: Several authors in the last decades suggest that diabetes condition is strongly correlated to an increased prevalence and severity of gingivitis and periodontitis. The aim of this pilot study was to assess the prevalence of periodontal disease and the condition of periodontal tissues in a population of patients affected by type 2 diabetes mellitus.
Methods: An observational epidemiological study was conducted between June and October 2019 at the Periodontology Unit of the Dentistry and Maxillo-facial Surgery Clinic, University of Verona. Subjects affected by type 2 diabetes mellitus were enrolled, through a screening questionnaire, from the Endocrinology, Diabetology and Metabolism Disease Unit of the University Hospital. Once completed the questionnaire, the patients were called to schedule a first appointment at the Periodontology Unit. At the end of this first dental visit, a second appointment was given to patients who agreed to continue the study for performing a periodontal status chart. The second appointment aimed to detect and assess clinical conditions of the periodontal tissues, in order to identify patients affected by periodontitis or not. The following parameters were recorded: presence or absence of dental elements, presence of implants, presence of bridges or crowns, probing pocket depth (PPD), bleeding index (BI), plaque index (PI), clinical attachment level (CAL), recession (REC), mobility, presence of furcation defects, Periodontal Risk Assessment (PRA).
Results: 100 patients were evaluated at the first dental visit. 42 out of 100 patients (17 men and 25 women), with an average age of 64 ± 12 years, were visited at the second appointment. 25 patients (60%) were not affected by periodontitis, while 17 (40%) presented periodontal disease, whose form was moderate and severe respectively in 11 (65%) and 6 (35%) patients. Furthermore, statistically significant differences (p value<0.05) were found between these last two groups regarding values of CAL [range 4-5 mm] and PPD [range 4-5 mm]. However, no statistically significant differences were found for the parameters of BI and PI.
Conclusion: The outcomes of this study do not seem to corroborate a significant prevalence of periodontal disease in patients affected by type 2 diabetes mellitus. However, the data obtained should be considered as preliminary, as our investigation was a pilot study, with a small sample size compared to the other investigations in the literature. Furthermore, the effects of periodontal therapy on glycemic control in the different phases of periodontal disease, together with the possible microbiological and immunological implications, should be included for future studies with larger groups of patients.

Non-surgical crown lengthening vs surgical crown lengthening: a clinical randomized controlled trial

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Aim: The clinical crown lengthening is a necessary technique for prosthetic purposes (to obtain the ferrule effect) and for restorative purposes (so that the dental elements are ready for the dam insertion with both direct and indirect techniques) in the event of clinical crowns of insufficient height. The aim of this work was to investigate on the effectiveness of a clinical crown lengthening technique by the crown lengthening flapless technique (CLFT), in comparison with apically positioned flap (APF) widely consolidated and supported by literature.
Methods: 46 teeth with healthy periodontium and clinical crowns of insufficient height to receive full crowns restorations were selected: 23 were randomly placed in the test group and 23 in the control one. The patients were included in the study according with stringent inclusion criteria. After supragingival calculus removal, oral hygiene instructions and making of thermo-printed and bite-block masks for clinical and radiographic parameters reproducibility, Relative Attachment Level (RAL); Relative Bone Level (RBL); Relative Gingival Recession (RGR); Pocket Depth (PD); Gingival Thickness (GT); Rx Bone Level (RxBL) were recorded. Patients' post-operative pain was assessed by a VAS scale 1 week after crown lengthening. In the control group, teeth to be lengthened were treated by a conventional surgical technique, preceding the preparation of the prosthetic abutment, carried out in the next visit along with the temporary crowns delivery. The surgical technique did not involve the dental surface and consisted of the raising of a split-thickness flap, followed by ostectomy and osteoplasty. The flap was then apically sutured at the level of the bony crest. In the test group, CLFT was performed, and the dental abutment were prepared simultaneously with crown lengthening. CLFT consists to prepare the tooth using a turbine and 100/200 µm cone diamond bur of 1.2 mm diameter, simultaneously lengthening the clinical crown by a controlled invasion of biological width until bone crest. Then, the marginal bone was removed, as needed, was realized circumferentially, removing very small amounts of bone by repeatedly checking with bone probing, until the desired height of the abutment is obtained. A temporary crown was immediately placed in both groups. Clinical and radiographic parameters were recorded every 3 months up to 12 months after surgery.
Results: All clinical parameters changes between baseline and 6-month post-op examinations did not significantly differ between the experimental groups. RGR only at interproximal sites was significantly lower in the test group at the 6 and 12-month examination ($p<0.05$). Postoperative pain (VAS scale) was significantly lower for test patients, while tissue thickness at test teeth showed a tendency towards a greater increase as compared to controls.
Conclusions: The non-surgical lengthening of the crown offers the same results compared to the traditional surgical technique, from a prosthetic point of view: the possibility of crown lengthening (obtaining the needed ferrule-effect to stabilize the prosthetic crown), while more preserving the integrity of supracrestal soft tissues at interproximal sites. A further advantage of the CLFT technique is the lesser discomfort produced for the patient, increasing his compliance with the restorative treatment.

Surgical extrusion: therapeutic alternative

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Aim: The purpose of this research is to present and analyse the Surgical Extrusion technique. When clinical crown is dimensionally inadequate, this "one-step" procedure allows to extrude the root of a very compromised tooth and to lead it in a more coronal position, so to make restorative procedures accessible. It is indicated as a last attempt to keep dental elements intended for extraction or it can be considered as an alternative additional treatment to rapid orthodontic extrusion with fiberotomy, surgical crown lengthening and post extractive implant.
Method: This technique is based on studies and observations made on re-implanted and auto-transplanted teeth that generally have favorable
Results: Analysing the scientific literature, it is easy to find similarities between the type of healing that occurs in cases of intentional re-implantation and auto-transplantation and the healing process developing after surgical extrusion. The main difference between re-implantation or auto-transplantation and the surgical extrusion technique is the extraction of the tooth from the alveolar socket: in case of surgical extrusion, the root of the tooth is never completely removed from the alveolus; this factor can lead to an improvement in the prognosis: if the root does not leave the alveolar cavity, the potential deleterious effect of the periodontal cell dehydration is eliminated. From a prognostic point of view, this treatment modality can also be compared with the traumatic extrusive luxation which has a favourable prognosis with low incidence of root resorption. Surgical Extrusion can be used when it is necessary to obtain the exposure of a sufficient portion of healthy dental tissue ("ferrule effect" or "cervical cerclage")

to proceed with a restoration that respects the supracrestal tissue, also called "biologic width". From a careful analysis of the literature, it appears that the main indication is the case of crown-root fractures. However, this procedure can also be used in the following situations: subgingival caries, radicular perforations of the coronal third of the root (where other therapies have failed) or cervical root resorption. Furthermore, it is recommended to use this technique in case of monoradicular teeth or biradicular ones with non-divergent roots. Local contraindications include: high risk of fracture during luxation procedure (e.g. thin or curved roots), presence of unfavorable crown root ratio, ankylosed roots, teeth with multiple roots, primary dentition. It is not recommended to perform this technique in case of uncomplicated crown-root fractures to attempt pulp vitality preservation. There is still no definitive operating protocol, however most of the Authors agree with this operating sequence: professional oral hygiene one week before the operation, anesthesia, periotomy, luxation, extrusion (on average 4-5 mm, if necessary, 180° rotation, straightening or uprighting can be associated) and stabilization with semi-rigid splint (for no more than 2 weeks for preventing ankylosis). After 8 days sutures are removed, 4-5 weeks after surgery the abutment is reconstructed and the provisional (not functionally loaded) is cemented, 6-8 weeks after surgery it is possible to finalize the case with a direct or indirect restoration. Endodontic treatment can be performed before the operation or 4-5 weeks after the surgery, when the periodontal ligament is stable (the choice depends on the possibility of obtaining an efficient isolation with rubber dam).

Conclusions: The surgical extrusion allows to keep natural dental elements and it is a method quite simple, quick, cheap and that creates less discomfort for the patient, if compared to other procedures. So, it represents a valid alternative especially for the management of crown-radicular fractures.

Are the proteomic profiles of the gingival crevicular fluid and periodontal pocket comparable? A preliminary study

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Aim: Currently, periodontitis is diagnosed exclusively by clinical criteria based on probing. Moreover, the etiology and the pathogenesis of periodontal disease (PD) are multifarious and remains mostly unknown. Therefore, PD therapy has considerable limitations. PD is characterized by periodontal attachment loss due to periodontal pocket development, leading to tooth loss if remains untreated. The periodontal pocket is the pathognomonic lesion that diagnoses the PD. PD is largely widespread and quite often belatedly diagnosed, it is a crippling disease with an irreversible natural history leading to tooth loss and begets immoderate social costs. The easy, reliable and correct early detection of the PD, is as important as any way to reduce biological and social costs. In the last few years, the -omic sciences acquired substantial significance in the study of PD. Most of proteomic analysis regarding periodontal disease have been performed on saliva, gingival crevicular fluid (GCF), peripheral blood or periodontal plaque samples, which are easier to collect than periodontal pocket tissue (PPT). However, all of these approaches failed to provide reliable results for clinical applications. The analysis of the PPT could guide correctly the investigations, showing what could be the proteomes playing an effective role in PD pathogenesis among the hundreds detectable. Thus, the aim of this study preliminary study was to analyze the GCF and the periodontal pocket tissue and assess whether they are really comparable with a proteomic approach.

Methods: 7 healthy subjects affected by severe periodontitis needing of periodontal surgery were enrolled for this preliminary study. Immediately before surgery, GCF samples were taken by placing filter paper strips in the gingival sulcus correspondent to periodontal pockets. Then, PPT harvested during surgery was adequately stored for proteomic analyses. All samples were immediately frozen at – 80°C until further analysis were performed. Tissue samples were mechanically disrupted and incubated in lysis buffer, while GCF was obtained incubating the collecting paper in phosphate buffer. Overnight, after centrifugation, the supernatant was precipitated in cold acetone in both cases, and protein content were pelleted by centrifugation and then dissolved in a rehydration buffer. Mono-dimensional gel electrophoresis was used to separate protein content. After staining gel, images were acquired and compared. Liquid chromatography coupled to mass spectrometry (LC-MS/MS) analysis was performed to allow protein spot identification.

Results: 1-DE gels from PPT and the correspondent GCF were analyzed by software Quantity One. Almost the same qualitative protein expression profile was found in PPT and GCF from each patient. Furthermore, no statistical significant correlation between the quantitative proteomic profile of PPT and GCF was found, except for one band (that of K immunoglobulin) which resulted statistically significant in all patients.

Conclusions: To date, this is the first preliminary study comparing the proteome of periodontal pocket tissue

and the corresponding GCF. The PPT and the GCF show a similar proteomic network but they do not seem significantly influence one another. So, results seem to indicate that the GCF does not seem suitable to study on the pathogenesis of PD, explaining the reason for the failure of studies based only on GCF to control the periodontal disease in real-time. However, once PD proteomic network was defined, the specific proteome detection in GCF could be useful and less traumatic than PPT analysis as a diagnostic program.

Surgical treatment of periodontal intrabony defects using hyaluronic acid versus enamel matrix derivative: A single-center, randomized and controlled clinical trial

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Aim: Hyaluronic acid (HA), as shown by numerous preclinical and clinical studies, plays a prominent role in periodontal wound healing and regeneration.
The primary objective of this mono-center, randomized and controlled clinical trial was to evaluate the clinical outcomes obtained in intrabony defects following the use of (HA) in conjunction with reconstructive periodontal surgery as compared to the use of enamel matrix derivative (EMD) over a period of 24 months.
Methods: 32 non-smokers, Stage III grade A or B periodontitis patients, with one intrabony defect deeper than 3 mm (probing depth [PD] ≥ 5mm; clinical attachment level [CAL] ≥ 6 mm) were randomly assigned to be treated using a single flap approach (SFA) in conjunction with HA (test group) or EMD (control group). Full-mouth plaque score (FMPS) and full-mouth bleeding score (FMBS) were ≤ 20% before surgery. Randomization sequence was computer generated and allocation concealment was performed using opaque and sealed envelopes, which were opened after flap elevation. All the regenerative periodontal surgeries were performed by the same highly experienced periodontist. PD, CAL, gingival recession (REC) and bleeding on probing (BOP) were evaluated at baseline, 12-, 18- and 24-months after surgery. All patients received the same post-operative instructions and the same pharmacotherapy.
Results: The primary outcome variable was the CAL gain at 24-months. The EMD group achieved an higher mean value of CAL gain (2.94±1.1 mm) compared to the HA group (2.19±1.1 mm). However, the two-tailed t-test showed that the difference in CAL gain between groups was not significant (p-value=0.067). REC increase was superior in the control group (1.56±0.7mm) compared to the test group (1.56±0.7mm). This difference was not significant using a two tailed W-test (p-value=0.1417). PD reduction was significantly higher (p-value=0.001) in the control group (4.5±0.96 mm) than in the test group (3.31±0.71 mm). No statistically significant differences were found regarding BOP values.
Conclusions: Clinical improvements were observed in both groups. The treatment of periodontal intrabony defects with EMD offered an additional benefit in terms of PD reduction compared to HA treatment. HA treatment showed a lower increase in REC and it can be considered a valuable alternative for the periodontal regenerative surgery.

Periodontitis, low-grade inflammation and systemic health: a scoping review

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Aim: Periodontitis is a multifactorial chronic inflammatory infectious disease in which an infection is necessary, but not sufficient, for development of the condition. Individual susceptibility strictly linked to the immune and inflammatory response of the organism must also be present. Low-grade inflammation (LGI) is a systemic status of chronic sub-clinical production of inflammatory factors. This condition represents a risk factor for many chronic diseases including diabetes, cardiovascular disease, cerebrovascular disease, neurodegenerative disease and cancer. This scoping review aims to clarify, summarize and disseminate current knowledge on the possible link between periodontitis, LGI and systemic health, in order to identify key concepts, theories, sources of evidence and gaps in the literature on this subject and to assist in the elaboration of proposals for future research.
Methods: PRISMA Extension for Scoping Reviews guidelines were followed. An ad-hoc created keyword string was used to search the electronic databases of PubMed/Medline, Embase, The Cochrane Library and ClinicalTrials.gov. A hand search of specialized journals and their reference lists was also performed.
Results: 14 studies that respected eligibility criteria were selected and analyzed. There is emerging evidence of strong links between periodontitis, LGI and systemic health. On the one hand, periodontitis influences the systemic status of LGI. In fact, periodontitis, due to its nature of infective inflammatory disease, involves the activation of the broad axis of innate immunity caused by the pathogenic action of subgingival microbiota through upregulation of proinflammatory cytokines from monocytes and polymorphonuclear

leucocytes. These locally produced cytokines move into the systemic circulation where they remain over time and may perpetuate an altered inflammatory status (e.g., increase insulin resistance and glucose levels). In this way, periodontitis may worsen already existing systemic diseases such as diabetes, and may even represent an important risk factor for the development of other non-communicable diseases (NCDs) such as osteoporosis, hypertension and angina pectoris. On the other hand, the systemic production of inflammatory factors affects periodontitis, with a bidirectional connection.
Conclusions: LGI and the subsequent onset of a systemic inflammatory phenotype can be considered the common substrate of many chronic inflammatory diseases including periodontitis, with multiple mutual connections between them. The evidence summarized from the included studies supports the existence of a mutual correlation between periodontitis and systemic diseases mediated via LGI, although so far, there are no specifically designed clinical studies to confirm such a relationship. Understanding of the biological principles and mechanisms underlying such a complex interrelationship could lead to significant improvements in the field of personalized diagnostics and therapeutic protocols.

L-PRF in non surgical treatment of periodontal intrabony defect. A clinical randomized and controlled clinical trial

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Aim: The aim of this study was to evaluate the adjunctive use of Platelet Rich- Fibrin (PRF) on periodontal healing following non surgical periodontal therapy (SRP). In particular, we investigated if the addition of PRF in the SRP treatment could result in a greater pocket depth (PD) reduction, clinical attachment level (CAL) gain, less gingival recession (GR), more bone defect level (DBL) gain and bone defect angle (DBA) reduction in both test and control sites.
Methods: This study was carried out as a randomized, split-mouth, controlled clinical trial and designed to evaluate clinical and radiographic results after 6 months, following the SRP treatment of intra-bony defects. 11 patients with stage III/IV periodontitis were selected and underwent SRP; they were divided into two groups (test group and control group) and subjected to quarterly checks. The primary outcome of the study was CAL gain. 26 sites, mesial and distal, with a similar anatomy and associated with intra-bony and morphologically similar defects were selected and compared. In each patient, sites with pocket depths ≥5mm were selected. In case of tooth mobility, a dental splinting was previously performed. There was no dropout. All sites received accurate SRP under local anesthesia in a single session, using piezoelectric ultrasonic instruments and Gracey curettes. Pre- and post- treatment measurements were performed by an examiner blinded to the treatment modalities using a graded periodontal probe PCP 15NC. The cemento-enamel junction was used as a reference point for the assessment CAL. The non-surgical technique for control sites consisted of SRP only; in test sites, conversely, PRF was added in the final phase. PRF was obtained by venipuncture of the antecubital vein of the patient. After blood centrifugation, PRF was compressed and shredded, making the material of adequate size and homogeneous for insertion into the pocket. The test pocket was subsequently sealed by Histoacryl, to avoid the spillage of the material. No post-treatment drug therapy was prescribed. The patient was asked not to brush in the experimental area until the cyanoacrylate was removed. In addition, the patient was instructed to apply 0.2% chlorhexidine gel to the site twice daily. Clinical and radiographic examinations were performed 6 months after treatment. The 26 sites treated (13 tests and 13 controls) were analyzed for clinical (PD, GR, CAL) and radiographic (DBL, DBA) parameters at baseline t0 and 6 months t6. Radiographic examination was carried out using individualized silicon bite blocks for reproducibility.
Results: All patients completed the study. There a satisfactory healing of the experimental sites and no cases of post-operative infection were observed. The PD, CAL, DBL values were similar between the experimental sites, without any statistically significant difference. However, after 6months, statistically significant differences between the test group and the control group were highlighted for the values of GR and DBA ($p < 0.01$).
Conclusion: The results of this study do not support the additional use of PRF during non-surgical therapy of periodontal pockets, to improve PD reduction, CAL gain and DBL increase. Future studies using different formulations or with a different therapeutic approach are needed to suggest an added benefit from the additional application of PRF during non-surgical periodontal treatments.

Entire papilla preservation technique on mandibular molars: a case series

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Aim: The aim of this study is to describe the clinical and surgical management of two case series treated with the entire papilla preservation technique (EPP).
Methods: Two clinical cases of intrabony defects on mandibular molars were treated with the entire papilla preservation technique. The operative protocol involved the execution of a beveled vertical incision made in the buccal gingiva of the neighboring interdental space. A buccal full-thickness mucoperiosteal flap extending from the vertical incision to the defect-associated papilla was elevated by a microsurgical periosteal elevator. The granulation tissue was removed with mini-curette and any residual subgingival plaque or calculus were debrided by a sonic scaler applying periodontal tips (SF10L/R, Komet Italia S.r.l, Milan, Italy). The defects were rinsed with sterile saline and the exposed roots were treated with 24% EDTA for 2 minutes for conditioning the surface; after this the areas were rinsed again. EMD were applied on the exposed root surfaces, afterwards heterologous bone chips were placed into the intrabony defects. No periosteal releasing incisions were made, only a gently pressure were applied on the surgical area using saline-wetted gauze for 1 minute to readapt the flap. The flap was sutured with 5/0 PTFE and the sutures were removed after 2 weeks. Patients were enrolled in a stringent plaque control program with recall on a weekly basis for the first month and then monthly controls for professional tooth cleaning for the next 12 months.
Results: Entire papilla preservation technique, designed by Aslan Serhat, is a novel tunnel-like surgical approach for the regenerative treatment of deep and wide intrabony defects. This approach aims to preserve the whole integrity of the defect-associated papilla providing a tunnel-like undermining incision. The completely preserved interdental papilla provides an intact gingival chamber to stabilize the blood clot and improve the wound healing process. A peculiarity of this procedure is the beveled vertical releasing incision made on the papilla contralateral to the papilla of the defect, that seems to reduce the risk of failure in wound healing via exposure of the regenerative biomaterials. This technique could favour primary healing over the biomaterial and enhance the stability of the blood clot formation in the intrabony defect. The entire papilla preservation technique has some limitations dictated by the papilla morphology, for instance some limitations as a narrow interdental space, a defect that involved the lingual side of the tooth or a defect that requires the elevation of the papilla for the debridement.
Conclusion: The entire papilla preservation approach in the two clinical cases has shown excellent healing results and seems to provide ideal clinical condition to favour the early and late wound healing phases.

Efficacy of locally delivered statins as an adjunct to scaling and root planing in the treatment of periodontitis: a systematic review and meta-analysis

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Aim: Statins may promote pleiotropic effects, such as anti-inflammatory and immunomodulatory effects, and they have been proposed as an adjunct to nonsurgical periodontal therapy to improve clinical outcomes. The aim of the present systematic review and meta-analysis was to assess the efficacy of locally delivered statins used in combination with scaling and root planing (SRP) compared with SRP alone in the treatment of periodontitis.
Methods: A literature search was carried out in April 2020 by two independent and calibrated reviewers using ad-hoc search strings on PubMed (MEDLINE), EMBASE, ClinicalTrials.gov, Researchgate, and the Cochrane Database of Systematic Reviews. All randomized controlled trials (RCTs) assessing the efficacy of local application of statins as adjunctive therapy to non-surgical periodontal treatment were included. Studies on statins used in addition to any other drug or biomaterial or used differently from the subgingival application were not considered. The quality of the included studies was assessed using the updated version of the Cochrane Risk of Bias Tool for RCTs (RoB 2). The difference in means for clinical attachment level gain (CALgain), probing depth reduction (PDred), modified sulcular bleeding index reduction (mSBIred), and intrabony defect reduction (IBDred) between test and control groups was calculated, and the relative forest plots obtained. Sub-group analyses were performed for the type of statin used. Statistical heterogeneity among individual studies was evaluated by the Q-test and the I2 index. Publication bias was analyzed by a Funnel plot.
Results: Twenty RCTs published between 2010 and 2019 reporting on 1212 patients and 1289 intrabony defects treated with three different statins (Atorvastatin, Rosuvastatin, and Simvastatin) were selected for analysis. Fifteen RCTs showed a low risk of bias, four presented some concerns, and one was considered at high risk. Due to the high heterogeneity

found for both the overall and the sub-group analyses, a random effect model was preferred for the quantitative synthesis of extracted data. An overall statistically significant effect size in favor of statins for CALgain and PDred was found (1.05 mm, 95%CI .39, 1.70, P=.012 and 1.06 mm, 95% CI 0.51, 1.61, P<.001, respectively). Significant effects in favor of Atorvastatin and Rosuvastatin in terms of CALgain and PDred were also found, whereas Simvastatin did not reach statistical significance for these outcomes. No statistically significant effects in terms of any other outcome were found for either overall or sub-group analyses.
Conclusion: Within the limits of the available studies, the local administration of statins as adjuncts to SRP results in additional significant improvement in terms of CALgain and PDred in systemically healthy patients with periodontitis compared with SRP alone. Similar results were also found in diabetic patients and smokers. Such a combined approach may represent a low-cost alternative to conventional adjunctive local drug delivery agents in periodontal therapy. Due to the high heterogeneity found, the clinical relevance of these findings should be interpreted with caution. Further well-designed randomized controlled trials, with well-defined selection criteria and operative protocols, are needed to draw more definite conclusions, which may open interesting new options in the field of personalized periodontal therapy.

The adjunctive effect of a connective tissue graft on single immediate implant placement: a randomized controlled clinical trial

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Aim: Immediate implant placement (IIP) leads often to an inadequate aesthetic outcome. The placement of a connective tissue graft (CTG) concurrent with IIP may contribute to the stability of the gingival level and the augmentation of soft tissue contour. However, it is unknown whether CTG can compensate for bone resorption and maintain the buccal bone plate over time. The primary objective of the present RCT was to evaluate the influence of soft tissue thickness augmentation, obtained through the application of a CTG, on horizontal and vertical buccal bone changes 6 months (6M) after IIP with CTG. The secondary endpoint was to assess buccal soft tissue contour changes at 6M.
Methods: All participants referred to the Department of Dentistry of San Raffaele Hospital with a single hopeless tooth in the upper or lower jaw from the right second premolar to the left one. 18 patients, candidates for a single implant restoration, were included: 9 patients for the test group (IIP with CTG) and 9 patients for the control group (IIP). A split-full-split thickness envelope flap was elevated, the tooth was extracted atraumatically and the IPP procedure was carried out. In the test group, a CTG, harvested from the palate and deepithelialized extraorally, was sutured to the base of the anatomical papillae. The buccal flap was coronally advanced and adapted to the healing abutment. In both groups, a temporary Maryland bridge was delivered to the patients and follow-up evaluations were performed at 7, 14, 30, 90, 180 days after surgery. The width (KTH) and the thickness of keratinized tissue (KTT), were measured at baseline and at 6M. An assessment of horizontal and vertical buccal bone changes was performed by matching DICOM files of the CBCTs taken before tooth extraction and at 6M. The evaluation of buccal soft tissue contour changes was performed by matching STL files resulting from digital intra-oral impressions taken before tooth extraction and at 6M. Both STL and DICOM files were imported in the software SMOP to allow the overlapping of the files acquired and subsequently the cross-section images were imported in the software Image J to calculate volumetric soft and hard tissue variations at 1, 2, 3, 4, 5 mm below the gingival margin.
Results: One millimeter apical to the most coronal point of the bone crest at baseline, the buccal ridge thickness decreased of 1+0.85 mm in the test group (tg) and of 1.79+0.3 mm in the control group (cg), with statistically significant difference between groups (p=0.044). The buccal ridge height decreased of 0.97+0.04 mm in the tg and of 0.41+0.61 mm in the cg, with no statistically significant difference (p=0.227). In terms of buccal soft tissue contour changes, there was a statistically significant difference between groups at 6M: horizontal reduction in the tg was 0.02-0.19 mm, while in the cg was 0.6-1.91 mm. Between baseline and 6M evaluations, KTH (tg: 2.5+1.3 mm; cg: 0.17+1.52mm; p=0.005) and KTT (tg: 3.33+1 mm; cg: 1.43+1.08 mm; p=0.013) changes were significantly different among the two groups.
Conclusion: The present study demonstrated that the adjunction of a CTG during IIP can reduce horizontal buccal bone loss in the most coronal portion of the bone crest. Furthermore, soft tissue thickness augmentation compensated for horizontal buccal bone loss, maintaining buccal soft tissue contour unchanged over time, and led to an increase of KTH and KTW.

Invasive cervical radicular resorption (CIRR)

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Aim: The purpose of this research was to investigate the process of invasive cervical radicular resorption and to propose treatment options in relation to the degree of appearance of the resorption, taking in consideration the nature, extent and accessibility of the lesion. In addition, an in-depth analysis of the clinical and radiographic characteristics of CIRR is provided in order to facilitate correct diagnosis.
Methods: Invasive cervical radicular resorption is included among the external resorption, and it is an insidious phenomenon in which the pathogenic noxa originates in the gingival sulcus on the root surface below the epithelial attack. The main predisposing factors are as following: dental trauma, orthodontic treatments and parafunctional habits. The combination of one or more of these factors determines a greater frequency of CIRR, denoting its multifactorial etiology. Recent studies have highlighted how these stimulating factors are united by the ability to create a hypoxic microenvironment, thereby activating osteoclastogenesis and contributing to the development of resorption. The exposed root surface, subject to the activity of osteoclastic cells, loses healthy dental structure which is replaced by fibrovascular tissue. The diffusion of resorption occurs in the circumferential and apico-coronal direction with respect to the root canal which is not affected, except in advanced stages of the pathology. The diagnosis can take place following an accidental clinical or radiographic examination since the condition could be asymptomatic and the tooth respond positively to the viability test until the root canal is perforated. As a result of clinical examination, cervical defects with cavitation (vestibular or palatal) can be detected from the typical pink coloration of the collar of the tooth and abundant bleeding (given by the granulation tissue) on probing.
Results: The clinical classification most used in daily practice is that of Heithrsay (1999) which divides the severity of CIRR into 4 classes based on the size and proximity of the lesion to the root canal. The new clinical classification proposed by Patel (2018) introduces the use, in addition to periapical radiographs, of CBCT which guarantees greater precision in assessing the location of the lesion. CIRR treatment involves the surgical removal of all granulation tissue and the filling of the resorption cavity with composite resins, very suitable if used in a properly isolated environment and then widely polished, or with biocompatible materials (MTA or Biodentine) in case of communication with the periodontium precisely when the entrance portal is limited or inaccessible. In the latter cases, endodontic treatment benefits from the use of the operating microscope. Alternative treatments include intensive replanting and orthodontic extrusion of the tooth. The tooth that cannot be treated can remain under observation or be corrected in case of large lesions which cause an important structural and functional loss.
Conclusion: Invasive cervical resorption has attracted increasing clinical and scientific interest as its incidence has increased significantly over the past decade. This increase is linked both to the growing predisposing factors, to an improvement of the techniques in the analysis and also to an extent thanks to a greater awareness of the clinicians. The therapeutic possibilities available to the clinician are numerous. Most of them are reported in the literature as isolated case series and review articles, but there is still no general consensus in the scientific literature on a treatment protocol.

Altered passive eruption: a case report

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Aim: Tooth eruption includes two phases: an active eruption phase in wich the tooth emerges into the oral cavity, and a passive eruption phase that is characterized by apical migration of the soft tissue covering the crown of the tooth. The aim of this report is to describe the clinical and surgical management of a case of altered passive eruption in the upper jaw. The patient requested the treatment for esthetic reasons.
Methods: A case of altered passive eruption in a 24 years old female patient was treated with gingivectomy and osteoplasty. The diagnosis was established with clinical observation and radiographic analyses. Clinical and radiographic lenghts of the crowns were compared. with a difference of ≥ 3mm diagnosis was confirmed. The presurgical treatment phase consisted in oral hygiene instruction. but no "scaling and root planing" to avoid unintentional curettage of the soft tissue of the psudopockets and unesthetic gingival recessions. The operative protocol involved the execution of buccal paramarginal gingivectomy from 1.4 to 2.4 and the elevation of a full thickness flap. After removal marginal tissue and de-ephitelization of the anatomical papillae with microscissors, the increased bone thickness was removed. A physiological distance between the cemento-enamel junction and bone crest for connective tissue attachment was observed on all teeth. The root surface should not be planed during surgery as this could lead to further unpredictable bone and attachment loss. The osteoplasty was carried out using rotating instruments such as carbide round bur. The most of osteoplasty was performed

on the interradicular areas where concave surface was created for subsequent repositioning of the surgical papillae in order to minimize the rebound of interdental soft tissue. The flap was repositioned 1mm coronal to cemento-enamel junction with interrupted sutures (Vicryl 6/0) anchoring the surgical papillae to the interdental de-epithelialized anatomical papillae.
Results: The clinical controls were carried out at baseline, two weeks, 1 month, 3 months, 6 months, 12 months, 18 months. At the time of suture removal (14 days) the soft tissue margins were localized almost at the same level of the end of the surgery. Even 18 months after surgical treatment, no signs of apical migration of the soft tissues was detected. The patient was very satisfied after the surgery.
Discussion: Altered passive eruption is a situation in wich the gingival margin in the adult is located incisal to the cervical convessity of the crown. The prevalence is reported to be approximately 12%. Gingival excess has been recognized by the American Academy of Periodontology as a mucogingival deformity around teeth with addres esthetic and or functional concerns. The relationship between the mucogingival junction and alveolar bone crest identifies a type 1 with a noticeably wider band of attached gingiva and type 2 with a normal mean width of attached gingiva. In the subgroup A the alveolar crest is the normal distance (1-2mm) from the cemento -enamel junction, on the contrary in the subgroup B the alveolar crest is at the level of or coronal to the cemento-enamel junction. In this clinical case type 1 and subgroup A was identified.

The role of periodontal bacteria in colorectal cancerogenesis

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Aim: Colorectal cancer (CRC) is one of the most common malignant tumors and is an important associated-factor in intestinal microbiota. Dysbiosis may enhance the carcinogenicity by proliferation and differentiation of epithelial cells. Fusobacterium nucleatum (FN) and Porphyromonas gingivalis (PG) have specific virulence properties and include the abilities to invade the gut submucosa and epithelium, activate the WNT signaling pathway, disrupt oncogene signaling, promote inflammation, and inhibit natural killer and cytotoxic T cells, promoting tumor proliferation and progression .The aim of the study was to analyze the link between the presence of FN and PG in a series of matched oral brushing, colon adenomas/carcinomas and adjacent colonic mucosa, and finally to elucidate the dissemination mechanism of oral periodontopathogenic bacteria. We also wanted to study how lifestyle factors could influence oral abundane of oral FN and PG and the risk of CRC.
Methods: 23 patients with histological diagnosis of colon cancer or adenoma and 20 healthy controls were included in case-control study in order to assessed FN and PG oral abundance by qPCR. In parallel, oral health data (plaque index PII, gingival index GI, number of teeth), food habits, lifestyles (alcohol intake, smooking, BMI) were recorded. Genomic DNAs from brushing and tissue were extracted using a DNA kit (Zymo). PCR amplifications of FN fadA gene, a region identified to bind host cells and PG 16S rDNA were performed using Sybr-green based assay for FN and TaqMan based assay for PG.
Results: No variables (PII, GI, N teeth, BMI) appeared to discriminate well between CRC and controls. The amount of FN in the oral cavity was similar in controls and cases while PG is higher in controls (FN vs PG S: -2.460 p=0.030). The molecular analysis revealed FN presence in 91% of colon adenomas/carcinomas analyzed; similarly in adjacent colonic mucosa. Instead PG was not present in the colon tissues. The quantity of FN was statistically significant higher in the oral cavity and was correlated with the highest concentration in pathological tissue (p= 0.007) and lowest abundance in adjacent colonic mucosa (p < 0.001). In patients with adenoma the quantity of FN was similar in pathological and healthy tissues. There was a direct relationship between the presence of the FN in pathological tissue and increased severity of colon cancer, mildy mediated by age (22,35%) and in almost no way by the general anthropometric state (1,97%).
Conclusion: In our study, for the first time, we confirm that FN could migrate from the oral cavity to the colon, contributing to colorectal carcinogenesis. Indeed an increase in oral FN concentrations was correlated with an increment in colorectal tissue FN quantity. FN colon abundance could predict colon cancer staging. This study lays the foundations for further research about adjuvant treatments for colorectal cancer against FN invasion, which may influence the tumour prognosis in early staging patients.

Soft tissue harvester technique

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Aim: The palatal tissue removal is a widely used technique in today's periodontal surgery especially to cover gingival recessions to meet functional and aesthetic needs. The aim of the work is to compare a device for making palatal withdrawals through the classic freehand techniques.
Methods: The purpose of performing a palatal sampling in the context of mucogengival surgery is to increase the volume of keratinized gingiva when it is missing or to simply cover the root surface. It is possible to use different methods to perform the freehand withdrawal. The "trap door" technique consists of a mesio-distal incision of the size equal to the desired graft to be performed at a minimum 1.5 mm from the edge of the neighboring teeth, then 2 vertical incisions from the ends of the primary incision. At this point, a partial depth flap is raised and the underlying connective tissue is deeply incised. The parallel incision technique involves two horizontal incisions: the first one, deep, 2-3 mm from the gingival margin and the second one, superficial, 1-2 mm from the gingival margin. From the second one, a half depth incision is made, then the connective tissue is detached. The method of the "L" technique consists of a first horizontal incision 2-3 mm from the gengival margin followed by a second vertical one, thus creating a right angle that allows the connective tissue to be removed. Finally, we have the unique incision technique which, undertaking up the concept of the "trap door" allows us to access the connective tissue through a single horizontal incision. All of these techniques involve healing by primary intention. The most common technique, however, involves the removal of a palatal epithelial-connective portion: once the flap project has been drawn, it is engraved at a depth of 1.5 mm to describe a rectangle. With the help of periodontal tweezers, cut the flap at half depth, taking care to maintain a constant thickness. The removed tissue is then de-epithelialized using a new blade. This technique involves healing by secondary intention. The Soft Tissue Harvester device (MEGAGEN) has been introduced on the market with the aim of standardizing palatal withdrawals. It is a transparent plastic instrument with an ergonomic handle which adapts to the anatomy of the palatal vault. At the edge of the device there is a horizontal blade of about 5 mm which allows the palatal sampling by simulating the freehand epithelial-connective tissue sampling. After reaching the desired length, we proceed backwards with the instrument until it is extracted from the mouth. At this point the last incision will be made with a 15 blade.
Results: These are preliminary investigation data that can standardize a palatal sampling, especially indicated for beginners.
Conclusions: The advent of the device for palatal sampling has made this maneuver standardizable. In fact, one of the difficulties in freehand techniques was to be able to take a sufficient volume of connective tissue without it being excessive and therefore getting too close to the bone plane with greater possibility of cutting vessels that cause copious bleeding or take too small quantities of tissue.

The effect of a 2-mm inter-implant distance on esthetic outcomes in immediately non-occlusally loaded implants in healed ridges: 12-month results or a randomized clinical trial

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Aim: This RCT evaluated soft tissue maintenance and marginal bone stability around implants placed either at 2 or at 3 mm of distance. The primary outcomes of the study were changes in: a) papilla height (Ph); b) percentage of inter-implant papilla fill (Pf) and 3) papilla fill index (PFI) at 12 months post implant placement
Methods: Thirty systemically healthy patients missing two adjacent premolars randomly received 2 non-occlusally loaded implants at either 2 (test) or 3 (control) mm of distance. No bone regeneration was performed. Soft tissue esthetics (Ph, Pf, PFI, amount of keratinised tissue and recession) and radiographic peri-implant bone level changes were assessed at 3 (T1), 6 (T2) and 12 (T3) months by a blind examiner.
Results: All implants reached primary stability and were suitable for immediate provisional loading. Forty-eight implants were placed in the maxilla and 12 in the mandible. Ph significantly improved in both groups from implant placement to T2 (+1.02 $\pm$ 0.55 mm in the control group and +0.64$\pm$0.80 mm in the test group, respectively) but no significant inter-group differences were detected. Pf and PFI also showed a significant improvement during time in both groups, but no significant inter-group differences were noted, although the control group had always a tendency for better outcomes. The difference of gingival recession between time points was not significant and group

allocation did not play a role. Likewise, peri-implant bone levels did not differ between test and control groups up to 12 months post placement.
Conclusion: The study indicates that immediate non-occlusally loaded implants placed at 2 and 3 mm have comparable outcomes in terms of soft tissue esthetic and peri-implant bone levels at 12 months post implant placement. The improvements from implant placement to 12 months post placement of esthetic outcomes indicates a progressive maturation of the soft tissues around the immediate restorations. Longer follow-ups are warranted to assess the stability of the outcomes over time.

Is PSR still a useful test after the introduction of the new classification of periodontal disease? A case report of a patient who brushes his teeth more than an hour a day

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Aim: The aim of this case report is to consider the possible inconsistencies between an initial periodontal diagnosis performed with Periodontal Screening and Recording (PSR) and the diagnosis according to the parameters of the new classification of periodontal and peri-implant diseases and conditions (AAP/EFP, 2018). Another aim of the work is to assess whether a daily more than an hour brushing teeth can be considered negative and traumatic for periodontal tissues or, on the contrary, a positive factor in preventing the worsening of an advanced periodontal disease case.
Methods: A 54-year-old male patient of Hispano-American origin, without systemic pathologies, non-smoker and familiarity with periodontal disease, came to our observation in October 2019 presenting periodontal impairment, characterized by significant loss of clinical attachment (on average -8,2mm), low probing depth (on average 1.5mm), respectively 10% and 15% bleeding and plaque score. The PSR shows the following values: I:3*; II:3; III:3*; IV:1*; V:1; VI:1*, clinical situation compatible with moderate periodontitis. However, after a more accurate investigation with periodontal charting and radiographic status, was diagnosed stage IV, grade C, generalized periodontitis (the worst clinical group of periodontal disease according to the new classification). The patient's home hygiene habits are investigated. Since receiving a diagnosis of periodontal disease several years earlier, the patient has reported to devote 1h and 40 minutes daily to his oral hygiene, divided in intervals of 20 minutes in the morning, 20 minutes after lunch and about an hour in the evening. The devices he uses for oral hygiene habits are: electric toothbrush with round head and interdental brushes of various sizes for cleaning the interproximal tooth and gingival surface. From the periodontal charting and radiographic status performed in October 2016 at the same facility, it emerges that the patient, three years earlier, presented a similar periodontal situation, with similar values of CAL, PD, Rec, FPMS, FBMS, F and M. During the three years, the patient performed only supragingival oral hygiene recalls every six months, splinting of elements 1.4 and 2.4 and rhizectomy of the decay mesial root of element 3.6.
Results: An inconsistency has emerged between the initial diagnosis with PSR and the diagnosis made by the new classification. The patient, after three years, performing only supragingival oral hygiene treatments, without resorting to periodontal surgery and/or complex rehabilitative treatments, kept his periodontal picture stable.
Conclusions: We believe that the PSR screening test, taking the probing depth as a reference, in a case of advanced periodontitis such as the one described, underestimates the severity of the clinical picture. On the contrary, the new classification, which does not only take into account the probing depth but also considers the loss of clinical and radiographic attachment, places the clinical picture presented as the worst among those of periodontal disease. We believe that the excessive duration of this patient's brushing did not cause influential trauma on the development of periodontal disease and allowed the maintenance of low FMBS and FMPS values and a stable periodontal clinical picture over time.

Evaluation of two different periodontal plastic surgery techniques in achieving complete root coverage: a 5-years retrospective clinical trial

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Aim: Gingival recession (GR) and the exposition of root surface may cause to the patient aesthetic problems, hypersensitivity and inability in maintaining periodontal health. Several surgical procedures were proposed to treat GRs obtaining root coverage. Complete root coverage (CRC) is usually identified as the success factor for the surgical treatment of GRs because only CRC leads the elimination of esthetic defects and hypersensitivity associated with recessions. In a recent review, Hwang and Wang concluded that CRC was related to the flap thickness. A thick gingival

phenotype seems to be desirable not only to obtain an acceptable aesthetic result but also to reduce the future risk of recession recurrence. The purpose of this study was to evaluate the long-term effects of two different periodontal plastic surgery techniques to obtain CRC with an high level of predictability: the Full-Thickness Palatal Graft Technique (FTPGT), that use a very thick mucoperiosteal graft, compared to subepithelial connective tissue graft technique (SCTG) for root coverage.

Methods: 40 systemically healthy, non-smoking 34.5 ± 5.2 years aged patients, with at least a Miller's class II gingival recession were treated for root coverage. 20 participants received FTPGT (test group) and 20 patients underwent SCTG (control group). Gingival recession (GR), Clinical attachment level (CAL), pocket depth (PD) keratinized tissue height (KT) and keratinized tissue thickness (TK) were measured at the baseline, 6 months and 5 years after treatment. Data were analyzed byANOVA and post hoc tests (SPSS version 13, IBM). A subject-level analysis was performed for each parameter. Descriptive statistics used means ± standard deviation (SD) for quantitative variables and percentages for qualitative variables.

Results: The experimental groups were balanced by age (P >0.05) and gender (P >0.05). Both at the 6 month and the 5 years follow up, each group yielded significant improvements as compared to baseline values. Comparing the two groups 6 months and 5 years after surgery, GR, CAL, KT and TK showed better scores in the FTPGT group. No significant differences were observed between the two techniques for PD. At 6 months, the %CRC was 110 ± 17,77 in the FTPGT group and 87,78± 12,24 in the SCTG group; at the 5 year examination, the %CRC was 99 ± 4,4 for FTPGT group and 88,45 ± 11,36 for SCTG group. Within the test group, the CRC significantly (p < 0,01) decreased from 6 months to 5 years while no significant changes for CRC were showed within the control group from 6 months to 5 years. However, it should be underlined that the difference between groups for CRC was significantly greater in favor of the FTPGT group (p< 0,001) at both follow up periods.

Conclusion: This 5-years retrospective clinical study indicates that both techniques are effective treatments for gingival recession therapy; however, in the long term evaluation, FTPGT showed better results in comparison to SCTG in achieving complete coverage of exposed root surfaces.

The efficacy of the photodynamic therapy during the maintenance phase

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Aim: The aim of this study is to evaluate the efficacy of the use of photodynamic laser as an adjunctive therapy, after the non-surgical treatmenf of periodontitis, during the maintenance phase.

Methods: Every patient underwent the classic etiological periodontal therapy, following which, after three months, every dental site is assessed with periodontal probing. At the first re-evaluation (t0), the sites with a probing depth of >4mm are inserted in the study. A half of them is then treated with photodynamic therapy, a half receives a traditional approach of maintenance. The diode laser is applied in the first day, after seven days and after sixty days. The protocol provides the application of Indocianine Green, with a rounded needle, inside the periodontal pocket and on the cervical part of the tooth. After one minute, with a 300 micron fiber and a power of 200mW, time of irradiation 15, 30 and 45 seconds, respectively for anteriors, premolars and molars. Then a second irradiation, now with a 300 micron bulb-fiber, 200 mW continuous wave, starting from the bottom of the pocket, moving apico-coronally for 20 seconds. The patients are then visited after a week and after 60 days and get treated with the same protocol. At last, the final re-evaluation is executed after 3 months from the first re-evaluation (t0). The considered parameters are BOP (bleeding on probing) and PPD (probing pocket depth). The software Prism – Graph Pad Software 4.00 has been used for the statistical analysis. The statistical significance has been chosen to be for p<0.05.

Results:PPD Photodynamic at t1: levels of PPD are not significantly different than t0. (P<0.05). Traditional maintenance: levels of PPD are not significantly different than t0. (P>0.05) Photodynamic therapy and traditional maintenance therapy are not significantly different at t1 BOP Photodynamic at t1: frequence of BOP=0 significantly superior than t0 (P<0.05). Traditional maintenance at t1: frequence of BOP=0 significantly superior than t0 (P<0.05). The photodynamic therapy showed a higher frequence of BOP=0 at t1 than that of the control group.

Conclusion: The sites which, at t0, showed higher PPD values, have been treated with photodynamic therapy This choice has been done for clinical reasons, since the sites which were affected by PPD superior to 4 or 5mm, would have been treated with surgical periodontal treatment Thanks to the photodynamic therapy, several sites reduced their PPD to lower values. Many of them obtained complete healing Looking at the data, the mean difference of the sites treated with photodynamic therapy, from t0 to t1, is 1,02mm, with a standard deviation of 0,83mm The sites treated

with traditional maintenance therapy, from t0 to t1, show a mean difference of 0,22mm, with a standard deviation of 0,53mm Regarding BOP, photodynamic therapy gained to make it negative in 22% of the sites, while the traditional maintenance therapy obtained to reduce it in the 6% of them If the goal of a periodontal treatment is to reduce the affected sites to less than 25%, maybe the periodontal maintenance is enough In the perspective of excellence in dentistry, though, gaining better results, with the complete acceptation of a non-invasive treatment, supported by strong scientific evidence about the mechanisms of healing due to the laser therapy, must be considered our standard.

Effectiveness of soft tissue augmentation procedure by means of porcine collagen matrix on peri-implant health

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Aim: The presence of adeguate keratinized mucosa (KM) around implants can influence peri-implant mucosa health. Xenogeneic collagen matrix has been applied for augmenting KM around teeth and implants, demonstrating its efficacy even in comparison to the free connective tissue auto-graft. The aim of this case report is to describe a surgical procedure using a porcine collagen matrix for augmenting KM around implant and improving peri-implant health.
Methods: A 47 years old female patient, with no systemic diseases and negative smoking status, was diagnosedwith mucositis on implant in position 3.5. She was initially treated with oral hygiene instruction, non-surgical treatment and supportive periodontal therapy. After 6 months plaque and BoP were still present at the vestibular aspect of the implant, due to difficulties and discomfort in self-perfomed oral hygiene. The width of KM around the implant was about 1 mm, so a surgical procedure to augment KM width was scheduled. After administration of local anesthesia, a split-thickness flap was elevated in the surgical site in order to prepare the vascular bed for a porcin-derived collagen matrix (CM). The minimal band of remaining KT around the implant was preserved. The coronal edge of the flap was apically moved and sutured with 6/0 absorbable sutures obtaining anchorage to the periosteum. CM was shaped, well adapted and sutured to the vascular bed with 6/0 absorbable sutures. Patient received the standards post - surgical advices and pharmacological therapy. She was checked after 1 week, sutures were removed after 2 weeks. Self – performed oral hygiene was started after 1 month and she was inserted in a 3 months based supportive periodontal therapy. Healing was followed up to 6 months, when presence of plaque, bleeding on probing, KM width and patient's discomfort during self-perfomed oral hygiene procedures (VAS) was checked.
Results: Healing during the first 6 months was uneventful. Absence of plaque and bleeding on probing at the vestibular aspect of the implant was reported. KM width increased of 2 mm and the patient reported reduced discomfort during self-perfomed oral hygiene procedures.
Conclusion: The present case report demonstrated that augmenting KM width at the buccal sites of the implant with a porcine collagen matrix may improve daily oral hygiene procedures, reducing plaque accumulation and inflammatory signs.

Necrotizing gingivitis between new and old classification of periodontal disease: a case report

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Aim: Necrotizing gingivitis (NG) is clinically characterized by pain, interdental papilla necrosis and sometimes spontaneous bleeding. Some predisposing factors may lead to this condition, such as smoking habits, alcohol, stress, nutritional deficiencies and immune system dysfunctions, including HIV infection. The purpose of this paper is to illustrate a case of necrotizing gingivitis, from diagnosis to healing, and to compare the scientific definitions of the disease proposed by different autors over time.
Methods: A 21-year-old patient with a negative systemic history, smoking about 20 cigarettes/day, comes to our observation complaining of strong gum pain that arose spontaneously a few days earlier. She reports she leads a stressful lifestyle and has an unbalanced diet, rich in carbohydrates and low in protein, often skipping a few meals. After an accurate physical examination, diffuse gingivitis is observed in the presence of moderate plaque deposits, with signs of interdental papillae decapitation and spontaneous bleeding at V and VI sextant. The clinical picture appears to be pathognomic of necrotizing gingivitis. Firstly the patient is advised to reduce smoking, a more regular diet and greater stress control. A delicate removal of supragingival plaque is also performed, taking care not to traumatize the residual periodontal attachment; in addition, a systemic antibiotic therapy with Amoxicillin is prescribed (1g/3/6 days) and haematochemical tests are required to investigate the presence of systemic pathologies

(immune system deficits, HIV infection, diabetes, etc.). A weekly follow-up is set up.
Results: The gradual remission of clinical signs and symptoms was observed in six weeks; healing hesitated in the partial loss of some papillae and the formation of black triangles. Hematochemical tests ruled out systemic pathologies.
Conclusions: Necrotizing gingivitis usually results in a variable loss of clinical attachment, depending on the severity and extension of disease and the clinical and extra-clinical management of the causes. Prior to the Armitage Classification of 1999, in which NUG and NUP (Necrotizing Ulceratve Gingivitis and periodontitis) are described, different forms of Necrotizing Periodontal Disease were defined by authors in different terms ("Vincent's Gingivostomatitis", "Ulceromembranous Gingivitis", "Acute Necrotizing Ulcerative Gingivitis - GANU"). In the new classification this condition is called Necrotizing Gingivitis (NG), the term "ulcerative" has been omitted, as ulceration is considered as a consequential process of necrosis. Also the term "acute", often used in the past, has been abandoned because of the sometimes recurrent and chronic characteristics of the pathology.

Periodontal treatment and HBA1C reduction. A systematic review and meta-analysis of randomized clinical trials

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Aim: Even though the beneficial effect of the periodontal treatment in terms of reduction of HbA1c is well investigated, results are conflicting within the literature.
Methods: Electronic searches were performed in PubMed, CENTRAL, and Embase databases. A hand search was carried out in the reference list of all articles included and also other relevant journals. Randomized clinical trials assessing the HbA1c changes after periodontal treatment in diabetes II affected patients were considered for this review. Studies should have presented at least two measurements of periodontal conditions over time, pre and post-treatment, respectively. We used meta-analysis to estimate the pooled effect of periodontal treatment in terms of HbA1c. The risk of bias was evaluated through qualitative analysis. Quality analysis of Randomized Clinical Trial was performed according to the Cochrane Reviewers' Handbook. Data of the included articles were extrapolated through an "ad hoc" extraction sheet. The extraction sheet, previously tested on possible included studies, was divided into three sections. In the first section, information such as baseline characteristics of the subjects, systemic health, length of follow-up, type of surgical intervention, and periodontal parameters were collected. The second section focused on the quality of the study. The last section served to extrapolate the blood levels of systemic biomarkers. Reviewers were calibrated for study screening against another reviewer with experience in conducting systematic reviews. Each round of calibration consisted of a duplicate, independent validity assessment of 20 titles and abstracts from the search. Reviewers achieved a consistent level of agreement (K score>0.8). In order not to exclude potentially relevant articles, abstracts providing unclear results or missing information were included in the full-text analysis.
Results: A total of 700 studies were identified for inclusion in the review. The electronic search determined a total of 584 articles. Hand searching identified a further 155 articles for the full-text analysis. Twenty-six studies matched the inclusion criteria and were finally analyzed. Meta-analyses showed a reduction of HbA1c of 0.53% ($p<0.01$, [95% CI: 0.26.3-0.79]).
Conclusions: This study provides evidence that periodontal treatment is capable of reduced HbA1c levels in diabetic patients. Future prospective longitudinal studies ought to overcome methodological caveats identified in this review.

Periodontal treatment and C-reactive protein reduction. A systematic review and meta-analysis of randomized clinical trials

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Aim: The magnitude of the effect of periodontal treatment on systemic inflammation is unknown. We conducted a systematic review and meta-analysis of randomized controlled trials to evaluate the reduction of C-reactive protein (CRP).
Methods: Electronic searches were performed in PubMed, CENTRAL, and Embase databases. A hand search was carried out in the reference list of all articles included

and also other relevant journals. Randomized clinical trials assessing the CRP changes after periodontal treatment in healthy patients were included in this review. Studies should have presented pre and post-treatment CRP data and at least ten patients per group. We used meta-analysis to calculate the effect of periodontal treatment in terms of CRP. The risk of bias was evaluated through qualitative analysis. Quality analysis of Randomized Clinical Trial was performed according to the Cochrane Reviewers' Handbook guidelines. Data of the articles finally included in the review were managed through an "ad hoc" extraction sheet. The extraction sheet comprised three sections: (i) the first was about characteristics of the subjects, type of surgical intervention and periodontal parameters; (ii) the second section was related to the quality of the study; (iii) the third section was used for extrapolating the blood levels of systemic biomarkers. Reviewers were calibrated for study screening against another reviewer with experience in conducting systematic reviews. Each round of calibration consisted of a duplicate, independent validity assessment of 20 titles and abstracts from the search. Reviewers achieved a consistent level of agreement (K score>0.8). In order not to exclude potentially relevant articles, abstracts providing unclear results or missing information were included in the full-text analysis.

Results: A total of 700 studies were identified for inclusion in the review. The electronic search determined a total of 584 articles. Hand searching identified a further 155 articles for the full-text analysis. Eleven studies matched the inclusion criteria and were finally analyzed. Meta-analyses showed a reduction of CRP of 0.25 mg/L ($p<0.01$, [95% CI: 0.01-0.49]).

Conclusions: This study provides evidence that periodontal treatment determines a modest but significant reduction of CRP levels in systemically healthy patients.

Evaluation of pain and discomfort after surgical periodontal treatments

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Aim: To evaluate levels of pain and associated discomfort during and following various types of surgical periodontal procedures.

Methods: The sample consisted of 93 patients submitted to different surgical periodontal treatments (i.e. conservative, regenerative, muco-gingival and resective). The patients registered pain using a Visual Analogue Scale (VAS) and a Numerical Rating Scale (NRS) immediately after the conclusion of the procedure. A written questionnaire about Oral Health Impact Profile (OHIP-14), post-operative pain score and discomfort score was compiled 24h after treatment. The patients also recorded if analgesics were taken.

Results: Of the total of surgical procedures, 22 (23.9%) were regenerative, 9 (9.8%) were muco-gingival, 53 (56.5%) were conservative and lastly 9 (9.8%) were resective. The average duration of the intervention was 40.45 ± 14.07 minutes, with a minimum value of 15 and a maximum of 92 minutes. Mean NRS score resulted 0.97 ± 1.03 immediately after surgery. Data analysis showed a mean discomfort score of 7.34 ± 5.45, a mean post-op pain score of 5.46 ± 3.49 and an OHIP-14 score of 25.73 ± 9.55. Within 24h following the operation, patients reported as average value for oral pain 1.27 ± 1.23, and 1.33 ± 1.55 was found to be mean for the worst level of pain experienced. Instead the average of residual pain turned out to be 0.94 ± 1.38 after 24 hours. Pain perceived during regenerative procedures was significantly higher than conservatives ($p < 0.05$). Muco-gingival interventions were associated with the worst level of pain in the entire follow-up period compared to conservative and regenerative interventions ($p < 0.05$). Instead, regarding the average pain experienced in the 24h post treatment resulted that the resective surgeries showed higher values over conservative and regenerative surgeries ($p < 0.05$). Furthermore, post-operative pain and discomfort scores were statistically lower for conservative procedures compared to both regenerative and muco-gingival treatments ($p < 0.05$). Resective and conservative surgeries required a lower intervention time than the others ($p < 0.05$). OHIP-14 and presence of residual pain at 24h from the surgery did not show any statistically significant difference between the various types of proceedings ($p < 0.05$). Moreover, 73 of 93 (78.5%) of the subjects did not take analgesics at any time during the one-day follow-up period, while on the opposite 20 (21.5%) of them resorted to drugs.

Conclusions: Levels of pain and discomfort were found to be low to very low for most patients after all the different types of surgical periodontal treatment; this also agreed with the low consumption of analgesics. Furthermore, the fact that the patients who received muco-gingival surgery were those for whom it took the longest could explain why they complained greater post-operative pain and discomfort. Lastly, resective treatments seemed to be associated with a worse Oral Health Impact Profile and a higher residual pain at 24h from the intervention, although a lack of statistical significance.

Oral Pathology and Oral Medicine

Photobiomodulation laser therapy in pemphigus vulgaris oral lesions: a randomized, double-blind, controlled study

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Aim: Pemphigus vulgaris (PV) is a rare, chronic, autoimmune, mucocutaneous, vesiculobullous disease. Systemic corticosteroids are the mainstay treatment for PV oral lesions; the aim of this study is to evaluate the efficacy of PBMT with a 645 nm diode laser as a supportive topical therapy in patients with PV induced erosive-ulcerative oral lesions.
Methods: This double-blind placebo-controlled study was carried out at the Department of Oral Medicine of the Dental Clinic of Spedali Civili of Brescia (Italy). Patients were consecutively enrolled from March 2019 till February 2020. Inclusion criteria were: (a) clinic, serologic and histologic diagnosis of Pemphigus Vulgaris according to the conventional WHO criteria (b) presence of erosive-ulcerative oral lesions with a diameter > 1,5 cm (c) symptomatic lesions (d) acceptance of participating in the study by signing the informed consent. Selected patients were divided into two groups: group A, patients receiving laser therapy and group B, receiving sham therapy (placebo). All patients were being treated also with a systemic corticosteroid therapy i.e. prednisone 0.5 mg Kg per day. Size of lesions, VAS and satisfaction were evaluated before the treatment (T0), after 4 weeks (T1) and after 8 weeks as a follow-up (T2). The device used for this study (Raffaello 980 Bio, Dental Medical Tecnologies, Italy) had the following parameters: 100mW power, 645 nm wave length, irradiation area 1cm2, application time 30 sec/cm^2, energy density 3J/cm2, scanning modality. Laser treatment/placebo were performed 2 times a week for 4 weeks by trained clinicians.
Results: A total of 50 lesions (23 patients) were evaluated. About lesions size, there was a statistical significative difference between the two groups just at T2 ($p=0.0193$), though VAS significantly decreased both at T1 ($p=0.0198$) and at T2 ($p=0.0087$). VAS median for group A were: 3.5 at T0, 0 at T1 and 0 at T2; for group B: 5 at T0, 2 at T1 and 1 at T2. In general, all patients were satisfied of the treatment received.
Conclusion: PBMT can be considered a validate supportive therapeutic option, even if further RCTs studies with wide sample sizes and standardized management protocols are suggested.

Oral and psychological alterations in haemophiliac patients

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Aim: Haemophilia is a hereditary coagulopathy whose basic anomaly consists of the quantitative or qualitative alteration of one or more plasma proteins (factor VIII and factor IX) in the coagulation system. It occurs only in the male sex, while women are healthy carriers: this is because it inherits in recessive mode through the X chromosome and the other non-

affected X chromosome will compensate for the production of factor VIII or IX. The objective of this review is to analyse all risk factors, predispositions and alterations to the oral-maxillofacial district and to direct and update the clinician in the treatment of haemophilia patients.The broader assessment also includes the psychological aspects that could affect the treatment and maintenance of oral conditions.
Methods: The study takes into consideration all the works in the literature in the last 10 years, in English language. Although haemophilia is a hereditary condition, no genetic alterations involving the oral structures are evident. Rather we can talk about risk factors or predisposing factors for the development of oral diseases because these patients fear the bleeding caused by tooth brushing. This fear often leads them to avoid these prophylaxis manoeuvres. Unfortunately, this is a disabling pathology that tends to be present in the patients' daily life. Surely this leads to an aggravation of their condition compared to healthy patients. On the other hand, it must be considered that access to dental care by these patients is much more complex, as there are important medico-legal responsibilities in dealing with these patients.
Results: Von Willebrand disease, Haemophilia A and Haemophilia B account for 95–97% of all coagulation deficiencies for this reason the topic is current and has a good spread. We have certainly understood that it is possible to perform surgical practices on these patients by evaluating both systemic and collaborative conditions; however, it is necessary to carry out the appropriate protocols for each patient. these patients often have a worsening of oral health conditions, not so much related to their systemic conditions, but due to their difficult management and, from a clinical point of view, and bureaucratic difficulties.
Conclusion: Surely the path of research that we started with our team, will move in producing a guideline to the surgical treatment in the dental field of these patients. A guideline that can be used and consulted by all clinicians, so as to be able to treat these patients in a more secure and predictable way. Important support of this work regarding the psychological aspect of these patients is essential during a dental treatment, especially if the patients are still in childhood.

Amino acids evaluation in whole, parotid and submandibular/sublingual saliva

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Aim: The detection of salivary metabolites associated with pathological and physiological alterations has stimulated the search of novel and non-invasive diagnostic biomarkers for oral health evaluation. The purpose of this work is to identify and quantify the standard and non proteinogenic amino acids within the whole saliva (WS), parotid saliva (PS) and submandibular/sublingual saliva (SM/SL), in a cohort of healthy volunteers.
Methods: A cohort of 20 healthy subjects (10 males, 10 females), aged 19-25 years, after oral clinical examination and interview for data acquisition on general medical history has been qualified for saliva collection. For each participant, a sample of PS, SM/SL and WS was collected separately in absence of stimulation. Participants were asked to refrain from eating, drinking, smoking and performing intense physical activity for at least 12 hours before salivary sampling and to drink only water. Furthermore, it was requested not to carry out oral hygiene maneuvers in the 45 minutes before saliva collection. For PS and SM/SL collection, a sterile sponge was positioned on the outlet of the ducts. Periodically the sponge was squeezed using a syringe to transfer the saliva into a cryovial. WS was collected by the passive drooling method. During saliva collection, salivary samples were transferred to a tube containing NaN3 (0.5%), kept on ice until the achievement of 5.4 mL and, finally, freezed at -80°C. The metabolic profile of biofluids was determined by proton nuclear magnetic resonance (1H-NMR) in a JEOL 600 MHz ECZ600R spectrometer at the Interdepartmental Center for Measurements "Giuseppe Casnati" of the University of Parma. To compare the metabolite composition of each saliva subtype, the upper-tailed Mann-Whitney test (Origin 2019 software) has been applied. Heatmap analysis was carried out on targeted metabolites. Heatmaps were generated using MetaboAnalystR (https://www.metaboanalyst.ca) with normalization referenced to TSP and auto-scaling.
Results: 1H-NMR spectra of WS, SM/SL and PS samples, highlight different and characteristic metabolite patterns. We identified 15 standard amino acids: alanine, arginine, aspartate, glutamate, glutamine, glycine, histidine, isoleucine, leucine, lysine, phenylalanine, proline, threonine, tyrosine and valine, and 6 amino acid-derived compounds: cadaverine, creatine, homoserine, putrescine, pyroglutamate and taurine. Amino acid mediane concentrations in WS and/or in PS are significantly higher than in SM/SL. Glutamine, glycine and proline (the most abundant residues in salivary Proline Rich Proteins - PRPs), are present in high concentration. Also, the degradation

of mucins (synthesized and secreted by the SM/SL and minor salivary glands) contribute to proline salivary concentration. Pyroglutamic acid, a cyclic amino acid found at the N terminus of acidic-PRP, is present at a significant concentration in saliva samples. Arginine was found only in PS. Taurine is present in all salivary subtypes, with a prevalence in PS. Arginine, ornithine and lysine, which originate from proteins and peptides lysis, are metabolized by oral cavity bacteria and contribute to the salivary content of putrescine and cadaverine.

Conclusion: Free salivary amino acids are known to be primarily produced by endogenous and exogenous proteases of salivary glands, exfoliating cells and oral microflora. Along with their secretion in the oral cavity, PRPs and mucins are subjected to a proteolytic fragmentation. We assume that the levels of the amino acids found in WS are markedly influenced by the bacterial metabolism since its composition does not reflect the product of salivary glands.

Comparative evaluation of amorphous casein-calcium phosphate (CPP-APC) mousse versus a fluoride gel preparation in oral health of Sjögren's patients: a randomized controlled trial

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Aim: Sjögren's syndrome (SS) is a chronic autoimmune disease of unknown etiology, affecting most of its patients with xerophtalmia and hyposalivation, with the latter being a notorious trigger for dryness and frailty of oral mucosae, recurrent fungal infections, tooth decay, caries and periodontitis. This trial aims to compare the efficacy of an amorphous casein-calcium phosphate mousse (GC Tooth Mousse®) against a 0.33% sodium fluorine gel (SFG) on the oral health status of patients with primary or secondary Sjögren's syndrome.

Methods: Patients referred to our Oral Medicine Section with a diagnosis of primary or secondary Sjögren's syndrome were recruited and randomly distributed in two groups. The protocol was carried out in four stages throughout a timespan of six months. In both groups, the first session (T0) consisted of the following: instruction and motivation for oral hygiene, collection of intraoral photographs, evaluation of oral lesions, assessment of basal and stimulated salivary flow, salivary pH, Decayed, Missed, Filled Teeth (DMFT) index and pain through Visual Analogue Scale (VAS), followed by a non-surgical periodontal therapy session. At the end of T0, group 1 was given Tooth Mousse®, whereas group 2 was administered 0.33% SFG to be applied twice times a day for one month. One month after T0 (T1), treatment was concluded and a second VAS scale was calculated. Two months after T0 (T2), basal and stimulated salivary flow, salivary pH and VAS were estimated. Six months after T0 (T3), intraoral photographs, objective and subjective clinical scores were re-evaluated, just as at T0.

Results: 16 patients (15 F, 1 M; mean age: 59 years old) agreed to participate and were recruited. Of these, three patients dropped out before end of protocol. In the end, 13 patients (12 F; 1 M; mean age: 58,3 years old; 7 of Group 1 and 6 of Group 2) completed the trial. No statistically significant changes were found regarding salivary flow or salivary pH throughout the six months timespan. No significant differences of DMFT index were found, neither within each group, nor between the two groups, between T0 and T4. An overlapping propensity for fungal infection emerged, with two patients in each group experiencing oral candidiasis. Conversely, Group 1 experienced a significant reduction (p-value < 0.05) of VAS at T1, when compared to T0.

Conclusion: The main limitation of this trial relies in the smallness of its sample, which can be mainly attributed to the low prevalence of Sjögren's syndrome. Despite such limitation, combination of oral hygiene protocol with either sodium fluorine gel or GC tooth mousse® showed some encouraging results, with the latter being able to provide a significant pain relief, at least at the end of treatment. The low incidence of fungal infection might be the result of the thorough instruction and motivation for oral hygiene provided to each patient at T0. Interestingly, no difference in DMFT were detected between group 1 and group 2, despite CPP-APC mousse being evaluated in literature as a valid tool for the prevention of caries. Further studies on larger samples are needed, to establish the reliability of these preliminary results.

Which is the real association between geographic tongue and psoriasis? A small epidemiological study

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Aim: Psoriasis is a inflammatory, chronic skin-articular disease with genetic and immunological basis.

Psoriasis occurs in approximately 1-3% of the world population, affecting white individuals of both sexes. Its etiology is unknown: there is a defect in the normal cycle of epidermal development, with a leukocyte infiltrate. Psoriasis can be localized or generalized, affecting almost all the skin with an unpredictable course. Several studies show that geographic tongue is the oral manifestation more commonly associated with psoriatic disease. The geographic tongue (GT) is a chronic, inflammatory oral lesion, immunologically mediated and with unknown etiology. It affects the 0.6%-4.8% of the world population. It is characterized by slightly eroded areas with depapillated mucosa often but not always, with white sclerotic border around. The difficulty however in accepting the diagnosis of geographic tongue as oral psoriasis is the fact that not all patients with geographic tongue present psoriasis. Recent studies have investigated the role of anxiety, depression, stress and psoriasis. Depression and stress decrease the quality of life and this fact in patients with psoriasis is directly associated with the severity of the disease. The role of vitamin D deficiency was also investigated. Hypovitaminosis D has been associated with a variety of autoimmune diseases such as rheumatoid arthritis, Crohn's disease, systemic lupus erythematosus, and osteoporosis. In addition, vitamin D deficiency is often associated with skin disorders, such as pemphigus vulgaris, bullous pemphigus, alopecia areata, vitiligo and psoriasis. Some studies have identified an association between polymorphisms of vitamin D receptor (VDR) and the severity of psoriasis disease, believing it affects the alteration of the cutaneous barrier. The aim of this work is to evaluate the relationship of these conditions in a small sample population.

Methods: The tongue of 52 patients with a diagnosis of psoriasis (32 women and 20 men) aged between 9 and 64 years was carefully checked in a dermatological private practice, than in a dental private practice to evaluate the presence or absence of migratory glossitis.

Results: Of the 52 patients visited, 8 (15,2%) of them (5 women and 3 men) presented a tongue with the characteristics of GT. Several studies have highlighted the association between cutaneous psoriasis and geographic tongue. Common features are the clinical presentation, the histological pattern and the presence of common genetic markers (HLA). We have found a percentage of GT in psoriatic patient higher than the association found in previous works in the scientific literature. However, it is true that not all the people who show a geographic tongue have psoriasis.Despite this, the presence of geographic tongue may be an early sign of psoriasis. Several studies have shown that early diagnosis of psoriasis can reduce the risk of complications and damage and functional disability due to psoriasis. Therefore the clinician, in particular the dentist, should always investigate more thoroughly when a patient with a geographic tongue appears at the first visit.

Conclusions: General practitioners and dermatologists are encouraged to perform a detailed oral examination of psoriatic patients, in the same way dentists are advised to recommend a dermatological examination to patients with a geographic tongue.

Photodynamic therapy as support of pharmacological therapy in a case of particular refractory oral lichen planus: a case report

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Aim: Lichen planus (LP) is a chronic autoimmune mucocutaneous condition, primarily affecting the oral and genital mucous membrane, skin, nails, and scalp. The oral lichen planus (OLP) affects approximately 2% of the population. OLP, in general, may arise in > 70% of persons with skin lesions. The frequency of malignant change ranges from 0.4% to 3.3%. OLP is seen worldwide, mostly in the fifth to sixth decades of life, and is twice as prevalent in women as in men. OLP has demonstrated numerous systemic connotations such as diabetes mellitus (DM), hypertension, metabolic syndrome (MS), thyroid diseases, psychosomatic ailments, chronic liver disease, gastrointestinal diseases, and genetic susceptibility to cancer. The treatment options for OLP are numerous and include topical and systemic agents. Topical corticosteroids remain the mainstay of therapy.

Case report: A 62-year-old woman came to our observation for a lesion present for about 1 year extended to the hard palate and the upper vestibular gingival mucosa. In the anamnesis she reported osteoporosis and gastro-esophageal reflux. On objective examination there were erosion areas of different width and depth interspersed with erythematous and rare areas white patterns. The patient also reported the formation of bubbles that in a very short time exploded. The negative Nickolsky sign on physical examination did not testify for a diagnosis of vesicular-bullous disease. An incisional biopsy was performed in the palatine area. The subsequent histological evaluation and immunofluorescence were significant for the diagnosis of lichen planus bullous. Topical therapy prescribed with Clobetasol 0.05%

2 times a day and topical Nystatin (100.000 ul/ml) 3-4 times a day for 3 weeks brought an evident improvement; however an erosive lesion persisted in the area 22-23. It was decided to proceed with a photodynamic support therapy with 460 nm diode light, 4 watts (FlashMax P4 CSM Dental, Copenhagen, Denmark) and 3% hydrogen peroxide. Mucous surface was wetted with hydrogen peroxide then illuminated with diode light 20 times for 3 seconds, subsequently the hydrogen peroxide was removed with a sterile gauze. This treatment was repeated 3 times every 7 days.

Results: One week later there was an important clinical improvement, the subsequent therapeutic sessions allowed an almost complete remission of the lesion unresponsive to corticosteroid treatment. Numerous invasive and non- invasive therapeutic methods including local and systemic corticosteroids, laser therapy, and surgical intervention for the treatment of OLP are suggested. Extended use of corticosteroids for chronic OLP may have certain local and systemic complications, which includes opportunistic candidiasis, mucosal atrophy, adrenal insufficiency, gastrointestinal disorders, hypertension, and diabetes. To surmount the side effects of steroid therapy, photodynamic therapy (PDT) has been proposed as an alternative treatment strategy for OLP. PDT uses a photosensitizing agent which, when activated by the energy of light, creates a photodynamic reaction that is cytotoxic. A systematic review of the literature assessed the effectiveness of PDT in the management of OLP. PDT also showed an increase in the bactericidal activity of hydrogen peroxide in a case of refractory hairy tongue.

Conclusions: Photodynamic therapy appears to have some effect in the symptomatic treatment of OLP in adult patients. However, further randomized controlled trials with standardized PDT parameters are needed.

Efficacy of different strategies in MRONJ prevention

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Aim: The aim of this study is to evaluate the efficacy of preventive oral visit and its relation with the risk of MRONJ (Medication Related Osteonecrosis of the Jaw).

Methods: In this retrospective study were examined all the medical records of patients in treatment care at the Hospital of Padova (departments of Dental Clinic, Maxillofacial Surgery, Hematology and Clinical Immunology) and the Veneto Oncology Institute between 2010 and 2019, subjected to drug therapies related to the risk of ONJ. Were included patients with diagnosis of drug-related osteonecrosis of the jaws, in therapy (or previous therapy) with drugs related to the development of osteonecrosis of the maxillary bones, head and neck radiotherapy was an exclusion criteria. Patients were grouped according to the preventive dental visit. Group 0: patients who didn't receive preventive dental visit. Group 1: patients who received preventive dental visit before the treatment with antiresorptive/antiangiogenetic drugs in the Dental Clinic of the University of Padova; Group 2: patients who received preventive dental visit before therapy with antiresorptive/antiangiogenetic drugs in Oral Maxillo Facial Surgery Unit; Group 3: patients who received preventive dental visit in private dental clinics. Group 4: patients who received preventive dental visit in one of the above categories, but didn't stick to the treatment proposed; Group 5: patients who didn't receive preventive oral visit, but were evaluated as eligible for the therapy with antiresoptive/antiangiogenetic drugs from the oncologist that evaluated only a radiographic exam of the jaws. Staging of osteonecrosis of the study population was performed following SICMF-SIPMO (Italian Society of Maxillofacial Surgery and Italian Society of Oral Pathology and Medicine) recommendations. Descriptive analysis was used, being a retrospective study; the software used was SAS 9.4 (SAS Institute Inc., Cary, NC, USA) for Windows. The Fisher's exact test was applied to assess whether the results obtained were statistically significant ($p < 0.05$) relative to the osteonecrosis event in the respective groups.

Results: In 1305 patients taking MRONJ-related drugs, 93 of them had diagnoses of drug-related osteonecrosis of the jaws. 21 patients were excluded from the study population. The 72 patients belonging to our study population were grouped in the indicated groups. In Group 0, 26.92% of patients had Stage 1 MRONJ; 65.38% Stage 2; 7.69% Stage 3. All Group 1 patients had MRONJ Stage 2. In Group 2, 25% of patients had Stage 1 MRONJ and the remaining 75% Stage 2. In Group 3, 27.27% of patients had Stage 1 MRONJ; 54.55% Stage 2 and 18.18% Stage 3. In Group 4 half of the patients had MRONJ Stage 1 and the other half MRONJ Stage 2. In Group 5, 17.39% of patients had Stage 1 MRONJ; 39.13% Stage 2 and the remaining 43.48% Stage 3. The exact Fisher test was performed, which shows that the results obtained are not statistically significant ($p > 0.05$), this also due to the limited number of the study population, it is always a rare pathology. In any case, the incidence of MRONJ in the sample that had done the dental assessment prior to therapy is 3.22%, significantly lower than the incidence reported by the Italian Association of Medical Oncology in 2016 which

can reach up to 16%.
Conclusions: Preventive oral care in patients that must be treated with antiresorptive or angiogenetic drugs can help reduce the risk of medication related osteonecrosis of the jaws. The active collaboration of those involved in the management of patients at risk for osteonecrosis of the jaws and / or who are affected can contribute to minimizing the phenomenon.

Predicting death in patients with mutated TP53 head and neck squamous cell carcinoma

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Aim: Head and Neck Squamous Cell Carcinoma (HNSCC) is one of the most common cancer worldwide. Often, HNSCC presents as a locally advanced disease and includes biologically and molecularly diverse groups of tumors. The most affected sites by HNSCCs are oral mucosa, oropharynx and larynx. The risk factors frequently involved in the etiopathogenesis of HNSCC are tobacco and alcohol consumption, that cause DNA-damage with mutations in cancer-related genes. Consistently, several studies have shown that such carcinogens contribute to the mutational profile of TP53. TP53 tumor suppressor gene mutations are the most frequent somatic genomic alterations in squamous cell carcinoma of the head and neck (HNSCC). TP53 encodes the protein p53, which is implicated in important cell regulatory functions such as apoptotic process and control of cell cycle. So, we can assert that TP53 gene alterations are frequent in a large proportion of human cancers and occur in a tissue-specific manner. Unfortunately, it is not yet clear whether specific TP53 mutations could influence in a significative manner the wide landscape of HNSCC. The ultimate goal of this study was to study the TP53 mutation landscape and to link these molecular characteristics with clinical variables.
Methods: We performed a computational analysis on 300 patients with head and neck squamous cell (HNSCC) from available online database. We accessed to survival and clinic-pathological characteristics of the patients. We could also download data about mutational TP53 status with details about amino-acid substitutions, zinc-ion ligand and DNA binding domain. We built a classifier that was able to distinguish patients with a greater risk of death. For the statistical analysis we used an approach based on a Multivariate Cox regression model, for which the high risk group of mutation was compared to not fatal TP53 mutations and wild-type patients, together with age, gender and stage.
Results: TP53 mutations in HNSCC showed many distinct differences in different anatomical sites. The mutational profile of TP53 is heterogeneous in HNSCC. Carrying a mutation in TP53 gene resulted to be an independent prognostic factor in HNSCC. Our classification method highlighted the existence of high risk of fatal mutations and resulted to be an independent prognostic factor in this HNSCC database. In this cohort of patients, stage had not statistical association to a higher risk of death, same for gender and age.
Conclusion: In this study, we propose a new classification method, which has been able to highlight patients with mutations at high risk of death in tumors of the head and neck district. Instead, the proposed new classification method showed a better predictive performance, in particular patients in the high-risk group showed a worse prognosis, while the low risk group showed a similar overall survival compared to wild type.

Role of direct acting antivirals in the dental management of patients with hepatitis C

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Aim: DAAs (Direct Acting Antivirals) are a category of drugs that work by targeting specific points of the viral polyprotein, preventing it from replicating. The potential targets of DAA include structural and non-structural proteins, with the aim of altering or blocking the virus replication cycle. The aim of this study is to shed light on the effectiveness of these new antivirals in the treatment of hepatitis C, evaluating the dental management of patients treated with DAA compared to patients treated with conventional interferon therapy, and the reduction of infectious risk.
Methods: The study was conducted on a group of 10 patients aged between 56 and 74 years, who had a previous clinical history of hepatitis C. They included subjects who had other past diseases, such as cardiovascular disease, diabetes, CRF (chronic renal failure) in functional compensation. Patients were

randomized into two groups: group A of 5 patients already treated by the use of DAA (3 of the 5 patients took Sofosbuvir in combination with Ledipasvir, 1 of the 5 patients took Sofosbuvir associated with ribavirin, 1 of the 5 patients took Sofosbuvir in combination with Velpatasvir), and group B, of 5 patients already treated with conventional interferon therapy in combination with ribavirin. All patients are sent in advance to specialist advice to rule out contraindications to dental interventions. All patients underwent oral surgery which involved the extraction of one or more dental elements

Results: All oral surgery procedures, were performed in accordance with the guidelines for cross infections, without post-operative complications. All patients in group A had no HCV-RNA presence in the bloodstream, 36 months after therapy with DAA, thus recovering from hepatitis C. 3 of the 5 patients in group A had functional impairment of the liver related to the chronicity of the disease. 3 of the 5 patients in group B did not present, 24 months after interferon and ribavirin therapy, any presence of HCV-RNA and were therefore cured of the disease. 2 of the 5 patients still had the presence of HCV-RNA 24 months after conventional interferon therapy, thus resulting in hepatitis C. 4 of the 5 patients had functional liver changes related to the chronicity of the disease. No patient presented complications 7-10 days after surgery. Patients who showed HCV-RNA in the bloodstream showed a 10% greater healing delay in post-operative than patients who were cured by DAA, due to the progress of chronical disease (cirrhosis) over time.

Conclusions: Use of these drugs for the treatment of hepatitis C has made it possible to reduce the risk of cross-infections for healthcare workers by almost 95-100% during any dental procedures. There is statistically greater healing in patients undergoing DAA therapy than in patients undergoing interferon therapy. These are revolutionary and effective drugs, which would allow total eradication of the virus by over 90% of affected patients. The effectiveness of DAAs is now widely proven by scientific literature, although many studies are still ongoing to establish the real capabilities of these drugs.

Field cancerization in patient with oral lichen planus and metastatic neck lymph node from unknown primary focus: an unusual case-report

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Aim: to describe an unusual case report of a patient diagnosed with long-term diagnosis of Oral Lichen Planus, precipitating into a frantic and unexpected propensity to cancerization in the last three years.

Methods: In June 2018, a 79 years-old non-smoker female was referred to our Oral Medicine Section for recurrent gingival pain. Remote clinical history was significant for hypertension and Oral Lichen Planus, histologically diagnosed in 1995. Recent medical history was significant for left neck dissection and radiotherapy consisting of 60 Gy over 30 sessions performed in 2017, due to a metastatic neck lymph node from unknown primary focus. At first visit, oral examination revealed white bilateral reticuli and homogenous plaque-like lesions in buccal mucosae and tongue, and desquamative gingivitis (DG) on the palatal gingiva of the left upper arch. With no indication for biopsy, topical corticosteroid and chlorhexidine mouthrinse was administered for one month, leading to a successful reduction of DG-related pain. Follow-up visits every four months were then established.

Results: Patient suffered no relapse from July 2018 up to January 2019, where a sudden neuralgic pain occurred on the upper left cheek. Irregular atrophic-erosive lesion was detected on the left palate. One month later, despite topical treatment, a speckled gingival growth occurred in the edentulous tract of the upper left arch, distal to the second premolar. Urgent incisional biopsy revealed a G2, invasive oral squamous cell carcinoma. Patient was referred to the Oral and maxillofacial surgery (OFMS) section, where hemimaxillectomy and reconstruction with temporalis muscle flap were performed. Margins were negative, with no perineural-vascular invasion, whereas depth of invasion was of 9 mm. Due to the previous exposure to radiation in the ipsilateral neck district, adjuvant radiotherapy could not be carried out. In September 2019, white plaque of the right buccal mucosa started to display a finely speckled surface, and an abrupt hardening at palpation. Urgent incisional biopsy revealed a second G2, invasive OSCC, treated in the OFMS Section with wide 2,2x2x1 cm excision and reconstruction with buccal fat pad flap. Margins were negative, with no perineural-vascular invasion, whereas depth of invasion was of 1.2 mm. In January 2020, patient's complaint of pain at the right base of tongue, spreading to the ipsilateral ear lead to otorhinolaryngologist finding a neoformation in the right lateral wall of the oropharynx. Urgent incisional biopsy revealed a G2-G3 invasive squamous cell carcinoma of the pharynx.

Conclusion: It remains unclear if there could be any association between the onset of the metastatic lymph node of the neck in 2017, and the three SCCs

arisen in the oropharyngeal district between 2019 and 2020. Positron emission tomography (PET) revealed no significant findings. Unfortunately, no histological comparison between the metastatic lymph node and the SCCs could be performed, with the former being treated outside Turin. In any case, field cancerization could only partially explain this unusual chain of events, especially with OSCCs occurring after more than 30 years from the first OLP diagnosis. To our knowledge, this is the first case report available in literature of a patient affected by long-term OLP with neck lymph node metastasis from unknown primary focus and oropharyngeal field cancerization. In this case, strict clinical follow-up and careful oral examination were not sufficient to prevent the onset of invasive SCCs.

Oral Cancer knowledge within the oral and medical professionals in Italy: a preliminary survey

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Aim: The diagnostic delay for Oral squamous cell carcinoma (OSCC) may be the responsible**;** it can be distinct as "professional delay" and "patient delay". Then, early detection and prevention (e.g. counselling for habits, adding patients in follow-up with personalised timing play) play a key role in OSCC prognosis and the oral professionals constitute the main player. The examination of the oral cavity is crucial for detection of OSCC: all this depends on oral cancer knowledge and attitudes within the oral professionals. The aim of this study was to investigate oral cancer knowledge and attitudes among the oral and medical professionals in Italy, in order to perform a more comprehensive survey and plan educational interventions.
Methods: This cross-sectional survey was conducted between November 2019 and January 2020 among a random sample of the target population in Italy (dentists, dental hygienists, physicians). A web-based questionnaire was sent to the target population using e-mail, WhatsApp™ and Telegram Messenger chat room, Facebook, by building on the knowledge of all authors and colleagues. The questionnaire included demographic semi-closed ended questions assessing the personal features of respondents, and the second group of closed-ended questions to obtain individual oral cancer attitudes and knowledge, as epidemiology in Italy, risk factors, diagnostic procedures, clinical presentation, clinical management. All questions were clear and unambiguous: a pilot test of the questionnaire was performed among a random sample of 10 dental residents of the University of Verona to ensure practicability, validity, and interpretation of answers. Then, the questions were revised considering the comments obtained before sharing the link of the web-based questionnaire to the study sample.
Results: A total of 98 questionnaires were returned. The mean age of respondents was 34,66 years, 63 were male and 35 were female. Further, participants recruited were 56 form Northern Italy and 48 from the South. 78 participants declared to be dentist, 5 dental hygienists, 15 physicians. 64,28% of participants reported that every year, in Italy, < 3000 of new cases of OSCC are registered. Moreover, among all risk factors for OSCC, smoking was identified by 74,5% of participants, and 71,4% identified alcohol as one of the risk factors. However, only 37,8% of the participants indicated traumatic prosthetic injuries as a risk factor. HPV was identified as a risk factor by 64,3% of the interview. Correctly, 80,1% of participants reported the most common first manifestation to be an ulcer and identified the tongue as the most common site (66,3%). However, only 51% of respondents highlighted all possible symptoms of OSCC (post-extraction site that does not heal, tooth mobility not related to periodontal disease, difficulty to swallow, sensitivity alterations, ear pain).
Conclusion: In this study, the attitude of the dental and medical community towards OSCC was positive but improvable for a better clinical practice. In detail, the results showed good knowledge of risk factors and clinical features of the disease, but more than half of interviewed reported that every year, in Italy, < 3000 new cases of OSCC were diagnosed, with a considerable underestimation of the disease; this could lead to underestimating the importance to perform a complete oral clinical examination for all patients. However, it is necessary a larger scale study and the results of this might be viewed in epidemiological and environmental ways in order to design appropriate intervention planning and continuing education to improve knowledge of Italian dental community about OSCC.

Worst pattern of invasion as prognostic factor in oral cancer

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Aim: HNSCC is one of the most common cancers in the world and approximately 600,000 new cases

are diagnosed each year. It is caused by multiple factors that can alter DNA in cells. The strongest risk factors for developing this type of cancer are tobacco consumption (including smoking or the use of chewing tobacco) and alcohol consumption. In the "TNM" tumor staging system, the management and prognosis of HNSCC depend on the stage of the primary tumor (T), on the lymph node involvement (N) and on the presence or absence of metastasis (M); to these is added the evaluation of the DOI (Deep of Invasion) of the primary tumor. Subsequently, the histopathological analysis of the infiltration profile of the primary tumor led to the creation of an additional parameter for the staging of the HNSCC (precisely of the OSCC): WPOI. The risk of regional metastasis is generally related to the T category as well as worst tumor pattern of invasion (WPOI). Cervical metastases are uncommon among tumors with nonaggressive WPOI (types 1, 2, 3) with increasing likelihood of metastasis for WPOI-4 and WPOI-5. Worst pattern of invasion (WPOI) is a validated outcome predictor for oral cavity squamous carcinoma patients. To simplify prognostication, the only cutpoint recommended for assessment is whether or not WPOI-5 is present. WPOI-5 is defined as tumor dispersion of ≥ 1 mm between tumor satellites

Methods: 100 patients with oral cancer were included in this study. We evaluated the Pattern of invasion (POI) score was defined as follows: POI-1 (pushing, well-delineated infiltrating borders); POI-2 (infiltrating, solid cords, bands and/or strands); POI-3 (small groups or cords of infiltrating cells > 15 elements); POI-4 (marked and widespread cellular dissociation in small groups of cells < 15 elements); and POI-5 (tumour satellites of any size ≥ 1 mm away from main tumour or next closest satellite with intervening normal tissue). At the invasive tumour front, we scored the predominant pattern of invasion (PPOI), and the worst pattern of invasion (WPOI). For the WPOI no minimal cut-off value of its extension was established. Statistical analysis was performed by using SPSS 20.0. Patients were categorized for each POI from 1 to 5. Univariate analysis was evaluated by log rank test. Survival time was evaluated in months. Multivariate analysis was build in order to explore the prognostic value of the main clinic-pathological variables together with the perineural invasion. Gender, staging 7th AJCC edition, age and grading were used in the model. Results were reported as Hazard Ratio (HR) and 95% Confidence Interval (C. I.). p values <0,05 were considered as statistically significant.

Results: Of 100 patients, only 5 patients reported WPOI-5. These patients did not report a worse overall survival compared to other WPOI grades. While comparing patients with different grades of WPOI, this variable showed inconsistent and not statistically significant results.

Conclusion: Results from this study do not support current evidence showing that WPOI is prognostic factor in OSCC, above all WPOI-5. These results may be due to the small number of patients showing WPOI-5 and shorter follow-up periods.

Monostotic fibrous dysplasia of the maxillary sinuses in young people: a case series

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Aim: Fibrous dysplasia is a rare bone disease, caused by a mutation of GNAS gene, clinically maninfest in the monostotic form (when occurring in a single bone) and in polyostotic form (when multiple bone involvement occurs). The polyostotic form may display additional clinical symptoms/sings such as like cafè-au-lait spots of the skin, endocrinopathies; such association defined the McCune-Albright syndrome [1]. The surgical management of patients with intrasinusal lesions is still controversial, especially to prevent recurrence and/or cosmetic and functional sequela. [2] We described the clinico-pathological aspects, the surgical management and the clinical outcomes of three young patients recently referred to Complex Operating Unity of Odontostomatology of the University of Bari "Aldo Moro".

Methods: Patients were all males (13, 15, 18 year-old). Two cases showed painless progressive swelling on the cheek; in one case maxillary lesion was occasionally founded on radiogram. Patients underwent to spiral CT which showed spot lesions of the maxillary sinus with well defined borders and without dental involvement. Although suggested, no genetic consulting has been obtained. The chosen surgical treatment was biopsy of the lesion along with bone remodelling. Histological examination of the surgical specimen showed an osteo-fibrous lesion with production of bone and presence of Chinese characters, thus confirming the clinical diagnosis. Patients were followed-up every three months for the first years and panoramic radiographs were performed to prevent lesion recurrence and/or growth.

Conclusion: Considering location, extension and especially age of occurrence, we preferred a conservative treatment in all cases as to prevent both functional and cosmetic complications. A close clinical and radiological follow-up is mandatory especially when not demolitive surgery has been performed. To date, a general clinical consensus about the surgical management of young patients affected by fibrous

dysplasia lesions occurring in the maxillary sinuses; furthermore studies are needed to better define the surgical management of craniofacial fibrous dysplasia, considering that classically highly variability of age, extension and long-term recurrence.

Osseous-cartilaginous choristoma: a rare case in the palatal mucosa

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Aim: Choristoma is a cohesive tumorlike mass consisting of normal cells in an abnormal location. Oral choristoma is rare and it can consist of various tissues. An osseus-cartilaginous choristoma is a benign tumour consisting of bone and cartilage where bone and cartilage do not normally occur. The purpose of the present study is to report a case of palatal osseus-cartilaginous choristoma.
Methods: A 88-years old female reported having for many years a symptomless swelling in the retro-incisal area of the palate. The swelling appeared as a sessile nodular mass of about 0,6 cm of maximum antero-posterior diameter. It was covered by white mucosa, it was hard in consistency and painless on palpation. On the orthopanoramic radiograph, no pathological sign was clearly visible. The subsequent occlusal intraoral radiography revealed a roundish shaped homogeneous radiopaque area, located at the level of the inter-incisive area of the pre-maxilla. The mass was surgically removed under local anaesthesia. A losangic incision was performed in palatal mucosa at the level of the retro-incisal area, including the hard mass, which was then separated from the underlying osseous plate. The resected specimen was fixed with 10% neutral-buffered formalin and sent for microscopic examination. A surgical dressing was applied on the wound and removed after 7 days.
Results: The healing process took place without complications and discomfort. The microscopic analysis showed, in the contest of the oral mucosa chorion, an ovalar formation consisting of both dense lamellar bone and mature cartilaginous tissue, without any relevant atypia. The osseous trabeculae were surrounded by an osteoblastic border and were characterized by slightly fibrotic trabecular spaces. The overlying oral mucosa was characterized by orthokeratotic hyperkeratosis with minimal aspects of pseudoepitheliomatous hyperplasia.
Conclusion: Although many tumorlike masses, composed of differentiated cartilage or normal mature lamellated bone in soft tissues, have been reported in the literature, only a few cases have been reported in the soft tissue of the oral cavity. Furthermore, the palate location is rare. In conclusion, oral choristoma is a rare benign lesion which can be resolved by simple surgical excision.

Oral squamous cell carcinoma in a patient affected by graft-versus-host disease 20 years after allogeneic hematopoietic stem cell transplantation: a case report

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Aim: Graft-versus-host disease (GvHD) is a immunologic complication of allogeneic hematopoietic stem cell transplantation (HSCT) that may affects several organs and tissues. The oral cavity is the second most commonly affected organ, with a wide variety of lesions that could heavily impair the oral function and the quality of life of patients. The interactions between chronic inflammation and therapy-induced immunosuppression are not fully understood, however, a immunosuppression status in a field of chronic inflammation, as in GvHD, may interfere with tissue repair and enhance the risk for tumour genesis.
Indeed, the incidence of oral squamous cell carcinoma in patients with GvHD has been reports as 4 to 7 times higher than general population. We report the onset of a OSCC in a patient affected by GvHD, as a possible late complication of HSCT.
Methods: We report the case of a man, who was referred to our Sector of Oral Medicine (University Hospital Policlinico "P. Giaccone" of Palermo, Italy) for the presence of diffuse aphthous lesions in the oral cavity.
Results: A 59-year-old male came to our attention, showing ulcerative lesions on the chewing mucosa of the 2nd sextant. The clinical history included diabetes, bone marrow transplant on 1999 due to a chronic myeloid leukemia, left kidney removal and testicular carcinoma. He reported no alcohol consumption and smoking 8 cigarettes a day. The clinical examination revealed the presence of a ulcerative symptomatic lesion on the chewing mucosa of the upper anterior teeth, with extension from the vestibular side to the median portion of the hard palate. Based on a high suspicion of malignancy, patient underwent a magnetic resonance imaging that highlighted an oval lesion measuring 1.5 cm x 0.6 cm x 0.8 cm with irregular margins, with contrast enhancement. Subsequently,

an incisional biopsy was carried out; furthermore, the microbiological examination test for HPV investigation were run. The histological examinations showed an epithelium discontinuously infiltrated by atypical cells with OSCC characteristics; the microbiological examination test was negative for HPV infection. Due to the confirmed diagnosis of OSCC, patient was subsequently referred to the Department of Oncology for the staging and management.

Conclusion: Patients affected by GvHD due to HSTC, have been shown to have an increased risk of developing OSCC, although the pathogenic mechanism are not yet clear. Usually in this group of patients the incidence of OSCC ranges from 1.2 to 1.6% at 5 years, from 2.2 to 6.1% at 10 years, and from 3.8 to 14.9% at 15 years post HSCT. Our case show how OSCC in these patients can develop even after many years (i.e. 20 yrs); additionally our case highlighted the need for a continuous multidisciplinary surveillance of patients with GVHD. Indeed, the onco-haematologists should carefully coordinated a multidisciplinary team during the long term follow-up, team that should include an oral medicine specialist, in order to manage HSCT complication and, eventually, promote early diagnosis of OSCC.

Analysis of long non-coding RNAS expression in squamous cell carcinoma

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Aim: he aim of the work is to carry out a retrospective study, through histological and molecular biology analyses, to identify Long non-coding RNAs (LncRNA) as biomarkers of oral carcinoma. Through a careful analysis of the literature, we intend to clarify the role played by the most often mentioned types of LncRNAs in the different clinical types of oral carcinoma, in order to identify reliable biomarkers, to better characterize the staging of neoplasms. Since, in recent decades, despite public awareness campaigns promoted by dental professionals and scientific societies, the survival rate has remained unchanged, at around 50%, it is considered appropriate to refine the clinical study of this neoplasm, with biomarkers capable of predicting local aggressive behavior, the ability to metastasize, the possibility of relapse and the response to treatments. The study is useful for providing tools, and be able to consequently plan more personalized approaches for the patient; to try to be more incisive and targeted, up to the molecular level, in the eradication of the disease in affected patients; or to be more aware of the management of the quality of life, in the case of injuries no longer removable surgically. Several Long non-coding RNAs were correlated with poor prognosis in patients with OSCC, and could potentially be used in clinical practice, as biomarkers.

Methods: By searching the database of the medical records archive at the Hospital of Circolo, we identified the numbers corresponding to patients diagnosed with Oral Squamous Cell Carcinoma / Verrucous Carcinoma treated in the years 2010-2015. At the Pathology Anatomy Service of Circolo Hospital, we recovered the stained slides in hematoxylin-eosin, and other immunohistochemical investigations carried out previously. Each sample included were in sufficient quantity to obtain the following useful indications for the retrospective study. The paraffin samples stored in the archive, were subjected to nucleic acid extraction, using special kits. RNA was pre-amplifier to complementary DNA (cDNA), to increase stability. Neoplastic and noncancerous matched tissue samples were subjected to molecular biology analysis with RT-PCR Arrays, for the identification of LncRNA that were suggestive of aggressive clinical behavior, capacity for lymph node metastasis, and frequency of recurrence and survival.

Results: In the preliminary results, 9 carcinomas were identified, and three sub-categories were characterized: Verrucous carcinoma, Metastatic Squamous cell carcinoma and Non-Metastatic Squamous cell carcinoma. Higher expression levels of some LncRNA's, such as HOTAIR, were detected in tumor tissue, when we compared the samples of noncancerous matched tissue (NCMT) with neoplastic tissue (NT). Identification of a greater or modify expression of Long non-coding RNA's in the neoplastic tissue was correlated with the histological type and with clinical behavior, and a higher expression was found in Metastatic Squamous cell carcinoma, in comparison with the other groups.

Conclusion: The preventive evaluation of LncRNA's expression, and a better understanding of their role, could give a more thorough perspective on the future treatment options for this cancer type.

A rare case of oral lichen planus phemphigoides

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Aim: Lichen Planus Pemphigoides was first described by Kaposi in 1982 as a variant of Bullous Pemphigoid or Lichen Planus. Recent studies have shown that it is a distinct entity characterized by lichenoid and bullous lesions developing in the context of autoantibodies targeting type XVII collagen (COL17). Prevalence of LPP is approximately 1 : 1,000,000. LPP has no gender predilection and commonly affects adults in the fourth or fifth decades, but it has also been described in childhood. Etiology is primarily unknown, but it may be associated with infections or drugs. The diagnosis of LPP is made on clinical, histopathological, and immunopathological features. Clinical features include blisters and erosions that appear on preexisting lichenoid lesions or uninvolved skin or mucosa, frequently affecting upper and lower extremities; however, it may present in other body areas and limited to the oral cavity. Oral LPP frequently affects the gingiva and buccal mucosa, presenting as desquamative gingivitis, or with Wickham striae, ulcerations and/or bullae.
Methods: An 36-year-old man was referred at our Oral Medicine Unit for the presence of multiple ulcerative lesions in buccal mucosa and concomitant bullous lesion in first quadrant. Patient reporter the onset of lesions several weeks before, and he was unable to eat or drink normally. Patient's medical history only reports a long history of smoking. Familial medical history reveal familiarity with autoimmune diseases; mother and other family members are affected by autoimmune thyroiditis, while sister by dermatomyositis. An incisional biopsy of the affected area findings lichenoid tissue reactions with subepithelial bullae on routine histology and linear deposits of IgG and C3 along the basement membrane zone with DIF. Clinical and histopathologic findings were consistent with oral LPP.
Results: On routine histopathology, LPP demonstrates lichenoid features with subepithelial bullae, while it shows linear deposits of IgG, IgA, and C3 along the basement membrane zone at Direct immunofluorescence analysis. Treatment of LPP comprises topical or systemic corticosteroids and/or immunosuppressants. Oral LPP management includes minimizing trauma from sharp teeth and food, topical corticosteroids and concomitant topical antifungal prophylaxis for oral candidiasis. Prognosis of LPP tends to be better compared with BP, mucous membrane pemphigoid, and LP with an estimated recurrence rate of 20%.
Conclusion: LPP is a very rare immunological disorder and for this reason it is difficult to diagnose. Correlation of clinical findings, routine histopathology, and DIF studies is essential for the diagnosis.

Significance of PTH1R variants of an italian sample with primary failure of eruption

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Aim: Primary failure of eruption (PFE) is characterized by non-syndromic eruption failure of not ankylosed teeth, which fail in their eruptive process partially or completely, without any systemic disease or mechanical interference identifiable. This condition is different from the mechanical eruption failure (MFE) due to a mechanical obstacle. Primary eruption failure is an eruptive anomaly whose cause must be found in heterozygous variants of the gene encoding the Parathyroid receptor 1 (PTH1R, OMIM * 168468), located on chromosome 3p21.31. Aim of this work is to identify clinical and radiographic characteristics that distinguish PFE from other eruptive disorders, by comparing the clinical characteristics between positive and negative patients for PTH1R variants and by observing the genotype/phenotype correlations in positive patients in light of the differences in the type of variants found. Furthermore variants significance has been analyzed evaluating their pathogenicity through a comparison with those reported in dedicated databases. In this way, the combination of genetic information and clinical data is used to expand knowledge on the genotype-phenotype correlation of PFE.
Methods: A data set of 38 patients (22 males and 16 females) with eruption disorders was collected at the Università Cattolica del Sacro Cuore in Rome. Clinical examination and panoramic x-ray were used to assess the dental phenotype and the localization of the eruption problems. Patients' selection was based on the clinical characteristics described by Stellzig-Eisenhauer et al. For DNA extraction, salivary cell samples were collected using special "salivary brush" usually used for these types of samples.
Results: After mutational analysis, patients with clinical PFE were placed into 2 categories: 17 with PTH1R variants and 21 patients negative for variants in PTH1R. In patients positive for the genetic test, were found typical features in agreement with phenotypic signs suggested by literature, such as involvement of posterior teeth, involvement of the distal teeth to the most mesial affected, coronal bone resorption of the affected teeth, involvement of both deciduous and permanent teeth, altered vertical growth of the alveolar process and posterior open-bite. In patients without variants a less clear phenotype has been found, which often involved only one tooth or a

single arch. In our patients 13 PTH1R variants were identified: 8 reported in the public databases, 5 novel and probably pathogenic.
Conclusions: Our results suggest that clinical and radiographic exams can be enough to give a prognostic preliminary opinion about the presence of PTH1R variants, but that the genetic analysis is indispensable for a certain diagnosis, in order to avoid therapeutic errors. So we conclude that the genetic analysis and further genotype-phenotype correlation studies result indispensable to focus on the molecular and biological basis of PFE and, especially, to avoid unsuccessful orthodontic treatments.

Oral Lichen Planus, oral hygiene and food: a non-pharmacological approach. A case report

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Aim: Oral lichen planus (OLP) is a chronic inflammatory disease of the mucous membranes and unknown etiology of which however some endogenous triggering agents are recognized, such as stress and heat shock proteins, synthesized in case of exposure of the cells to high temperatures with the intent to protect them. In this case, we want to highlight this possible correlation regarding the etiology as well as the effectiveness of home and professional oral hygiene in the control of symptoms and recurrences of acute states.
Methods: A 40-year-old patient presented to our observation for diffuse erythema on both dental arches, initially compatible with a picture of desquamative gingivitis. In the anamnesis he did not report general health problems, but an immoderate consumption of chilli pepper and intake of excessively hot or cold foods and drinks due to the marked insensitivity acquired with the excess of capsaicin taken. It was decided to carry out a professional hygiene session with motivation for home hygiene (the patient had been instructed in the execution of the Bass technique modified with a Dentosan compact toothbrush, medium bristles, and correct use of the Curaden curaprox bottle brush), while waiting to perform incisional biopsy. Total abstention from the consumption of chilli and other irritating foods (chocolate, coffee, spices, aubergines, peppers, tomatoes, peanuts, citrus fruits, kiwis, strawberries) was recommended and to restore hydration, which was found to be deficient, with 30 ml of water per kg of body weight. The histological examination confirmed the diagnosis of oral lichen planus. At the bi-monthly checks, without the use of any drug, the patient presented a clear clinical improvement, without gingival bleeding and without sensory alteration. Chili had been reintroduced to the diet. The checks performed at 3 years already showed a good condition of the oral tissues which, after 7 years, are further improved with the absence of symptoms and no restriction in the consumption of food.
Results: The gold standard for the therapy of oral lichen planus is topical cortisone or immunosuppressants and antifungals to avoid fungal superinfections. However, these drugs cannot be taken for long due to any side effects. Previous studies on the treatment of gingival lichen planus with rigorous oral hygiene protocols have given excellent results (University of Turin). Further studies have correlated a worsening of periodontal conditions and an alteration of the oral microbiota in patients with lichen planus compared to the control groups.
Conclusion: These results have led us to an extremely conservative approach to solving this case, showing how professional and home oral hygiene is crucial also in cases of autoimmune diseases exacerbated by chemical irritation. This case report also highlights how important the diet and poor hydration can be in the genesis and treatment of this widespread condition. Further clinical trials need to be performed to confirm this hypothesis.

A conservative surgical approach for the treatment of an odontogenic keratocyst: a case report

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Aim: Odontogenic keratocysts (OKCs) are one of the most aggressive cysts in the oral and maxillofacial regions because of their high recurrence rate and infiltrative behavior, and the treatment of choice is always surgical excision. This case report aims to emphasize how treating an odontogenic keratocyst (OKC) with a conservative surgical approach, leads to a faster and less invasive procedure, which is eventually followed by better healing of the lesion. The main challenges of this treatment were to preserve the vitality of the teeth where the lesion developed from, and also conserving their gingival margin height without altering the aesthetics of the incisor-canine area.
Methods: A 48-year-old female patient without any significant past medical history was referred to the Oral Pathology and Oral Medicine Unit, IRCCS San Raffaele Hospital, Dept. of Dentistry, for the evaluation of an asymptomatic swelling between teeth 22 and 23. The clinical objective examination showed a swelling of the gingiva between the apexes of 22 and 23.

The expert asked a radiologic examination, a cone-beam computed tomography (CBCT), to evaluate the extension of the lesion. Axial and sagittal cuts of the CBCT showed a small unilocular radiolucency that suggested the presence of an odontogenic cyst. The surgical excision was scheduled with the aim to preserve as much the esthetic of the front gingival area. After the administration of local anesthetic the lesion was enucleated. The surgical site was thoroughly irrigated with saline solution and the wound closed with a simple interrupted suture.

Results: The cyst was excised entirely with no attachment to the underlying bone, and the surgical sample was sent for the histopathological examination and returned a diagnosis of odontogenic keratocyst. After one week the patient came back for a post-surgical check-up. A second follow-up visit was set up after 3 weeks and the third one after 3 months, in which the assessment of pulp vitality through cold test for 22 and 23 was positive. Subsequently, 3-months follow-ups were scheduled to check for any possible recurrence. A conservative approach was possible due to the superficial position and the limited extension of the lesion, leading to fast healing, as shown in the 6 months follow-up CBCT.

Conclusion: Cone-beam computed tomography (CBCT) is the radiologic exam of choice for diagnosis and management of cystic lesions since it has a central role in assessing the real 3D dimension of the lesion and verifying its relationship with the adjacent anatomical structures. Whenever possible, a conservative approach should be the first option in the surgical treatment of cystic lesions to preserve the adjacent bone, soft tissues, and teeth. Complete surgical excision of cystic lesions minimizes the risk of recurrence and patient morbidity. In any case, long-term clinical and radiographic follow-up is mandatory for keratocystic odontogenic cysts, since recurrence is very common and it has been reported even several years later.

Role of intraoral customized devices in reducing oral mucositis in patients treated with VMAT-IGRT for H&N cancer

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Aim: Observe whether use of Intraoral Customized Devices (ICD) can prevent from high grade radiation-induced oral mucositis (OM) in patients receiving VMAT-IGRT (Volume Modulated Arc Therapy – Image Guided Radiotherapy). RT is commonly employed for management of Head&Neck Cancers (HNC). Prevention of radiation-induced adverse effects remains a challenging task. Oral mucositis is common during RT for HNC. Despite advances in conformational RT techniques, exordium of OM significantly affect disease's management and patient's quality of life1. ICD are simple custom-made prosthodontic devices which prevent radiation-induced toxicity to healthy structures (eg. oral cavity, salivary glands) by enhancing jaws'separation2,3.

Methods: Two consecutive caucasian patients needing VMAT-IGRT for HNC are presented. ICD were designed and delivered during pre-treatment oral assessment (indication for employment stated by multidisciplinary team for HNC management). IGRT-Cone Beam Computed-Tomography was used to check correct position of ICD during VMAT-IGRT sessions. Onset and gravity of acute radiation-induced adverse effects (OM and xerostomia) were assessed (RTOG classifications1) during and after (1 month) treatment. Patient#1: a 79 y.o. female patient complaining for tearing and nasal obstruction since 1 year was diagnosed of cribriform pattern adenoid cystic carcinoma of right maxillary sinus in October 2015. The patient was edentulous and wore dentures. Patient#2: a 54 y.o. male patient complaining for nasal obstruction and epistaxis was diagnosed of squamous cell carcinoma of right maxillary sinus in January 2016. The patient was completely dentate.

Results: Patients underwent surgical intervention for HNC involving maxillary sinus before RT. No dental pre-RT treatments were necessary and RT was completed without interruptions/delays (radiation fractionated dose:60Gy/30fr/2Gy). No difficulties/errors in wearing ICD were observed. Mild OM and xerostomia (RTOG grading 1) appeared at the end of RT (22 days/patient#1; 30 days/patient#2) and resolved one month after RT. Dysgeusia and anosmia were also experienced by patient#2, these alterations were persistent (slight improvement) during follow-up in this case. Patient#1, later diagnosed of metastatic breast cancer, is now on palliative care. Patient#2 was diagnosed of HIV infection following investigations after recurrent purulent maxillary sinusitis. This patient is in stable health conditions after starting antiretroviral therapy.

Conclusions: Several ICD have been employed in support to RT for dose reduction of surrounding healthy structures in HNC cancer. Positional ICD were found to be effective in reducing dose and adverse effects of conventional/conformal RT for HNC2. Limited experience exist regarding combination of ICD/VMAT-IGRT3. Promising results regarding delay and reduction of OM and xerostomia were observed

in our patients. Combination of ICD and highly-conformal RT in managing HNC could be of some benefit in OM prevention in accordance with available literature2, this probably reflects dose reduction to oral mucosa and salivary glands as observed in our previous experience as well3.

Bicarbonate sodium oral-rinse in patients with oral mucositis induced by chemotherapy and radiotherapy: does it give a real chance for management?

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Aim: Oral mucositis (OM) is an acute complication of radio treatment and chemotherapy of head-neck cancer. OM is characterized by erosive-ulcerative lesions, often complicated by fungal over infections. The most important discomfort of OM is pain, which can also be debilitating for nutrition and all stomatognathic functions. In 2004 MASCC/ISOO published guidelines for OM treatment, that have been revised in 2007, 2014 and 2019. Many agents have been tested for the prevention, treatment, or relieve symptoms of OM, and sodium bicarbonate is one of mouth-rinses most widely recommended. In the section Basic oral Care of MASSC/ISOO guidelines, it has been reported that use of sodium bicarbonate is an effective and inexpensive method for the treatment of pain secondary to OM but, at the best of our knowledge, there is no scientific evidence. Aim of this paper is to review the efficacy of sodium bicarbonate oral-rinse for the treatment of radio/chemo therapy-induced oral mucositis.
Methods: A literature search has been carried out to review the efficacy of the sodium bicarbonate in preventive or treatment of OM induced by radio-chemio therapy.
Results: Basic oral care strategies are always and strongly suggested for OM management; but no evidence has been reported in the international guidelines for mouthwash prescription. Moreover, most indications of suggested clinical practice are based on expert consensus opinion. Several mouthwashes have been proposed; interestingly, there is a lack of agreement, especially for the use or not of sodium bicarbonate and chlorhexidine (CHX) mouthwashes. MASCC and ESMO guidelines suggested to rinse with "harmless" sodium bicarbonate and to avoid the CHX mouthwash in every condition. On the contrary, Italian Health Ministry recommendations (2014) advised CHX rinses for the prevention and benzydamine mouthwash for the control of symptoms and signs of OM. Furthermore, the literature contains conflicting results on the use of the sodium bicarbonate oral-rinse for both preventive and therapeutic management of OM. In fact, some authors successfully report the use of sodium bicarbonate in the treatment of mucositis pain, but in association with other medication, for example lidocaine and diphenhydramine. Systematic reviews show an inefficient anti-microbical activity of sodium bicarbonate: a randomized control trial of benzydamine versus sodium bicarbonate for prophylaxis of OM shows that 19% of patients treated with sodium bicarbonate needed to be treated with oral antifungal agents. Sodium bicarbonate seems to be effective in reducing pain during treatment, but there are not significant results in sodium bicarbonate rinses for preventive purposes: a trials study shows that the first evidences of oral mucositis in group treat by sodium bicarbonate was found in forth weeks of treatment, while the appearance of mucositis in placebo group was occurred in the third week. Besides, no protective action has been showed against secondary infections in OM.
Conclusion: Unfortunately, no evidence has shown in the literature on the real therapeutic action of sodium bicarbonate oral-rinse for the prevention and/or management of OM; probably the concurrent association with drugs or substances doesn't reveal its real effectiveness. Further studies are needed to demonstrate whether it is actually useful in the management of oral mucositis.

Patients suffering with hereditary angioedema requiring periodontal treatment: prophylaxis of acute attacks, a novel short-term protocol

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Aim: C1-inhibitor (C1-INH) related hereditary angioedema (C1-INH-HAE) is a rare pathological condition caused by a deficiency or a functional alteration of serum protein C1-INH, with a reduced prevalence varying from 1.09 to 1.151/100,000 for habitants. Clinical manifestations are represented by recurrent, potentially life-threatening episodes of cutaneous or mucosal edema. The present study analyzed the effectiveness of a specific short-term prophylaxis protocol for the management of C1-

INH-HAE patients requiring chronic periodontitis treatment. Short-term prophylaxis of acute HAE attacks is indicated in the case of dental procedures or oral surgery since these may induce swelling of the lips, the face, the tongue or even a laryngeal edema with upper airway obstruction. Cases of death by asphyxiation due to laryngeal edema following oral procedures in HAE patients have been described.
Methods: 12 consecutive C1-INH-HAE patients with mild to moderate chronic periodontitis were treated by non-surgical periodontal therapy with a full-mouth scaling approach (FMS) in two sessions 24 h apart. The inclusion criteria were diagnosis of HAE; a minimum of two teeth in each quadrant with a probing depth (PD) ≥ 5 mm; ≥ 40% sites with bleeding on probing; and no involvement of furcation. The exclusion criteria were periodontal therapy during the last 12 months; pregnancy; previous or current radiation or immunosuppressive therapy; medication by anti-inflammatory and immunosuppressive drugs; previous history of excessive drinking; smoking; and class II and III tooth mobility. All patients underwent a short-term prophylaxis protocol of acute attacks based on the association of attenuated androgens (danazol), from 5 days before the first FMS session to 2 days after the second FMS session, and C1-INH concentrate given 1 h before the first FMS session. Patients were examined for periodontal changes over a 6-month period.
Results: Compared to baseline, scaling and root planing (SRP) treatment at 6 months, a statistically significant improvement in probing depth (PD) (baseline: 5.24 mm ± 0.85 mm vs 6 months: 2.96 ± 0.31 mm), clinical attachment level (CAL) (baseline: 5.46 ± 0.81 vs 6 months: 3.89 ± 0.38 mm), full-mouth bleeding score (FMBS) (baseline: 27.6 ± 2.2% vs 6 months: 18.5 ± 2.1%) and in full-mouth plaque score (FMPS) (baseline: 28.6 ± 2.4% vs 6 months: 21.66 ± 3.3%). No acute HAE attack was observed in any patient during the FMS sessions or the following 6-hour hospital stay. After completion of the FMS procedure, two patients showed slight sign of facial swelling/ edema or other HAE symptom after the last session, as reported by the patients and as observed at the clinical evaluations scheduled on day 3 and day 6. Other patients developed complications or edema up to 1 week postoperatively.
Conclusions: This study showed the clinical effectiveness of the reported prophylaxis protocol in preventing acute attacks in HAE patients requiring non-surgical periodontal treatment, although it cannot be avoided, with no complications up to 1 week after FMS. It is important for both patients and doctors to know the clinical characteristics of early symptoms to perform timely interventions in case of emergency. In conclusion, patients with a history of C1-INH-HAE should be subjected to an accurate clinical and laboratory examination before any dental procedure.

Psychological reactions to COVID-19 of Italian dental practitioners during the lockdown period

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Aim: The aim of this study is to analyze the reactions of dentists from different parts of Italy in relation to Sars-CoV-2 pandemic professional restrictive measures due to Italian national administrative order of 10 March 2020 (DM-10M20).
Methods: An online structured survey composed of 40 questions has been sent to dental practitioners all over Italy to analyze their reactions in relation to Sars-CoV-2 pandemic restrictive measures DM-10M20. Data collection took place in the time period from 2 April to 29 April 2020. The survey was created using the free-access Google Forms application and the link to the online survey was sent through an anonymous mailing list. Questions taken from the Generalized Anxiety Disorder 7-item (GAD-7) scale were included to assess the presence of general anxiety symptoms. The questions assessed whether in the previous two weeks responders had been bothered by: (1) feeling nervous, anxious, or on edge; (2) being unable to stop or control worrying; (3) worrying too much about different things; (4) experiencing difficulties in relaxing; (5) being restless; (6) becoming easily annoyed or irritable; (7) feeling afraid as if something awful might happen.
Results: 1109 dentists replied to the survey. Given the different distribution of the COVID-19 pandemic in the Italian regions, to assess concerns and psychological responses we divided the sample into two groups based on the number of cases registered in their work area. In the first group we included all the responders working in the Italian regions that had more than 15,000 confirmed cases of COVID-19 as of April 29, 2020. These regions were Lombardia, Emilia-Romagna, Piemonte and Veneto and the responders working in these regions were 828. The second group included responders working in all the other Italian regions, that had less than 15,000 confirmed cases. This group was composed of 281 responders. The 45.2% of the respondents showed minimal anxiety (score 0–4), 34.5% showed mild anxiety (score 5–10), 13.9% showed moderate anxiety (score 10–14), while 6.4% showed a score indicative of a severe level of

anxiety (score 15–21). The mean GAD-7 score was 6.04 (SD = 4.69) for group 1 and 6.19 (SD=4.65) for group 2.

Conclusion: All of the dentists that completed the survey reported high levels of concern about the professional future. Concerns related to professional activity were accompanied by severe anxiety levels.

Effects of zoledronic and alendronic acids on mesenchymal stem cells of the human periodontal ligament: an in vitro study

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Aim: The purpose of this research was to evaluate the biological effects of Zoledronic (ZOL) and Alendronic (ALN) acids, two nitrogen–containing BPs (N-BPs) of third generation in an in vitro model of periodontal ligament stem cells (PDLSCs).

Method: PDLSCs were harvested from healthy third molars after tooth extraction. PDL tissue was mechanically removed by a Gracey curette and PDLSCs were cultured in MesemPro Medium and treated with different concentration of ZOL and ALN. The effects of ZOL e ALN chronic exposure were evaluated on cell proliferation and survival via MTT, apoptosis detection and immunofluorescence. Furthermore, in order to evaluate whether the bisphosphonates taken into consideration was capable of producing a pro-inflammatory profile on PDLSCs, the secretion of pro-inflammatory cytokines was evaluated.

Results: After 48 hours of treatment with ZOL 5 µM, a reduction in cell viability was observed, this effect tends to worsen at 72 hours. Conversely, ALN concentrations above 10 µM are expected to observe a decrease in viability after at least 72 hours of treatment. In the case of the ZOL, the observation of a maximum cytotoxic effect at the concentration of 5 µM, after 3 days of exposure, allowed to select a concentration range between 0.1 µM and 5 µM for subsequent studies. After only 3 days of exposure to ZOL 1.5 µM, reduced cell proliferation was observed.
In order to verify whether the reduction in proliferation was due to the induction of cell damage, the percentage of PDLSCs in apoptosis was assessed. After 4 days of drug treatment, evident alterations of cell survival were observed for the highest concentrations for both drugs examined. Treatment for 5 days with the bisphosphonates taken into consideration led to alterations in the expression pattern of the mesenchymality markers. In particular, the exposure of the cells to the ZOL and ALN resulted in a considerable increase in the average intensity levels of CD73. In addition, the treatment carried out with increasing concentrations of AL after 48 h showed an increase in the expression of the pro-inflammatory cytokines IL-1, IL-6, a slight increase in the expression of MCP-1 and an up-regulation of VEGF and EGF. In contrast, no significant alterations in IL-4 secretion were observed respect to the control cell population.

Conclusion: Low doses of ZOL are sufficient to bring about a reduction in cell proliferation and viability. Conversely, higher ALN concentrations are required and for a longer treatment time to obtain the same effects. Both drugs do not completely destroy the mesenchymal phenotype. Furthermore, it seems that treatment with ALN after 48 h determines a proinflammatory profile. However, further studies are needed to understand how these drugs are able to modify the secretome of PDLSCs.

mir 21 circulating as a biomarker for HNSCC. Systematic review

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Aim: Head and neck squamous cell carcinoma(HNSCC) represents one of the main neoformations of the head-neck region and is characterized by the presence of squamous carcinomatous cells of the multi-layered lining epithelium of the oral ,larynx and pharynx. The annual incidence of squamous cell carcinoma of the head and neck (HNSCC) is approximately 600,000 new cases all over the world. Currently, 5-year survival from HNSCC is less than 50%, surgical, radiotherapy and chemotherapy therapies are strongly compromising on the quality of life of the patient. Tobacco smoke and alcohol are the main risk factors for squamous cell carcinoma. It is estimated that around 80% of carcinomas are due to these factors Micro RNAs (miRNAs) are a family of small non-coding endogenous RNAs that function in regulating gene expression by regulating a number of biological processes including carcinogenesis.The main upregulated micrograms associated with oral carcinoma are (miR-21, miR-455-5p, miiR-155-5p, miR-372, miR-373, miR-29b, miR-1246, miR-196a, and miR-181) while the regulated down ones are miRNAs (miR-204, miR-101, miR-32, miR-20a, miR-16, miR-17, and miR-125b). MiR-21 represents one of the first oncomirs studied, the upregulation promotes

cell proliferation, inhibits extrinsic or intrinsic apoptosis, and increases cel migration by suppressing a number of target genes, including Tropomyosin alpha-1 chain, (TPM1) phosphatase tensin homologue (PTEN), sprouty RTK signaling antagonist 2 (SPRY2) and programmed cell death 4 (PDCD4).This review therefore aims to verify through the meta-analysis the diagnostic potential of circulating miR-21.

Methods: The formulation of the PICO question is as follows: What are the levels of expression of Mir-21 in blood in patients with oral cancer (OSCC and HNCC) compared to patients without oral cancer? And is also added as a question: Can miR-21 circulation be a potential biomarker for early oral cancer diagnosis? The present systematic review work was performed on the basis of the Prisma protocol. a search was carried out on the PubMed and Scopus databases with the use of keywords. The research produced 628 records which, after the elimination of the overlaps and the application of the inclusion and exclusion criteria, led to a number of 7 included articles.

Results: The heterogeneity of the studies for Odds Ratio is high with Q value 26.616 (P value <0.001) and I 2 was 77.457% for Specificity the Heterogeneity is high with Q value 25.243 (P value <0.001) and I 2 was 76.231 for Sensitivity the Heterogeneity shows data with Q value 27.815 (P value <0.001) and an I 2 was 78.429 %. Therefore, the random-effects model was selected. Diagnostic Odds Ratio was 7.620 (95% CI 3,613-16.070). The results show that the sensitivity is 0.771 (95% CI 0.680 -0.842) (P value <0.001) while for specificity we found 0.663 (95% CI 0.538 0.770) (P value <0.001) figure 3, NLR, 0.321 (95% CI, 0.186–0.554); PLR, 2,144 (95% CI, 1,563–2.943) figure 4. Summary ROC Plot shows how the diagnostic test presents specificity and sensitivity; the AUC calculates starting from the graph was 0.79

Conclusion: In conclusion, our data provide evidence, notwithstanding the limitations of our review, that circulating mir-21 can be used as a potential diagnostic biomarker, and it is hoped in the future that better knowledge of serum or plasma expression of miR-21 can be used as a prognostic and predictive biomarker.

Medical and surgical management of long-term Miescher' s granulomatous cheilitis: a case report

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Aim: Cheilitis Granulomatosa (CG), also known as Miescher's cheilitis, is a rare chronic disease characterized by a recurrent firm swelling of one or both lips, and, histologically, by a noncaseating granulomatous infiltrate, oedema and lymphangiectasia. The present work describes a long-lasting case of CG, followed up for four years.

Methods: In June 2016, a 23 years-old healthy male patient was referred to our Oral Medicine Section for treatment evaluation of CG. Recent medical history revealed a first biopsy in 2011 with a histological report of multinodular chronic granulomatous flogosis, successfully treated with dapsone, prednisone, and topic clobetasol. Despite remaining steady for five years, since 2016 the clinical pattern worsened. A second biopsy of the lower lip revealed a CG with sarcoid-like pattern. However, sarcoidosis was promptly excluded, with chest X-ray showing no signs of bilateral hilar lymphadenopathy and serum angiotensin converting enzyme (s-ACE) within range. Congenital and allergic angioedema were excluded as well.

Results: At first visit, oral examination revealed a severe, firm swelling of lower lip, with a deep, painful and bleeding fissure in the median vermillion. Concurrent exfoliative cheilitis was detected. First-line treatment consisted of one vial per week of intralesional triamcinolone acetonide (Kenacort 40 mg/ml ®) for three weeks. At the end of treatment, a satisfactory reduction of overall swelling was achieved, with healing of lip fissure and improvement of the exfoliative pattern. Patient remained steady until August 2017, when relapse of the lower lip swelling ensued, together with swelling and erythema arising for the first time on the upper lip. Despite topical treatment with clobetasol propionate 0.05% for one month, patient experienced only mild improvement. In September 2017, oral examination showed moderate edema and erythema of lower and upper lip, with mild crusted fissures on the median vermillion of both lips. A novel six weeks protocol with Kenacort 40 mg/ml ® was carried out, with a vial per lip every two weeks. Once again, an overall improvement of symptoms and signs was obtained. From December 2017 to October 2018, no blatant lip swelling, oedema or severe erythema were experienced. However, in October 2018, another relapse occurred, with two submucous nodes detectable in the lower lip and one in the upper lip. Therefore, patient was referred to Plastic and Reconstructive Surgery Unit, where a cheiloplastic of lower lip was performed, confirming diagnosis of CG. Postoperative course was positive, with clobetasol propionate 0.05% being the sole topical therapy required for the subsequent six months. In June 2019, isolated erythema of the upper lip was the only significant finding. Since then, up to February 2020, clinical pattern remained unchanged, and patient was recommended to apply topical clobetasol, whenever necessary.

Conclusion: Due to the very low prevalence in the population, therapeutic proposals are often empirical, coming from case reports and case series, with no controlled trials available in literature. The main aim of treatment is to improve the patient's quality of life, and provide relief from the unsightly appearance of swollen lips. In this case, combination of topical treatment with clobetasol propionate 0.05%, intralesional therapy with triamcinolone acetonide and, ultimately, cheiloplastic, was able to provide satisfying results, both clinically and from patient's standpoint. Nevertheless, further and wider samples, ideally with a multicentric approach, would be needed to assess the validity of our experimental protocol.

Hypercapnia problems using FFP2 mask in dentist's practice

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Aim: Covid 19 world emergency is a problem that is going to change habits of billions of people around the world. Due to the necessity to change operative protocols of sanitary personnel, including dentists, and the use of procection devices like FFP2 masks in clinical practice, has developed some problem. Hypercapnia, also known as hypercarbia and CO_2 retention, is a condition of abnormally elevated carbon dioxide (CO_2) levels in the blood. Carbon dioxide is a gaseous product of the body's metabolism and is normally expelled through the lungs. Carbon dioxide may accumulate in any condition that causes hypoventilation, a reduction of alveolar ventilation Inability of the lungs to clear carbon dioxide leads to respiratory acidosis. Hypercapnia symptoms can range from mild to severe. These symptoms of hypercapnia may arise from shorter periods of shallow or slow breathing, such as during deep sleep. They may not always be a cause for concern, as the body is often able to correct the symptoms and balance carbon dioxide levels in the bloodstream without intervention. Severe symptoms. The symptoms of severe hypercapnia require immediate medical attention, as they can cause long-term complications. Some cases may be fatal. The goal of this study is to understand if continuous use of these devices for hours in a day is causing CO_2 hypercapnia problems in dentists. We proposed a query to 430 italian dentists, in order to discover if they had problems of CO_2 retention during clinical practice using FFP2 masks vs. surgical masks.
Materials and methods: using survio platform we spread a form to a wide range of dentists that use facebbok and whatsapp apps, asking if they had typical symptoms of CO2 recaptation, such as loss of concentration, insurgence of headache, urgence to urinate, etc. 260 of 430 completed the test, 129 males, 127 females
Results: the analysis of the results of this survey shows that the main symptoms of hypercapnia seem to be perceived by the population of dentists surveyed. the problem seems to be more present in professionals between 40 and 60 years of age. Face masks make breathing more difficult. For people with COPD, face masks are in fact intolerable to wear as they worsen their breathlessness. Symptoms seem to be mild, but the problem appears to be present and could affect the health and quality of work and services performed . We suggest to check saturation to subjects wearing FFP2 N95 masks for a long time.
Conclusions: the situation should be monitored with further diagnostic investigations.

COVID-19 IGG/IGM rapid test: an assessment in a sample of children and adolescents

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Aim: The interaction between nephews and grandparents is a constant in Italian society. Grandparents help their families in everyday activities: their support is considered crucial for both social and economic reasons. Epidemiological findings show that COVID-19 cases involving children and young people present generally less severe clinical manifestations than those in adult patients; nevertheless, paucisymtomatic or asymptomatic children might open the door to SARS-CoV-2's spread in the family (Huang et al., 2020; Dong et al., 2020). This infection route could be one possible explanation of the high level of COVID-19 found into elderly Italian population. The capacity to verify with a quick and cheap test if a person has developed antibodies in protection against the virus could help to gather epidemiological information, crucial to support political decisions and social measures involving millions of peoples, especially in the second phase of

the pandemic. Different serological tests are emerging as complementary tools, that can be used with clinical and socio- economic benefits for the whole community, to support the diagnosis of COVID-19. These tests are suitable for surveillance in disease and epidemic control. An accurate assessment of the immunological response provides several benefits (Petherick 2020), especially if a high prevalence of infected people may be asymptomatic (Day 2020). These subjects may hinder the efforts of virus containment, if it is not possible to differentiate between COVID-19 positive and negative individuals. This issue was highlighted in a recent epidemiological study, conducted in the municipality of Vo', Italy, where 43.2% of the confirmed SARS-CoV-2 infections detected across two different surveys were asymptomatic (Lavezzo et al. 2020). This situation calls for serological tests suitable for a fast, cheap and large-scale screening, assessing the patient's exposure to the virus. The aim of the present study is to verify the SARS-CoV-2 serological status (IgM and IgG) of children/adolescents, with and without cohabiting family members who were diagnosed with the virus, using a new serological blood test (Livzon IgM/IgG Covid-19 from Livzon Diagnostics).

Methods: Sample. Participation to the study is on a voluntary-base. Two sample groups will be enrolled. A convenient sample of children/adolescents aged from 4 to 16 years with at least one cohabiting family member diagnosed with Covid-19 through a nasopharyngeal SWAB, will be selected (test group). A second convenient sample of children/adolescents (control group) in the same age range without any cohabiting family member diagnosed with Covid-19 and at least a parent with a negative serological test, will be enrolled. Five municipalities of the Milan Metropolitan Area will provide a list of children with the above-mentioned characteristics, attributing each child a code to prevent disclosure of their names in order to protect their privacy. The municipalities themselves will arrange the appointments for children and parents to carry out the test. In this way, the privacy of the participants will be completely protected. A signed informed consent will be required to parents/guardians as well as to children/adolescents by an employee of the municipality. A sample size of 166 people is enough to estimate an expected prevalence of 12% with a level of confidence of 95% and 5% of error. Questionnaire. Before the serological test will be performed, a questionnaire will be administered to parents in order to collect data regarding demographic characteristics of both parents and child/children, composition of the family, place of living, type of school attended, parents' and child's health conditions regarding both general health and SARS-CoV-2 infection, medication taken and dental check-ups. The questionnaire will be administered through a direct interview to one of the parents performed by a researcher. Statistical methods. Intraclass correlation coefficients (ICCs) for the same observer (intra operator) and different observers (inter operators) were calculated using multilevel mixed model. Sensibility and their 95% Cis will be calculated in COVID-19 disease healed patients. Specificity and their 95% Cis will be calculated in healthy patients. Continuos variables will be summarized by mean and standard deviation or median and first and third quartile (Q1-Q3) Categorical variables will be summarized by number and percentage. Prevalence of serological positive children will be reported with its 95%Cis. Chi square test or Fisher exact test will be used to relate serological results to items of questionnaire. A p value <0.05 was considered statistically significant. Stata 16.1 will be used to analyze the data. All patients were asked to fill a Covid-19 anamnestic questionnaire in accordance with https://ec.europa.eu/eusurvey/runner/Epicovid19_POP customized for this research goals https://docs.google.com/forms/d/e/1FAIpQLSd36Yrl1KZA9o02Elvy5xvZw6agagEOlr4VtIDMh54VgKLjgA/viewform

Prevalence of oral manifestations in patients with inflammatory bowel disease: a case-control study

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Aim: The main purpose of this paper is to evaluate possible correlations between Inflammatory Bowel Disease (IBD) and the oral cavity in order to assess their prevalence in patients versus healthy controls.

Methods: Under the term "Inflammatory Bowel Disease" we include two severe pathological conditions that can affect the entire gastrointestinal tract: Crohn's disease (CD) and ulcerative colitis (UC). Extra intestinal manifestations of IBD are widely studied and affect eyes, skin, joints and the oral cavity with a prevalence rate ranging between 16.7% and 40%. Oral manifestations of IBD can be specific or nonspecific, and not easily recognised by gastroenterologists and dentists themselves. Pyostomatitis vegetans is specifically correlated to ulcerative colitis while cobblestoned mucosa, deep ulcerations, mucosal tags are more likely to appear in Crohn's patients. Aphthous ulcerations, taste changes, halitosis, stomatitis and

an increase in caries and periodontal disease are also reported in literature. In this study 21 patients with IBD (12 UC and 9 CD, age between 22 and 79 years old) were compared with 21 healthy controls, matched by gender and age. Data, regarding every participant's medical history, comorbidity, pharmacological therapy, were collected. In addition, participants filled out a questionnaire regarding their daily habits, self-reported symptoms and frequency of yearly dental appointments. Then participants underwent a dental examination in order to evaluate their mucosal state, DFMT index for caries and their periodontal status.
Results: Data analysis showed that among the most common manifestations there were recurrent aphthae and ulcerations (identified in the 14,3% of the total sample and in the 23,8% of patients), fissured tongue(9,5%), stomatitis (4,7%), taste changes (9,5%), lichen planus (2,4%) caused by the primary disease, due to the state of malabsorption and vitamin deficiency or induced by the pharmacological therapy. DMFT index was slightly higher in patients versus healthy controls ($p<0.05$) whilst not statistical differences were found regarding their periodontal health. Both groups showed little attention in yearly dental appointments with only 47% of patients and 52% of controls undergoing regular dental examinations.
Conclusions: Despite the extreme variability in our participants pharmacological therapy, disease state and years from diagnosis the data collected showed the importance of a multidisciplinary cooperation among gastroenterologists and dental care providers in order to improve patients' oral health and establish more comprehensive management of their disease. It also showed the necessity of raising awareness about role of prevention in dental care treatments.

Antibiotic prophylaxis in dentistry: practical recommendations

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Aim: In April 2019, the UN published a report addressing antibiotic resistance crisis, showing how resistance is growing at such a worrying rate that it will cause an estimated 10 million deaths per year by 2050. Considering this data and the fact that antibiotics are the second most prescribed drugs in dentistry (after analgesics), it is clear that it is of immense importance for the clinician to be updated and confident about how and when to use these drugs. We present a review of the literature to provide clear and simple instructions on the appropriate use of these drugs for the dental specialist.
Methods: Electronic searches were conducted on the PubMed databank to identify reviews about the use of systemic antibiotic prophylaxis in different dental procedures. The search aimed to identify all relevant studies written in English language. Keywords selected were: antibiotic, antibiotic prescription, antibiotic resistance, dentistry, antibiotic prophylaxis, bacteraemia, current guidelines, endocarditis.
Results: Systemic prophylactic antibiotics should be given to patients with a high risk of infective endocarditis (prosthetic valves, previous bacterial infective endocarditis, cyanotic congenital heart disease), or other comorbidities such as type II diabetes (T2DM), those who undergone organ transplantation, immunocompromised patients, splenectomised patients, patients with recent joint prosthetics, patient on bisphosphonates. Adult patients should be administered 2g of amoxicillin/ ampicillin/ cephalexin orally or i.v. or 1g i.v. of cefazolin or ceftriaxone as a single dose one hour prior to the intervention. Adults allergic to penicillin or ampicillin should avoid all of the aforementioned drugs (even cephalosporins due to cross-reactivity) and instead be administered 600mg of clindamycin orally or i.v. with the same modalities. Children (<40kg) should receive posology adjusted according to weight administered 50mg/kg of amoxicillin/ ampicillin/ cephalexin/ cefazolin/ ceftriaxone orally or i.v. If allergic consider clindamycin 20mg/kg orally or i.v. Antibiotic prophylaxis should be given in any procedure involving a mucogingival manipulation, more precisely; in oral surgery in case of purulence, bone manipulations, multiple oral localisations and surgeries lasting longer than 30 minutes, in case of trauma, only when a tooth reimplantation is performed, or in case of infections: maxillary sinusitis, pericoronitis, persistent infection, periapical abscess (only with systemic involvement or in patients with systemic diseases), but not in case of pulpal necrosis or irreversible pulpitis. It should be given for periodontal abscesses, aggressive periodontitis and necrotising gingivitis or periodontitis.
Conclusion: Need for antibiotic prophylaxis depends on various factors; some are patient related (including overall health status) while others are procedure based (type of intervention). As clinicians we should always keep in mind that antibiotic resistance exists and that it poses a notable future threats, but that in our everyday clinical practice we can reduce its burden by applying simple and clear rules such as avoiding their use when not recommended, and stressing the importance of a proper patient compliance.

The role of preoperative intraoral strain elastography in the diagnosis of early oral squamous cell carcinoma

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Aim: Nowadays Intraoral Ultrasound has been widely accepted as a valuable diagnostic tool for oral lesionsdueto the improvements in ultrasound resolution and the introduction of very small probes. Strain Elastography (SE) is a new sonographic imaging technique based on tissue elasticity that can be performed concurrently with ultrasonography. It processes a colorful sonographic map placed on the B-mode image, according to elasticity of the lesions. Elastography has been proven useful for differentiating between benign and malignant lesions in breast, prostate, thyroid, lymph nodes and testes. These findings suggest that elastography combined with conventional intraoral sonography might be useful for assessing the extent of oral carcinoma. The aim of this study was to evaluatethe advantageof SE in diagnosing oral cancer and to compare the SE results with histological ones.
Methods: From January 2018 toJuly 2019, a total of 28patients with suspectedearlyoral cancerlesions, were enrolled in thisstudy at the Department of Oral and Maxillo-Facial Sciences, Sapienza, University of Rome, MoMax (Oral Medicine and Maxillo-Facial) ambulatory. Preoperative intraoral US was performed by a single trained radiologist with 15 years of experience in head-neck radiology, using E-CUBE 15 EX scanner (Alpinion, Seoul, Korea) with two different probes: 3-12 MHz linear and 8-17 MHz "Hockey Stick" transducer. Patients were scanned in semi-prone position, using probes covered with a sterile glove filled with ultrasound gel. Afterconventional ultrasonography, SEwas performed using the same probeswith manual light compression and decompression of the lesionto achieve a valid color-coding. The red area in the SE map was the area with the greatest strain (softest component); the green area, with average strain (intermediate component) and the blue area with no strain (stiffest component). Surgical resection was undertaken in all patients and specimen was assessed histopathologically. SE results werecompared with the postoperative histopathologic diagnosis.
Results: Three patients were excluded from the study because affected by non OSCC. The enrolled patients were 14 men and 11women, with an average of 67 years (range 38–85). The nodal status wasN0 in all patients. Primary OSCC sites was found in the tongue (16), in the floor of the mouth (5) and in buccal mucosa (4). No OSCC resulted soft at SE. 17 of the 25 carcinomas (68%) showed a stiff pattern while 8 of the 25 carcinomas (32%) showed an intermediate pattern. All neoplasms not located on the tongue were shown to be stiff. Half of tongue OSCC showed an intermediate pattern and the other half was stiff. The lesions with intermediate pattern presented a histological DOI ≤ 6 mm, whileall stiff lesions presented a histological DOI > 6 mm.
Conclusions: We suggest that SE combined with conventional sonography or other radiological techniques could be advantageous for clinicians. In fact, the technique could provide useful diagnostic information, such as tumor malignancy and extent, by clearly visualizing even small or thin lesionsand these informations could help inmaking decisionfor the most appropriate treatment strategy. Further studies with a large number of subjects are requiredto validate theclinical applicationof SE.

Chronic periodontitis may influence DNA methylation status of oral mucosa?

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Aim: We recently developed a non invasive procedure to identify Oral Squamous Cell Carcinoma (OSCC) based on DNA methylation analysis of a panel of 13 genes starting from oral brushing specimens. However, the oral cavity is characterized by the presence of acute and chronic inflammatory conditions that might potentially influence the methylation level of one or more genes. In particular, different authors recently demonstrated the presence of an altered methylation status in patients with Chronic Periodontitis (CP). In the present pilot study we investigated if the methylation profile of our 13-gene panel may be influenced by presence of CP. For this reason 13-gene DNA methylation analysis was applied in a group of OSCC patients, a group of patients affected by CP and a group control of patients affected by localized or generalized gingivitis.
Methods: Epithelial cells from oral brushing were collected in the following groups of patients: 19 patients with clinical and histological diagnosis of

OSCC (brushing performed in tumor mass area), 15 patients with diagnosis of CP (brushing performed in gingival site with pocket depth greater than 5 mm and with bleeding on probing); 10 patients with presence of gingivitis (brushing performed in gingival site with bleeding on probing and without pocket depth greater than 5 mm). In all brushing specimens the DNA methylation level of: ZAP70, GP1BB, KIF1A, ITGA4, LINC00599, MIR193, MIR296, TERT, LRRTM1, NTM, EPHX3, FLI1 and PARP15 was evaluated. An algorithm of choice calculated a score for each sample. Values exceeding a pre-definite cut off value related to OSCC detection were considered positive. Statistical analysis: Differences in the final score and in the DNA methylation level of each gene across different groups were assessed by Kruskall Wallis test with multiple range test.

Results: mean score of 2.9±0.2 was calculated in OSCC group. 18/18 patients exceeded the threshold value and were detected as positive. A mean score of 0.7±0.3 was calculated in CP group. 3/15 patients exceeded the threshold value and were detected as positive. A mean score of -0.8±0.4 was calculated in patients with gingivitis. None of these patients were detected as positive Kruskall Wallis test identified a significant between group difference (F 32.6; p<.05). Methylation level of 13 genes: GP1BB and miR193 didn't show a significant different methylation level between OSCC group and CP group. Methylation levels of ZAP70 in CP group differed from both OSCC group and group of patients with gingivitis. Finally, the remaining 10 genes didn't show significant differences between CP group and gingivitis group, whereas a significantly altered methylation profile was detected in OSCC group.

Conclusion: These preliminary data suggested the hypothesis that not only OSCC patients but also a part of patients with chronic periodontitis may be characterized by an altered methylation pattern. In particular these preliminary data suggested the presence of a similar methylation pattern in OSCC group and in the CP group for GP1BB and miR193. A larger study population of patients with chronic periodontitis is necessary to confirm or not these preliminary data.

Multiple dental extraction in HIV positive patients: analysis and management of post operative healing vs serological marker research clinical trial

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Aim: Epidemiological trend of virus infection HIV has made it necessary to codify behavioral rules aimed at preventing the virus by healthcare personnel involved in the care of HIV-positive patients. In the last year 2,847 new diagnoses of HIV infection have been reported, equal to 4.7 new cases per 100,000 residents. Italy, in terms of the incidence of new HIV diagnoses, is delicately below the average of the European Union countries (5.1 cases per 100,000 residents). Considering the prevalence of HIV-positive subjects in the population, and the possibility that they are subjected to dental surgery treatments, this study verifies the incidence of postoperative complications and assessment of healing.

Methods: the study was conducted on a sample of HIV positive patients on antiretroviral therapy (CD4+ lymphocyte count> 250 cells/uL). Pre-surgical blood sampling was performed to classify the immunological status of the patients, looking for the three main serological markers HIV RNA, CD4 and CD4/CD8. The study sample included a total of 36 patients divided into two groups: 16 HIV-positive patients with CD4+ lymphocyte count <250 cells / µL (unresponsive to therapy for CD4+ levels) (1st group) and 20 affected patients HIV with CD4 + lymphocyte count> 250 cells / µL (immunocompetent) (2nd group). Patients were under multiple antiretroviral therapies in accordance with the highly active antiretroviral therapy (HAART) regimen showing close adherence to therapy before and after the study inclusion period and observation over time. Data were collected immediately after the surgical procedure (t0), 7 days (t1), after 14 (t2) and 28 days (t3). The following post-surgical complications were analyzed: local infection, alveolitis, persistent bleeding, persistent pain and superinfections associated with surgery.

Results: Patients were under multiple antiretroviral therapies in accordance with the highly active antiretroviral therapy (HAART) regimen showing close adherence to therapy before and after the period of inclusion in the study and observation over time (follow-up). In the 1st group, patients presented the following complications: two complained of persistent post-surgical pain (5.5%), one experienced surgical wound infection (2.7%), and one patient presented with alveolitis (2.7%). In the 2nd group, 3 patients presented persistent post-surgical pain (8.3%), two presented surgical wound infection (5.5%), two had alveolitis. The most common complication reported was persistent pain. The group of HIV-positive patients with CD4+ lymphocytes <250 cells / µL did not have a higher incidence of post-surgical complications than HIV-positive patients with CD4+ lymphocyte counts> 250 cells/µL.

Conclusion: In the present study, no statistically significant difference was found between the incidence of postoperative complications in patients with CD4+ lymphocyte counts below 250 cells/µL compared to patients with a higher CD4+ level. The only clinical variable that acts as a statistically significant predictor for postoperative complications is the clinical stage B of the disease, which includes specific morbid conditions. However, in both groups we found a delay in wound healing, physiological in the context of pathology, pain and post-extraction alveolitis and complications from post-operative over-reaction. However, further studies and investigations are needed to clarify the role of other serological markers such as CD4 /CD8, in the infectious and inflammatory process, with a larger sample of patients in order to increase the validity of the research.

Gingival verruciform xanthoma within desquamative gingivitis lichen planus related: a case report

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Aim: Verruciform xanthoma (VX) is an uncommon reactive lesion first described in the oral mucosa in 1971. The incidence rate reported is 0.025–0.095% within a 12 years period. Its aetiology is unknown, but it is believed to be a reactive lesion, maybe a response to trauma, chronic inflammation or an altered immunological response, which releases lipid material, with an epithelial damage and the characteristic foamy and/or granular histiocytic infiltrates. Oral VX usually appear as asymptomatic, slow-growing, well demarcated plaques or nodules with a papillary or verrucous surface, ranging in colour from pink, red, white, or yellow. The majority of cases have been reported on masticatory mucosa including gingiva and hard palate. Due to the variable presentation, VX are frequently misdiagnosed clinically; a microscopic examination is therefore needful. Oral lichen planus (OLP) is a common immune-mediated mucocutaneous disorder, with an estimated worldwide prevalence of 1–2%. The aetiology still remains unknown, although immune dysregulation seems to play a critical role in the development and progression of OLP. OLP is also considered as an oral potentially malignant disorder.Several VX cases have been reported in association with underlying immune-mediated, or other conditions, such as Pemphigus Vulgaris, Lupus Erythematosus, Dystrophic Epidermolysis Bullosa, Graft-Versus-Host Disease (GVHD). The coexistence of VX with cutaneous Lichen Planus, or other conditions in genital area is well described in dermatology literature, but only 11 cases have been reported in the oral mucosa of patients with the aforementioned disease. We present a case of VX in a patient with undiagnosed OLP.
Methods: A 66 years old woman affected by depression and using Vortioxetine, came to the Oral Medicine Unit, C.I.R. Dental School of Turin, complaining about a lesion arisen on upper right gingiva, from undefined time.
The intraoral clinical examination revealed an asymptomatic pink-white, sessile lesion, with a granular surface, finely speckled and measuring 0.7 cm of diameter in the upper right gingiva, also involving the fornix and the alveolar mucosa. The lesion was soft in consistency on palpation. At oral examination white striae in a reticular pattern were also observed in the right and left buccal mucosa and gingiva, consistent with the clinical diagnosis of OLP. Patient denied skin or genital lesions. Due to the size of the neoformation, an excisional biopsy was performed under local anaesthesia. Also, an incisional biopsy was performed on one of the white reticula.
Results: Microscopic examination showed hyperplasia with projections of the surface epithelium in a verrucous pattern with hyperparakeratosis and acanthosis. Accumulation of foamy histiocyte cells with sparse inflammatory cells was noted in the chorion. Dysplasia was not evident. The diagnosis was of VX. The microscopic examination on the second sample confirmed the diagnosis of OLP.
DISCUSSION AND **Conclusion:** The clinical diagnosis of VX may be challenging, and the differential diagnosis should include benign lesions, such as squamous papilloma, condyloma acuminatum, and verruca vulgaris, but also potentially malignant disorders including leucoplakia and erythroplakia, and malignant tumours, such as verrucous carcinoma and squamous cell carcinoma. Due to the fact that VX may mimic malignancy, biopsy is required for definitive diagnosis, especially when this benign tumour occurs in conjunction with lesions or conditions that may exhibit the potential of malignant transformation, such as OLP.

Tumor-associated tissue eosinophilia in tongue squamous cell carcinoma

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Aim: Head and neck squamous cell carcinoma (HNSCC) is reported to be the sixth most common kind of cancer worldwide. More than 90% of HNSCCs involves the mucosal surfaces of the oral cavity. Whereas, there are advances in therapy and general knowledge about this kind of cancer, the prognosis did not see any improvements. In particular, some kind of tumors show an increase of chemotherapy resistance. Last evidence shows how microenvironment could have a role, not only in the chemotherapy resistance, but also in tumor onset and progression. In detail, the variation in number of eosinophils seems to be associated with different prognosis. Being the count of eosinophils a simple and affordable exam it could have a remarkable role. For this reason the aim of this study is to show the possible association between the eosinophils and patient's prognosis tongue squamous cell carcinoma.
Methods: Routine haematoxylin-eosin (H&E) stained sections obtained from formalin-fixed, paraffin-embedded blocks of the primary tumour specimens, were carried out from the most invasive part of the primary tumour. Tumor-Associated Tissue Eosinophilia (TATE) was evaluated by two different pathologists. Only cells with eosinophilic cytoplasmic granules were considered. Eosinophils located within extensive necrotic areas and blood vessels were excluded from the analysis. Eosinophils at the invasive front were counted under a high-power objective (x 400 magnification) for 10 randomly high-power fields (HPF) using a light microscope. Multivariate analysis was build in order to explore the prognostic value of the main clinic-pathological variables together with the TATE. Gender, staging 7th AJCC edition, age and grading were used in the model. Results were reported as Hazard Ratio (HR) and 95% Confidence Interval (C. I.). p values <0,05 were considered as statistically significant.
Results: Of 50 patients, 31 patients reported lower values of tumor-tissue associated eosinophilia. These patients reported a worse overall survival, with a risk of death almost 2 times higher than patients with higher levels of eosinophilia. This resulted to be an independent variable from staging, grading, age and gender in predicting patients' prognosis.
Conclusion: Eosinophilia seems to be a promising biomarker in tongue squamous cell carcinoma prognosis and these results can give support for further researches, investigating the role of eosinophilia in cancer microenvironment, under a biomolecular point of view.

What do we learn from the clinical and biological evaluation of the oral cavity in centenarians?

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Aim: The number of centenarians is rapidly increasing worldwide, and so are the studies on this segment of the population. A general consensus in the literature is that healthy longevity is an outcome of multiple factors, but the interrelationship between good oral health, oral pathology, and healthy aging remains not fully understood.
Methods: Within the "CaT – Centenari a Trieste" project, a population-based cohort study set in the province of Trieste, Italy, which includes 120 centenarians enrolled so far, we report here the results of the clinical and biological oral health evaluation. Subjective oral health-related variables were recorded by means of a self-evaluation questionnaire developed at the Oral Medicine and Pathology Unit of the University of Trieste Dental School, based on the WHO Oral health self- evaluation questionnaire with the aim of evaluating Oral Health Related Quality of Life (OHRQoL) both in the present and past. Moreover, a comprehensive oral examination of teeth, prosthesis, and mucosae was performed. In addition, also PROP taste perception, and salivary oxidative stress markers (TOS and FRAS) were measured. Finally, the oral data obtained were compared with the presence or absence of dementia in the enrolled subjects. Neuropsychological evaluation for cognitive impairment was performed using MMSE, Clinical Dementia Rating Scale (CDR), and, whenever possible, performing a series of seven tests taken from the Consortium to Establish a Registry on Alzheimer's Dementia (CERAD) battery.
Results: Centenarians included in our study were generally satisfied about their oral health. Among the causes of discomfort, the most prevalent were difficulties in chewing and biting, with few subjects describing a correlation between their mouth and psycho-social aspects. Most of the subjects were completely edentulous with a mean duration of this condition being 34.25 ± 20.1 years, and 75% of them wore removable prosthesis. Oral mucosae examination showed presence of oral pathologies in 28% of subjects. 16% suffered from oral candidiasis, 8% from traumatic ulcers, and 4% from osteonecrosis of the jaws. 15 subjects were diagnosed with dementia. We evaluated possible relations of clinical and biological variables to the likelihood of being demented and didn't find significant associations. We found a higher, even if not significantly, mean salivary flow (0.22 versus 0.16 ml/min) and antioxidant capacity

of saliva (FRAS) in not demented subjects. When evaluating the PROP taste perception profile, we found a higher proportion of supertasters compared to previous studies and different taste perception profiles according to dementia (40% vs. 11%).
Conclusion: The interrelationship between good oral health and healthy aging remains not fully understood, and, in our cases, dementia does not seem to correlate properly with oral cavity pathology. Nevertheless, despite the limited number of subjects, we believe that our study is contributing to pave the way to a better understanding of the peculiar clinical and biological profile of the oral cavity in subjects reaching an age of above 100 years. Such results may encourage the inclusion of a comprehensive evaluation of oral cavity biology and function in centenarian studies performed worldwide.

Mikulicz's disease vs Sjogren's syndrome: a case report

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Aim: Once considered a subtype of Sjogren's syndrome (SS), Mikulicz's disease (MD) has recently been defined as a distinct entity belonging to IgG4-related diseases (IgG4-RD). IgG4-RD main features are IgG4+ve plasma cells infiltrating tissue distinctive storiform fibrosis and moderate eosinophilia. Little data exist on incidence and prevalence of IgG4-RD. MD is characterized by persistent (more than 3 months) and symmetrical swelling of more than two lacrimal or major salivary glands, elevated serum levels of IgG4 (>135mg/dl) and presence of IgG4-positive plasma cells infiltrating glands (IgG4-positive plasma cells/IgG-positive plasma cells >0.4). Other disorders which may cause lacrimal and salivary glands enlargements must be excluded. The present report describes a case of IgG4-related dacryoadenitis and sialadenitis (IgG4-DS).
Methods: A 71-year old man was referred to our department to have a diagnostic panel investigating SS. His complaint started 4 years before the referral and it was mainly characterized by enlargement of submandibular salivary glands and dry eyes. At that moment, a biopsy from a swollen lacrimal gland was performed. Immunohistochemistry (IHC) revealed a massive infiltration of IgG4 positive plasma cells leading to the suspect of a IgG4-related dacryoadenitis. In the following years, repeated doppler ultrasounds (US) showed hypoechoic areas and a high vascularization pattern at both the submandibular glands, while no alterations were reported at parotids. Such features joined with persistent and symmetrical glands' swelling led to a diagnosis of chronic sialadenitis. Serum IgG4 level was 169 mg/dl, while ANCA and ANA were negative. Prednisone 2.5 mg/kg daily per os was prescribed and the lack of response led to speculate the diagnosis of SS. Therefore, the patient was referred to our department. He doesn't have xerostomia, but only dry eyes. Resting whole salivary flow rate was unremarkable (6 ml/15 min); conversely the Schirmer test revealed an almost absent lacrimal flow (0 ml/5 min on the right, 1 ml/ 5 min on the left). A bilateral enlargement of submandibular glands in the absence of palpable lymph nodes was observed. An ENA panel was run and both anti-Ro and anti-La came out negative. Finally, labial salivary glands biopsy showed initial fibrosis, intact acini, presence of lymphoid follicles and a plasmocytic infiltration with negative IHC for IgG4. A further ultrasound-driven fine needle biopsy of the submandibular gland was performed showing fibrosis.
Results: Mikulicz's disease differs from typical SS when looking at gender distribution, persistent glands swelling, normal or mildly impaired salivary flow, good responsiveness to corticosteroid treatment, hypergammaglobulinemia and low frequencies of anti-SSA and anti-SSB antibodies on serological analyses, multiple germinal centre formations in glandular tissue. US is of utmost importance in IgG4-DS diagnosis and follow-up as it allows to differentiate IgG4-DS from SS. In the present case, US showed typical features of MD. High serum levels of IgG4, usually not reported in SS, are conversely peculiar for MD. To make a final diagnosis, biopsy is required. Lacrimal gland biopsy showed infiltration of IgG4 positive plasma cells, which is considered the main histological feature differentiating MD and SS. In addition, labial salivary gland biopsy showed lymphoid follicles around ducts, while in SS they create lymphoepithelial lesions leading to duct destruction.
Conclusions: In the absence of criteria needed to support a SS syndrome, the joint assessment of symptoms, high serum level of IgG4 and histomorphological findings, lead to the final diagnosis of IgG4-related sialadenitis.

Sturge Weber syndrome, patient with severe phenotype and its clinical management. Case report

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Aim: The Sturge Weber syndrome (SWS), also known as encephalotrigeminal angiomatosis, is a rare congenital disorder concerning the anomalies of the neuro-ectodermal area. It affects in a rate of 1 on 50 thousand, and it is reduced to 3% if we consider the vinous nerve. The presence of the "Nevus flammeus" is considered pathognomonic. The mutation in genetic mosaic GNAQ (9q21) is the cause of the onset of the SWS. This gene is involved in the synthesis of the protein G modulating and regulating the intracellular signs linked to the receptors playing an important role in the function of vasoactive peptides. neurotransmitters and the expression of growth factors. The SWS is characterized by the presence of angiomas, pinkish-wine-coloured and frequently present on the forehead and eyelid, by following the route of the first branch of the trigeminal (ophthalmic n.). They may be homo and contralateral. They may also be at the level of the soft tissues and maxillary and mandibular areas and may affect trunk and limbs. The hypertrophy of the soft tissue and bones may affect during the growth by causing some problems to the optic and auditory nerve, in the articulation of words and deglutition. Some ocular alterations often show as conjunctival, episcleral and choroid angioma. There is a high frequency of homolateral glaucoma. The vascular alterations of the optic plasm and the fundus oculi influence the visual efficiency (hemianopsia) up to the blindness. Since the birth it is possible to highlight leptomeningeal angiomatosis, which is more frequent in occipital and parietal site, associated to seizures which may be often result resistant to drugs. Hemiparesis, hemiplegia and alteration of the cognitive ability making part of the evolution of the disease. The usual oral lesions are homolateral to the skin injuries and, in some cases, bilateral, even if the skin injuries are so. The most involved sites are lips and cheeks, having a red-bluish flat angioma, lightening under pressure. The presence of angioma and gingival hyperplasia, the latter caused by the administration of antiepileptic, getting more severe for self biting, impeding the mastication. The tongue is less frequently affected and may be emi-hypertrophic, with telangiectasia. The treatment plan depends on the gravity. The angioma and hyperplasia are treated thanks to the use of diode lasers or Nd-Yag; the controlled seizures with administration of anticonvulsant drugs as phenobarbital, oxcarbazepine and levetiracetam; intraocular drops to reduce the intraocular pressure or surgery treatment in case of glaucoma; physiotherapy to recover the motor functionality. The aim of this study is introducing the clinical evidences, evolutions and therapy in oro-facial areas, in a patient with SWS with severe phenotype, as case report.

Materials: 25 years old patients, affected by hemiplegia, hemiparesis, glaucoma, severe mental deficit and with angioma with nodular aspect all over the face, blind in the right eye. EEC showed deficit to the right. The contrast-enhanced NMR showed a cerebral bilateral atrophy, leptomeningeal angiomatosis, broadening of the choroid plexus. The patient had a severe gingival hyperplasia and widespread on angioma as well as on the gingival, labial, lingual and check mucosa which did not allow him to feed. It has been decided to operate the patient in general anaesthesia and surgical site infiltration with adrenalin at 2 %. For the surgical resection it has been used the Nd - Yag laser with fibre at 400 microns, frequency at 40 Hertz energy 130 mJ, power 4W. The haemostasis has been controlled with ac. tranexamic and using laser at 200 Hz frequency, energy 20 mJ, power 4W.

Conclusion: The use on the surgical resection of Nd-Yag has made possible a reduced surgical timing, a bloodless surgical field, a reduced rate of relapse, a better compliance, a reduced healing time with a better tissue quality.

Orofacial manifestations in two brothers affected by neurofibromatosis type 1: case report

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Aim: Neurofibromatosis type 1 (NF1) or Von Recklinghausen's disease, is an autosomal dominant genetic disorder caused by the mutation of the neurofibromin-producing tumor suppressor gene, located on chromosome 17. This complex syndrome can affect several organs including the orofacial district. The most frequent manifestations of the disease are characterized by multiple neurofibromas, which are benign nerve-sheath tumor, Lish nodules also known as iris hamartoma, and areas of abnormally pigmented skin typically localized in axillary and inguinal area and called coffee-milk spots. NF1 is also associated to bone lesions, orthodontic and dental abnormalities, caries and periodontal manifestations. Jaws deformities and enlargement of the lower alveolar canal are often observed and associated with increased osteoclastic activity and the development of plexiform neurofibromas. The purpose of this work is to illustrate and compare the orofacial manifestations of the pathology in two brothers with NF1 referred to the

dental department of Policlinico of Bari.
Methods: Two brothers, a 12 years old female and a 8 years old male, identified as patients affected by NF1, were visited in Dental department of University of Bari. These patients were already diagnosed as having NF1 by finding alterations of central and peripheral nervous system in magnetic resonance imaging; moreover was clinically evident the presence of axillary and inguinal freckling, as well as more than six coffee-milk spots with a size of >15 mm. A panoramic radiograph was available for boths patient therefore the investigation was based on the their observation and the inspection of the orofacial and intraoral district. Clinical parameters were evaluated, such as noticeable bone and cutaneous anomalies, transverse and vertical dimensions, molar relationship according to Angle's classification, dental misalignment, overjet and overbite. Dental occlusion was assessed using dental mouth mirrors and millimetric rulers; the periodontal health was explored with a probe; bone anomalies were estimated from presence/absence of alteration in the panoramic radiographs and evident clinical deformities.
Results: Extra-oral examination revealed on the skin of face and neck of both patients, the presence of 5/6 coffee-milk spots. No obvious facial deformity was found. The intra-oral examination evidenced that the increasing of plaque index caused in both cases an high score of bleeding and gingival hyperplasia and an improved predisposition to decay development. In these two cases was evidenced macroglossia, atypical swallowing, and a severe dental crowding, that caused dental rotations and an increased probability of upper canines impaction for each brother. The female patient has a second dental class with openbite and increased overjet, while the male has a tendency to the third dental class with head to head frontal teeth relation and right unilateral posterior cross-bite. After panoramic radiographs assessment the enlargement of the mandibular canal was found in each patient; no asimmetry of jaws were evidenced, but the female's condylar heads appears thinner than normal. We came across a delay of permanent teeth eruption, however no agenesis and supernumerary teeth were found.
Conclusion: It is important for the dentist to know and treat the manifestations of this disease because these could be present in childhood even if the main complications of the disease have not yet developed.

ifi-16 expression and localisation as biomarker of disease activity in Sjögren's syndrome

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Aim: Primary Sjoegren's Syndrome (pSS) is an autoimmune systemic disease characterized by sicca syndrome and systemic clinical manifestations. The interferonγ-inducible protein 16 (IFI16) is a pattern recognition receptor that has been detected in serum and minor salivary gland (MSG) tissue of patients with pSS. Its overexpression and translocation from nucleus to cytosol and into extracellular environment induce and perpetuate inflammatory response. Overexpression of IFI-16 is also considered a likely cause for breaking of tolerance with consequent development of anti-IFI16 antibodies in pSS. Aim of this study is to investigate whether IFI16 and anti-IFI16 expression in serum, saliva and MSG samples is linked with disease activity of pSS.
Methods: Adult patients with pSS, classified according to the ACR/ EULAR criteria, were recruited. Clinical manifestations were evaluated with EULAR Sjögren's syndrome disease activity index (ESSDAI) and MSG samples were collected from biopsies. Age and sex-matched healthy patients were recruited as controls. Saliva and serum samples were collected and stored at -80° C until use. IFI16 and anti-IFI16 were assesed by ELISA in the serum. Anti-IFI16 IgG, IgM and IgA were assesed by ELISA in saliva as well. IFI16 was evaluated by immunohistochemistry in MSG tissue.
Results: Three female adult patients with pSS and two sex- and age-matched controls were enrolled. An assessment of patients with pSS was provided according to ESSDAI and blood test results: patient (a) moderately active systemic form of SS (ESSDAI=12), patient (b) localized form of SS (ESSDAI=0), patient (c) mild systemic form of SS (ESSDAI=3). In patient (a) we observed highly increased expression of IFI16 (in nucleus and cytosol), high IFI16 in serum and anti-IFI16 IgG positivity. In patient (b), we observed a moderately increased expression of IFI16 in the nuclei and no serum IFI16 /anti-IFI16 IgG were detected. In patient (c), poor inflammatory infiltrate was observed and many cells did not express IFI16. Salivary anti-IFI16 IgA (10 U/mL) and serum anti-IFI16 IgG (147 U/mL) were detected. Then, salivary IFI16 was investigated, but it was undetectable. We set up a Western Immunoblot and tested incubated saliva samples effects on recombinant IFI16 at 37°

C. In controls, IFI16 was completely degraded after 6h, while in affected patients, degradation rate was considerably increased (1h in the patient (a)). Therefore, we repeated the experiment after addition of inhibitors of proteases and incubating for 1h, 3h and 24h at 4°C. In the control and in localised disease saliva samples, recombinant IFI16 remained intact, while in patient (a), the protein was already degraded after a 1h. Explanation for the unsuccess of inhibitors of proteases in systemic pSS saliva could be that a different type of protease was present, or that proteases were more abundant than inhibitors.
Conclusions: Further experiments in a larger cohort of patients and proteomic analysis could confirm our preliminary findings of a correlation between the expression of IFI16 in the MSG and the severity of SS.

The evaluation of tumor budding in oral tongue squamous cell carcinoma patients: a novel prognostic histopathological grading system

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Aim: Oral tongue squamous cell carcinoma (OTSCC) is the most common malignant tumour of the oral cavity. The current staging system for oral cancer is based on the 8th edition of AJCC cancer staging manual, which takes into consideration new prognostic morphological markers such as depth of invasion and extranodal extension. Although several markers have been proposed for prognostication of this tumor, none of them has been approved for daily practice. For these reasons, despite of recent advances in diagnostic and therapeutic systems, the prognosis of OTSCC is poor and often unpredictable. Tumor budding refers to small cancer cell clusters (1-4 cells) has been recently reported to be a reliable prognostic marker in several tumors. Furthermore, the incorporation of this morphological marker into the WHO grading system of OTSCC has been recently proposed by Elseragy et al. The aim of the present study was to evaluate the prognostic value of Tumor Budding in a cohort of patients with OTSCC.
Methods: A cohort of 154 randomly selected patients with primary OTSCC, stratified according to the pathological staging, were retrospectively evaluated. All the patients were treated with a curative intent at the "Ospedali Riuniti" General Hospital (Ancona, Italy), between 1990 and 2014. Hematoxylin and eosin stained sections obtained from formalin-fixed, paraffin-embedded blocks of the primary tumor specimens, were carried out from the most invasive part of the primary tumor. Two experienced pathologists independently performed the histological evaluation, blinded to the clinical and pathological data. Grading system was updated according to proposed method by Elseragy et al. In particular, tumor budding was considered in order to upgrade the current grading system. Sample with a number of infiltrating buds between 1 and 4 were upgraded to Grade 2. When the number of buds was more than 5, patients were upgraded to Grade 3. The software SPSS 20.0 was used to performed the statistical analysis. Log rank test was used to evaluate the new grading system in a Univariate survival analysis mode. Survival time was evaluated in months. Multivariate analysis was built in order to explore the prognostic value of the main clinic-pathological variables together with the upgraded grading system. Age, gender, and pathological staging (7th AJCC edition) were used in the model. p values <0,05 were considered as statistically significant.
Results: Grading was upgraded in in 46 patients (29.9%). Patients with the upgraded grading system reported a worse overall survival at both univariate and multivariate analysis. This risk was higher of 2 times compared to patients with lower grading.
Conclusion: Although the conventional WHO grading system has low prognostic utility in OTSCC, it can be improved by incorporation of Tumor Budding. Indeed, this new grading system can be used to augment the risk stratification of OTSCC. Furthermore, the evaluation of Tumor Budding is simple, inexpensive, and can be routinely included in pathology reports.

Medication-related osteonecrosis of the jaws in osteoporosis affected patient: a case report

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Aim: Bisphosphonates are a class of drugs commonly used for the treatment and prevention of osteoporosis and metastatic bone tumours. This class of drugs works by blocking bone metabolism, and so expose patients to bone necrosis, often triggered by

invasive or traumatic dental procedures. However there are also known cases of spontaneous necrosis. Bisphosphonate-induced osteonecrosis of the jaws is a rare but increasingly worrying side effect due to the frequent intake of bisphosphonates in osteoporotic patients. Therefore, in order to avoid these terrible complications, there is a strong need for patients who are, were or are about to start therapy with bisphosphonates to remain in constant oral follow-up. The objective of this report is to demonstrate the importance of centres for the prevention of osteonecrosis. In our hospital clinic we have a space dedicated to follow and safeguard patients treated with bisphosphonates, sent by oncology departments but also by general doctors and dental colleagues who treat patients with osteoporosis. Through the specialist care of their oral health, our goal is to improve their quality of life and intercept early cases of osteonecrosis of the jaw.

Methods: Here is presented the case of a 77 year old woman sent by her dentist to our specialized center, presenting a fistula in zone 14-15. She also presented pain at compression, noted following root extraction of 13. The patient has a history of hypertension in treatment, hyponatraemia currently not compensated and a depressive state in treatment. The patient reports taking for osteoporosis bisphosphonates from 2005, in particular Alendronate until 2010, then replaced by Ibandronate until 2015. In 2016, following diagnosis of rheumatic polymyalgia she took cortisone, which resulted in vertebral collapse. The treating rheumatologist then suspended the bisphosphonate and introduced Denosumab 1 fl every 6 months, suspended in 2019 due to the presence of oral fistula seat 14-15. Our center has prescribed a CBCT, from which the presence of right maxillary osteonecrosis has been detected. It has become necessary to remove the bone sequestration and extract and cure the residual root of 22, 23, 24. Followed by administration of amoxicillin plus clavulanic acid 1g twice daily for 4 days and 250mg metronidazole 3 times daily for 4 days.

Results: The month next to intervention, the patient was admitted and checked again. She showed good healing of the mucosa and stable oral conditions. This case is a demonstration of the importance and effectiveness in the prevention and follow-up program aimed to protect and safeguard the quality of life of these delicate patients.

Conclusion: Every single case of patient who is candidate to undergo a Bifosfonate treatment must be evaluated with the maximum caution, especially those who have important systemic health disorders such as diabetes, rheumatic or autoimmune diseases, assuming drugs such as cortisone. A highlighted role in prevention is covered by the odontologist: in order to avoid the risk of necrosis onset, before beginning the assumption is strictly necessary to restore dental conditions: conservative and endodontic treatments, correction of inadequate prosthesis, extraction of compromised teeth. Following the patient oral conditions in accurate way along BF time of therapy is another strictly required behaviour, in order to be able to act immediately if symptoms and signs of ONJ are observed.

Therapeutic effects by probiotics l. plantarum and l. brevis on diphenylhydantoin gingival hypertrophy in a pediatric patient

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Aim: Oral infectious diseases, such as dental caries and periodontal diseases, represent one of the most common infections that severely impact human health. As a result of antibiotics overuse and misuse and the emergence of antibiotic-resistant strains, probiotic therapy has been gradually applied to prevent and alleviate infectious diseases. Lactobacillus is one of the main probiotic genera that has been widely studied for its potential roles on oral health. The aim of this study was to report the effects of probiotics in a pediatric patient with gingival drug hypertrophy.

Methods: A 10-year-old boy with epilepsy treated with carbamazepine and diphenylhydantoin developed gingival drug hypertrophy. Intraoral clinical examination showed a serious enlargement of the interdental papillae with involvement of the marginal gingiva, more evident in the anterior maxillary and mandibular sector. In addition, deposits of bacterial plaque are detectable, mainly located in the cervical third of the teeth. To restore the balance of the oral microbiota, monthly probiotic therapy in tablets containing a combination of two strains of probiotic bacteria L. brevis and L. plantarum was prescribed, 1 cp to be dissolved in the mouth after home oral hygiene without performing any professional one. The gums had noticeably improved at check in a month. A further improvement of the parameters was achieved with a session of professional oral hygiene and motivation to control bacterial plaque.

Results: The four-week follow-up confirms the reduction of inflammation and the drug-induced gingival hypertrophy even without associating the non-surgical periodontal therapy. Clinical examination showed clearer gums. Furthermore, edema had also

significantly decreased.
Conclusion: Lactobacillus plantarum WLPL04, a new strain, was isolated from a breast milk sample by a healthy woman and demonstrated several probiotic functions. L. plantarum WLPL04, has also been studied for its ability to survive (tolerance to acids and bile salts, survival in the simulated gastrointestinal tract, inhibition of pathogens, susceptibility to antibiotics, yield of exopolysaccharides) and probiotic properties (anti-adhesion of pathogens, protection from the harmful effects of sodium dodecyl sulfate and anti-inflammatory stress on Caco-2 cells). The results showed that L. plantarum WLPL04 has a broad-spectrum activity against gram-positive strains and gram-negative ones. In addition, a systematic review of the literature has shown that professional oral hygiene therapy associated with L. brevis probiotics is the best method of treatment and prevention for oral mucositis in patients undergoing chemotherapy and radiotherapy. Furthermore, L. brevisprobiotic can inhibit periodontitis through modulatory effects on host response and periodontal microbiota. Consequently, probiotics represent an interesting option in the treatment of various pathological conditions, especially in the oral medical field. Finally, in this specific case, it allowed to avoid invasive surgical treatments or the replacement of the drug, thus improving the patient's quality of life.

Effect of 3 months dietary supplementation with omega-3 α-linolenic acid (ala) and polyunsaturated fatty acids (PUFAS) (Alphalife Freia Framaceutici Srl) following scaling and root planing: a pilot study

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Aim: Omega-6 (n-6) and omega-3 (n-3) Polyunsaturated fatty acids (PUFAs) are essential fatty acids (EFAs) and they cannot be synthesized by humans or other higher animals. A proportionally higher consumption of PUFAs can protect us against inflammatory diseases, cancer, cardiovascular diseases and other chronic diseases. The aim of this pilot study was to investigate the effect of 3 months dietary supplementation with Omega 3 α-linolenic acid (ALA) and PUFAs (alphalife Freia Farmaceutici srl) following scaling and root planing (SRP).
Methods: Twenty-four participants with moderate chronic periodontitis following SRP were randomly divided into 2 groups to receive for 3 months: (1) 3g daily of alphalife (Freia Farmaceutici srl) (n = 12); (2) 3g daily of placebo (n = 12). Probing depth (PD), attachment level (AL), bleeding on probing (BOP) and modified sulcus bleeding index (SBI) were recorded at baseline and after 3 months.
Results: AL, PD, BOP and SBI were significantly improved in both groups after 3 months ($p < 0.001$). After 3 months AL improved significantly better in the test than in the control group ($p < 0.001$), also PD in the tendency ($p = 0.1$). BOP improved better in the test group after 3 months ($p = 0.065$).
Conclusion: In the human body, this polyunsaturated fatty acids (PUFAs) give rise to arachidonic acid (ARA, n-6), eicosapentaenoic acid (EPA, n-3) and docosahexaenoic acid (DHA, n-3) that play key roles in regulating body homeostasis. Locally acting bioactive signaling lipids called eicosanoids derived from these FAs also regulate diverse homeostatic processes. In general, ARA gives rise to pro-inflammatory eicosanoids whereas EPA and DHA give rise to anti-inflammatory eicosanoids. After 3 months of intervention, patients who received omega-3 fatty acids supplements compared with placebo had significantly better periodontal parameters. Furthermore, the adjunctive use of a dietary supplementation with omega-3 α-linolenic acid (ALA) and Polyunsaturated fatty acids (PUFAs) following SRP could have a key role in soft tissues periodontal healing.

Dental pathology in present-day and copper age samples

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Aim: Dental paleopathology has become an excellent discipline to reconstruct the oral health of ancient populations and its trend from the past to the present day, especially regarding dietary habits. Our preliminary research aims to perform a comparative analysis on dental health status of two widely chronologically distant samples from Sardinia: the first one dates back

to the Copper Age (III mill. B.C.) and comes from a collective hypogean burial named Scab'e Arriu (Siddi, SU), the second one is composed by extracted teeth of present-day individuals, collected during some traineeships at the Department of Surgical Science of the Dentistry School, in Cagliari.
Methods: 259 archaeological permanent teeth from Scab'e Arriu (III mill. BC, Siddi, SU) and 90 contemporary permanent teeth from 88 patients at the academic clinic of Cagliari were included in the study. The ancient teeth are part of a larger sample that consists of a minimum number of 30 individuals (14 males and 16 females, all adults); present teeth were extracted from 88 patients (58 males and 30 females, averagely aged 51 years old). The archaeological teeth were found devoid of their anatomical support because of the bone deterioration. Carious lesions, dental wear and linear enamel hypoplasia of both samples were evaluated and compared. Dental evaluations were performed by using personal protective equipment, under artificial lighting source; teeth were examined with dental explorer Hu-Friedy EX23/66 and the parodontal probe Hu-Friedy PCPUNC 15; dental wear was recorded by using the Smith scale for both samples; linear enamel hypoplasia was recorded with a digital caliper and a magnifying glass 3-4x. Statistical tests were run by using the Chi-Square test on Social Science Statistics (https://www.socscistatistics.com/).
Results: 18% of the samples of Scab'e Arriu was affected by carious lesions, while the 78% had dental wear; 12% of teeth were affected by linear enamel hypoplasia. Indeed, 38% of the present samples is affected by carious lesions, while the 79% has dental wear; no individual is affected by linear enamel hypoplasia. Chi-Square tests performed on total amount of carious lesions, dental wear and enamel hypoplasia of both samples show a high significance ($p < .01$).
Conclusion: According to the World Health Organization, dental caries is a major public health problem: nearly half of the world's population got affected because of the preponderant consumption of complex carbohydrates, following the tertiary food processing. The frequency of the caries on the teeth from Scab'e Arriu is lower if compared to the present sample (18% versus 38%), as a result of lower consumption of processed foods. Therefore, the significance of the statistical result is not surprising ($p<.01$). Indeed, one curious aspect of Scab'e Arriu's sample is that the frequency of the caries is higher if compared to other prehistoric sites, and it would be interesting to further investigate this aspect. The greater presence of tooth wear in the Scab'e Arriu's sample is hypothetically due to a diet based on more abrasive and fibrous foods than present dishes, which are usually softer compared to the past. Finally, enamel hypoplasia is a condition frequently found in ancient populations, as they were more exposed to nutritional and infectious stress; contemporary cases of that condition are unusual, especially in wealthy countries.

Dental treatments in patients with special-needs: an observational retrospective study

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Aim: Patients with special needs (SNP) are more predisposed to develop pathologies of the oral cavity, both for the poor or absent collaboration to the dental treatments, and for interactions between their systemic disease, drugs administered and oral health. The aim of this study was to correlate the anamnestic characteristics with the dental treatments of SNP treated in operating room (OR). Furthermore, we assessed the adherence to scheduled follow-up recalls at 8 months from the intervention.
Methods: We analyzed SNP treated in OR between January 2014 and April 2019, at the "Santa Maria degli Angeli" Hospital in Pordenone. Patients were divided into four anamnestic groups according to the International Classification of Diseases (ICD-11): patients not affected by any disease; patients with mental, behavioral and neurological disorders; patients with diseases of the nervous system; patients with developmental anomalies. Moreover, they were subdivided in five groups according to the age: less than 6 years, 6-12 years, 12-25 years, 25-45 years and more than 45 years). Dental treatments were split in preventive, restorative, endodontic and surgical, both on permanent and deciduous teeth.
Results: A total of 118 patients were included in the study, with an average of 2.7 SNP treated per session. Almost all patients underwent dental surgery in AG (92%), while the remaining 8% was treated with deep sedation and local anesthesia. The group of SNP affected by mental, behavioral and neurological disorders was the most numerous (43%). SNP were treated for an average of 7.5 dental procedures at a time, without statistically significant differences among the four groups of ICD-11 pathologies. On the other hand, there was a significant difference on the type of dental treatment among groups for all age ranges ($p<0,001$). A total of 7 patients (8%) needed to perform an additional dental procedure over the 6-year period considered in the study, with an average interval from the first one of 22.4 ± 13.9 months. Only 23 patients (19.5%), mostly affected by diseases of the nervous system, came to follow-up appointment scheduled at 8 months after surgery.

Conclusion: Patients suffering from diseases of the nervous system and developmental anomalies require more invasive dental treatments (endodontic or surgical) rather than the other considered groups. It is therefore necessary to improve the perception by parents/guardians of SNP on the importance of periodic follow-up, in particular for those patients most predisposed to develop oral pathologies.

Dental findings in hypophospahatemic vitamin D resistant rickets

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Aim: Besides the classic rickets, there are also hereditary hypophosphatemic rickets- vitamin D resistent, divided into autosomal dominant, autosomal recessive and X-linked dominant, the most common. VDRR patients have many problems and limitations during dental diagnosis and treatment; therefore, early diagnosis, periodic examinations and multidisciplinary approach with the patient's pediatrician are important in the dental management of VDRR patients. Aim of this study is identify dental characteristics of VDRR, both in the deciduous and permanent dentition and at periodontal and occlusal level, from childhood to adulthood.
Methods: through a scientific literature review and the evaluation of 3 clinical cases treated, we could clearly identify dental and oral characteristics of the VDRR. VDRR is a disease characterized by defective reabsorption of phosphate from the proximal renal tubule. VDRR has a prevalence of 1:20000 people.
Results:. Physical findings are growth failure, bowing of the legs, short stature and walking disturbances, elevated risk of bone fractures, spinal stenosis. Dental alterations (more common in primary than permanent dentition) are: dentoalveolar fistulas or gingival abscess without a clinical history of caries or traumas (pulp vitality test is negative) in both primary and permanent dentition, enamel hypoplasia, poorely mineralized dentin and dentinal clefts, delated eruption, taurodontism, severely enlarged pulp chambers and enlarged pulp horns, short roots. Enamel is regularly formed with long cracks. Because the teeth are constantly exposed to mastication forces, the alterated dentin can be exposed, resulting in the bacterial contamination of dental tissues. The increased fibrotic content of the pulp, together with a reduced number of odontoblasts, decreases the response to pulp infection. Histological examinations show slightly hypoplatic enamel morphology, poorly mineralized dentin dysplasia in both deciduous and permanent teeth, large tubular clefts and lacunae extending up to the dentinoenamel junction, large interglobular space filled with non-mineralized organic matrix, numerous bacterial colony into the dentin and pulp colonies; the dentin mineralization defects appear as characteristically large interglobular spaces, resulting from the lack of calcospherite fusion in the circumpulpal region during the mineralization process with large crevices or lacunae within the dentin, poorly defined lamina dura and hypoplastic alveolar ridge, clefts in dental hard tissues especially dentine, marked globular dentine and increased predentine width. Periodontal tissues are involved in the bone component, that can be affected and ipomineralized. Orthodontic features are: maxillary hypoplasia, relative mandibular prognathism and anterior open bite.
Conclusion: Dentists should be aware of the features of this disorder, because early intervention, such as periodic oral examination, best manteinance of good oral hygiene and good oral bacteria control, topical fluoride applications, pit and fissures sealants, can prevent subsequent serious and more invasive dental procedures. In VDRR dental caries and attrition are frequent and bacteria can easily invade dental pulp through enamel and dentin defects, resulting in pulpitis. Prevent dental abscesses, early treatment of oral disease and preventive treatment of caries and attrition are essential, also using occlusal bite in case of griding. Placement of stainless steel crowns for primary dentition is recommended for prevention of attrition and enamel microfracture. The supplement therapy with phosphate (calcitriol) from birth can prevent dental anomalies, by good dental mineralization and development.

Presence of epigenetic instability in patients surgically treated for oral squamous cell carcinoma. A preliminary study

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Aim: Oral Squamous Cell Carcinomas (OSCCs) are often surrounded by genetically and epigenetically altered cells and secondary neoplastic manifestations can develop within this field as a result of independent

events affecting multiple cells after continuous exposure to carcinogenic agents. In the present study oral brushing samples were collected and analyzed at different moments during the follow up period of patients surgically treated for OSCC. Aim of the present study was to identify presence of epigenetic instability and his prognostic role in terms of appearance of a secondary tumor.

Methods: 33 patients surgically treated for Oral Carcinoma composed the cohort of the present study. Two or more Brushing specimens were taken with a 6 months-time-interval during the follow up period of each patient (first brushing specimen almost 6 months after OSCC treatment). 14/33 patients collected brushing samples at two different moments (6 and 12 months after OSCC treatment), 14/33 patients at three different moments (6, 12 and 18 months after OSCC treatment) and 5/33 patients at four different moments (6, 12, 18 and 24 months after OSCC surgery). In all brushing specimens the DNA methylation level of ZAP70, GP1BB, KIF1A, ITGA4, LINC00599, MIR193, MIR296, TERT, LRRTM1, NTM, EPHX3, FLI1 and PARP15 was evaluated by quantitative Bisulfite-Next Generation Sequencing (NGS). A pre-definite algorithm calculated a score for each sample. Values exceeding a specific cut off value (1.0667) related to OSCC detection were considered positive. Epigenetic instability was defined as the presence of one or more positive test during the follow up period. Epigenetic instability was analyzed for any relationship with appearance of a secondary tumor. Survival rate was estimated using the Kaplan–Meier method.

Results: 10/33 patients developed a secondary tumor and two of these developed a third neoplastic manifestation during follow up period of the present study. 23/33 patients showed presence of epigenetic instability: in particular in 6/23 patients all brushing specimens collected during follow up were detected as positive whereas in 17/23 patients a variation of positive and negative test was calculated during follow up. 10/33 patients did not show presence of epigenetic instability and all brushing specimens collected during follow up were calculated as negative. Kaplan-Meier analysis revealed the presence of a significant relationship between presence of epigenetic instability and appearance of a secondary tumor (Chi 8.14; $p<.05$): 4/6 patients with all positive tests and 6/17 patients with variation of positive and negative tests developed a secondary tumor. At the opposite no patients with all negative tests developed a secondary tumor. In particular, a positive test preceded 11/12 secondary neoplastic manifestations.

Conclusions: In the present study we revealed for the first time the presence of epigenetic instability during the follow up of patients surgically treated for OSCC. Our non-invasive procedure based on 13-gene DNA methylation analysis from oral brushing repeated at different moments may have clinical applications in the future as a surveillance tool for patients surgically treated for OSCC.

Development of a prognostic score based on DNA methylation analysis from oral brushing in oral squamous cell carcinoma. A preliminary study

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Aim: Presence of genes with an altered methylation pattern may play a role not only in cancerogenesis of Oral Squamous Cell Carcinoma (OSCC) but also in the prognosis. The aim of this study was to investigate the prognostic role of methylation profile of 13 genes starting from oral brushing collected in a group of patients affected by OSCC. An algorithm of choice was also developed to calculate a prognostic score with the aim to predict survival of OSCC patients.

Methods: The dataset of the present study included 37 consecutive OSCC patients followed up for a median period of 22 months (range 1–59). Epithelial cell collection was performed prior to any cancer treatment brushing all surface of the tumor mass. DNA methylation level of a series of 245 CpGs representatives of the 13 previously described methylated genes in OSCC (ZAP70, KIF1A, LRRTM1, PARP15, FLI1, NTM, LINC0059, EPHX3, ITGA4, MIR193, GP1BB, MIR296, TERT) 1 were investigated by bisulfite-Target Next Generation Sequencing (NGS) using MiSEQ platform (Illumina, San Diego, CA). Univariable Cox proportional hazards models analyzed the association between each of the CpG sites and time survival. Then, a Cox proportional hazards lasso model was used to select the prognostic markers of the candidate CpG sites. Lastly, a cross-validated prognostic score was computed for each patient, based on individual values of methylation and non-zero regression coefficients. Related to the prognostic score two groups with different epigenetic profile were obtained. Kaplan-Meier estimates were calculated to compare the survivor functions of the two groups (High-risk of relapse group and low-risk of relapse group). Statistical significance of the log-rank test was set at 0.05.

Results: 9 out of 37 (24%) OSCC patients of the training dataset developed a secondary neoplastic manifestation during the follow-up period. Cox proportional hazards lasso model selected 5 CpG sites significantly related with appearance of a second neoplastic event (ZAP70-position1, FLI1-position3, FLI1-position4, ITGA4-position4 and MIR193-position3). Based on these 5 CpG sites, a prognostic score for each patient was calculated, and OSCC patients were divided on the basis of risk of relapse (high and low risk) in two groups: 8/18 high-risk group patients (44,4%) developed a local relapse with respect to 1/19 low-risk group patients (5,3%). This difference is statistically significant ($P < 0.0003$).
Conclusion: Our study revealed that an altered methylation pattern may be also related to the prognosis. In the present study we developed a prognostic score that might be a useful indicator in surgical decision making. An external validation dataset will be necessary to confirm or not the prognostic value of our non invasive procedure.

Incidence of mucositis during therapy with PD1-PDL1 type immune checkpoint inhibitors

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Aim: The aim of our work is to understand the incidence and oral adverse events during therapy with immune checkpoint inhibitors (ICI). ICI (anti-PD-1 / PD-L1 and CTLA-4 inhibitors) have ushered in a new era for cancer treatment and may play a new role in improving results in a metastatic context. Regulation of the mechanisms of immune surveillance, immunoediting and immunoescape can play, as monotherapy or associated therapy, an interesting and relevant role.[1]
Methods: An electronic table (excel) has been prepared for the collection of data to facilitate a rapid compilation by the clinicians. Data of hospitalized patients (date of birth, race, gender, age at the time of diagnosis, profession) were collected anonymously alongside some variables such as habits (smoking, alcohol and consumption notes), systemic and local risk factors. The main section concerned the presence or absence of oral lesions. Systemic adverse effects and staging data of primary neoplasia and management of primary tumor were also collected. Data analysis was performed to establish and study the development and presence of such adverse effects.
Results: Data were collected for 51 patients (42 males and 9 females) with an average age of 62 years and an average of 15.2 cigarettes or other tobacco smoked per day for an average of 17.8 years. 16.32% (32 patients) were regular consumers of 2 glasses on average / day of alcohol for 10 years on average. No patient showed vitamin deficiencies or immunosuppression states. There were no infections with Candida Albicans or HPV. 14.28% (28 patients) showed a poor state of oral hygiene but no patient was found to be the carrier of oral lesions prior to intravenous treatment with ICI. The treatment was necessary for the management of 3 out of 51 patients (1.51%). No patient had to stop immunological ICI therapy for oral lesions or other recorded adverse effects. Xerostomia was reported in one patient being treated for Squamous cell lung cancer receiving Nivolumab. Two other patients experienced oral lesions for which cortisone treatment was performed. A patient being treated with Pembrolizumab for cutaneous melanoma was treated for multiple areas of Grade II mucositis. Lastly a patient had histological diagnosis of Pemphigus in the lower lip (grade II) with skin lesions and was successfully treated with steroid therapy.
Conclusion: ICI treatment can lead to the onset of serious side effects that may require additional therapy and cause significant discomfort in cancer patients[2]. During this study, there was no suspension of ICI cancer therapy but it is good to draw the attention of oncologists to the importance of the clinical detection of oral lesions and the therapeutic implications of these lesions. Awareness campaigns are needed to carry out specialist visits to the oral mucous membranes and to detect and manage oral lesions adequately. We are certainly facing an underestimation of oral injuries.

Mucocutaneus Leishmaniasis, a case report

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Aim: Leishmaniasis are uncommon infectious diseases, generally described in different forms

such as cutaneous, mucocutaneus and visceral. Cutaneous leishmaniasis causes ulcers on the skin. It represents the most frequent form and its treatment may enhance healing and prevent complications. Mucocutaneous leishmaniasis is usually considered a subset of the cutaneous form and it can affect the nasal, throat and oral mucosa; it always requires treatment. Visceral form is potentially life threatening and its manifestation include fever, damage to the spleen and liver, and anemia. Leishmaniasis are caused by protozoa of the genus Leishmania, transmitted to animals and humans by vectors of the Psychodidae fly family. Parasites are found in various species of wild and domestic animals. Several species of rodents are known to be natural hosts and potential wildlife reservoirs. Health Board of Emilia Romagna registered 204 cutaneous cases between 1999 and 2019, with 0,74 new cases over 100.000 residents; the hill country of Modena, Bologna and Forlì-Cesena were defined as area of parasite major density.

Methods: In December 2019, a 71 years old woman was referred by the Dermatology Unit of Azienda Ospedaliero-Universitaria Policlinico di Modena, with a histological diagnosis of cutaneous Leishmaniasis involving the right cheek. Antifungal therapy with amphotericin-B was already implemented. The patient was a heavy smoker (≥25 cigarettes/day); medical and drug history interview did not disclose any other information. Intraoral examination revealed an inadequate complete removable prosthetic rehabilitation. Mucosal aspect was irregular and slightly ulcerated; major lesions were white, non-tender, diffuse, compressible tissue enlargement, involving both gingiva and cheek lining mucosa. Also, maxilla and tongue had signs of initial manifestation with both white and hyperemic lesions. Lesion onset was uncertain and not specified by the patient. Differential diagnosis considered squamous cell carcinoma, proliferative verrucous leucoplakia, lymphoproliferative disorder (such as lymphoma and EBV+ mucocutaneus ulcer) and mucosal Leishmaniasis.

Results: Multiple biopsies were taken. Fresh specimens were collected for PCR examination and transferred on ice to the microbiology laboratory; routine histology samples were fixed in 10% buffered formalin. Patient was aware about smoking habit reduction, mouth hygiene and domestic prosthetic maintenance. Moreover, abstention from denture use was planned for a week.

Conclusions: Both examinations returned the diagnosis of mucosal Leishmaniasis, supporting the initial skin biopsy results. After 20 days from surgery, soft tissue healing was observed despite of minimal lesion regression. The patient is still in strict follow-up and under pharmacological treatment for the infectious disease, due to difficult and incomplete resolution.

Systemic light-chain amyloidosis associated with macroglossia: a case report

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Aim: Amyloidosis represents a heterogeneous group of conditions characterized by the deposition of an extracellular proteinaceous substance called amyloid. The systemic light-chain amyloidosis (AL) is the most common type of systemic amyloidosis. It is characterized by a clonal population of plasma-cells that produce monoclonal light-chain (kappa or lambda type). We report a case of AL in a patient with past medical history of peripheral neuropathy and initial intraoral manifestations.

Methods: On March 2013, a 70-year-old female was referred to the Department of Surgical Odontostomatology, Ancona General Hospital, complaining 14 months of dysphagia, dysphonia, lingual obstruction, decrease of voice tone and pharyngeal burning. Past medical history revealed a surgical treated bilateral carpal tunnel syndrome and a surgical treated thyroid goiter. Intraorally, a severe macroglossia, with submucosal thickenings, lateral tongue deep indentations, depapillation of tongue dorsum and purple-red perioral spots, were appreciated. The patient underwent to an incisional biopsy of the tongue and of the labial salivary glands. The surgical specimens were sent to the Institute of Pathology, Marche Polytechnic University.

Results: Microscopically, a mucosa with diffuse perivascular and interstitial deposits of amorphous, acellular and eosinophilic material, dissociating the muscle fibers, was observed. This material tested positive for Congo Red and Tioflavin T. Thus, a final diagnosis of amyloidosis was rendered. On May 2013, immunoelectrophoresis showed high levels of free light-chains k (3520 mg/L), high k/λ ratio (236.2) and high dFLC (350 mg/L). Normal count of creatininemia and troponin I, mild elevation of alkaline phosphatase and marked elevation of NT-proBNP (4390 ng/L), were detected. A 24-hour urine collection revealed a normal range of proteinuria. The immunofixation test showed a positivity to Bence Jones protein and a monoclonal kappa protein band. The research of amyloid substance on abdominal fat tissue was positive. Bone marrow biopsy demonstrated 20%

plasmacellular population. The echocardiography showed a compatibility with cardiac amyloidosis. Therefore, diagnosis of AL-k and Bence-Jones proteinuria, involving the cardiac and the soft tissues, was made. The chemotherapy protocol included 8 cycles of Bortezomib, Melphalan and Dexamethasone. Furthermore, diuretic, antithrombotic and antiviral prophylaxis was recommended. The reported side effects were a self-limiting skin erythema, asthenia, hypotension and constipation, which led the patient to access to the Emergency Department on March 2014. Patient complained diffuse joint pain and chewing difficulties. Intraorally, a marked macroglossia with an involvement of the submandibular tissues was appreciated. In this occasion, the levels of free k chains had further decreased (117 mg/L) but the skeleton X-ray showed bilateral shoulder osteorarefactions. On September 2014, the serum concentration of free light-chains showed a further reduction (57.9 mg/L). The NT-proBNP, had also reduced by three times, but remained high (1729 ng/L). Other two therapeutic cycles were recommended: Bortezomib, Dexamethasone, Omeprazole, Acyclovir and Ciprofloxacin.

Conclusion: AL is an aggressive condition with a swift clinical course if not recognized promptly. Clinical findings such as macroglossia, periorbital bruising and dyspnoea are suggestive in AL. Conservative excision is a satisfactory treatment for local amyloid masses. However, the role of surgery in systemic forms is controversial. There are no specific guidelines to aid clinicians in the management of macroglossia secondary to amyloidosis. Surgical excision may also be required in some cases to relieve symptoms.

Orofacial signs and symptoms of Fahr's disease: a case report

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Aim: The Fahr's disease is a rare neurological syndrome transmitted as an autosomal dominant trait. MRI pathognomonic sign is the finding of bilateral calcification located in basal ganglia and other cerebral structures such as thalamus, hippocampus, cortex, cerebellum, dentate nucleus in the MRI examination. The symptoms are extremely heterogeneous, ranging from typically neurological signs such as movement disorders (parkinsonism, chorea, tremors, dystonia), to neuropsychiatric manifestations (psychosis, depression, cognitive impairment). The aim of this case report is to evaluate the possible presence of oro-facial signs and symptoms during Fahr's disease, which could be simplify the diagnosis.

Methods: A 69-year-old man patient, presented to the Oral Surgery Unit of the University of Salerno for a specialistic evaluation with a history of orodinia, occlusal dysesthesia and mandibular dyskinesias. The patient referred burning sensation diffused all over the mouth, except for perioral labial and cutaneous regions. This symptomatology was less intense in the morning, worsened during the day reaching the acme in the evening, it was relieved by chewing and it completely disappeared during sleep. At the anamnestic investigation he claimed to be hypertensive, referred sleeping disorders, mood deflection, irritability and an access to the emercency room because of a short-term ictal vertigo episode, associated with a feeling of confusion. A physical examination of oro-maxillo-facial complex and neurological examination of the cranial nerves was conducted. For diagnostic purposes blood chemistry tests to evaluate metabolic and micronutrients deficiency status, screening tests for thrombophilia was prescribed. MRI of the brain and brainstem, with and without contrast agent, was requested.

Results: On physical examination of the oral cavity, oral mucosa was free of chromatic and/or morphological alterations; there were no quantitative or qualitative changes in the salivary flow. The mandibular dyskinesia referred by the patient was confirmed; the neurological examination of the cranial nerves was negative. The laboratory tests showed a slight alteration of the metabolic status with increased serum levels for glycaemia, glycated hemoglobin, homocysteine, thyrotropin and reduced for thyroglobulin. No other metabolic or mitochondrial disease or systemic disorders have been detected. The brain MRI, performed with contrast agent, showed the presence of bilateral depositions of calcium-dystrophic matrix in the dentate and lenticularis nucleus, expecially in the globus pallidus, together with other symmetrical and less extended zones in the caudate nucleus heads and pulvinar, referable to calcium depositions. This calcification are not related with infection, trauma or toxic causes. These clinical records, in accordance with Manyam's diagnostic criteria, are compatible with Fahr's disease.

Conclusion: Fahr's disease is a rare neurological disorder whose diagnosis is challenging for its clinical complexity. Relevant attention must be given to the finding of related neurological signs and symptoms, detectable in different areas of the body. In our clinical case we found the combined presence of mandibular dyskinesia and somatosensory alterations such as the patient's reported orodynia, in the absence of oral mucosa disease, have oriented the diagnosis towards a neuropathic, dysaesthetic disorder such as burning mouth syndrome (ICOP 6.1) with a possible

association with a somatic symptom disorder (DSM-V F45.1). The brain and brainstem MRI, made it possible to make diagnosis of Fahr's disease by the finding of bilateral idiopathic calcifications of the basal ganglia. Further studies will be required to determine whether basal nucleus calcifications and gliotic phenomena detected in the patient can correlate with peripheral neuropathic disorder or the somatic component.

Case report of a patient affected by relapsed-refractory Hodgkin lymphoma undergoing autologous stem cell transplantation: choice of a therapeutic protocol

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Aim: We present a case report of a patient in which, despite the presence of periapical translucencies attributable to endodontic lesions, in consequence of clinical conditions and the short time before transplantation, we decided to carry out a protocol used in the Department of Oral Surgery and Systemic Pathologies, Dental School, University of Turin: it consists in avoiding dental extractions if the lesion is less than 5 mm, the element is asymptomatic with complete coronal sealing. The aim of this study was to evaluate the correctness of our therapeutic choice, according to patient's clinical situation and time avaible before therapy.
Methods: A 21-years-old male was referred to the Department of Oral Surgery and Systemic Pathologies, Dental School, University of Turin in May 2014. He was affected by relapsed/refractory (RR) Hodgkin lymphoma (HL) since 2013. The patient presented to have suitability for allogenic stem cell transplantation (allo-SCT) in the next 21 days. (WBC 4.73 (109 /L), RBC 4.95 (1012 /L), PTLS139 (109/L) INR 0.98. On clinical examination, 36 and 46 appeared to be filled with no discoloration, having undergone endodontic treatment, 4 years ago, according to the patient. Radiographs (orthopantomography and endoral X rays) revealed periapical radiolucency with relation to 36 and 46 less than 5 mm: lesion was diagnosed to be of endodontic origin with absence of periodontal component, no symptoms and mobility, coronal sealing was maintained. Considering the small size of the lesion, the absence of filling's infiltration, the absence of symptoms and evaluating the haematological prognosis, especially the necessity of an urgent hospitalization, it was decided to not proceed to any procedure, a part of a session of professional oral hygiene. The patient was explained about the procedure and due consent obtained. The patient was transplanted in June 2014, 21 days after the first dental visit. The conditioning regimen for lymphoma was FEAM (Fotemustine plus Etoposide, Cytarabine and Melphalan); complication in the immediate post-transplant period were the normally recorded and patient was visited during the hospitalization period by a trainee dental hygienist to record any symptoms of mucositis and dental problem. The same operator visited the patient after transplantation every three month to record any symptoms or modifications in the dental stability.
Results: During the 18 months after HSCT patient never had any symptoms in 36 and 46 and radiographs show the stability of the lesions. After 18 month the hematologist agrees to start oral treatment again. After the execution of RTC the follow-up was planned and after 5 years the dimension of the lesions decreases.
Conclusions: This case report shows an emblematic situation that frequently occurs for the dentist who have to treat patients before transplantation. When the days available for the oral management are less than 21, tooth extractions have to be chosen wisely, taking consideration of patient primary disease and systemic conditions. In this case an efficient marginal sealing had permitted to maintain the stability of the lesion till the haematologist had agreed to start the RTC; a 5 years follow-up shows us the decrease of the translucency and the total absence of symptoms. The most important aspect of our protocol if that we hadn't extract two teeth in a young patient with a good life expectancy.

Differences in dental management of patients in therapy with VKAS compared to patients treated with DOACS

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Aim: The aim of this study is to evaluate post-operative bleeding and healing during anticoagulant therapy with VKAs or DOACs in patients who underwent multiple extractions.
Methods: The study was carried out on 298 patients (average 62.3) who needed from 2 to 6 extractions. All patients were divided into two groups (A or B) depending on the type of the anticoagulant therapy. Group A (40,3%) took VKA; these drugs have an antagonistic action on the effects of vitamin K. 48

patients took Coumadin (Warfarin sodium), the rest of Group A (72 patients) took Sintrom (Acenocoumarol). Group B (59,7%) took DOACs that inhibit selective coagulation factors. 51 patients were prescribed Pradaxa (Dabigatran etexylate mesylate) inhibitor for IIa factor. 80 were given Xarelto (Rivaroxaban), 32 patients Eliquis (Apixaban) and 15 Lixiana (Edoxaban tosylate) the last three drugs mentioned inhibit Xa factor. Differently from Group A, Group B didn't need a periodical blood collection to check INR, as the DOAC mode action extended the time of active partial thromboplastin (aPTT). Compared VKA to DOAC drugs have a half-life between 8 and 16 hours in patients with good renal function, higher bio-availability and reduced interaction with drugs and food. In all Group A patients, cardiologists replaced VKA, with LMWH two days before and after surgery, in accordance with World Guidelines (WFO) if INR>3; while all Group B patients didn't need a therapeutic bridge. The Group B protocol consisted of a temporary suspension of DOAC for 24 hours before surgery depending aPTT and creatinine clearance in each patient. For all 298 patients a minimally invasive surgical approach was used; bleeding and haemostasis were controlled by using fibrin sponges, sutures and sterile gauze compresses. Ice was applied in the post-operative phase and a cold liquid diet was recommended to reduce destabilizing the coagulant and further bleeding. All patients were given antibiotics for 5 days, to be taken 1 day before surgery and 4 days after. We use visual examination for intra-operative bleeding and Iwabuchi classification for post-operative bleeding (5 grades: 0, no bleeding; 1, excessive blood clotting in the socket, no treatment required; 2-1, haemostasis achieved by compressing the wound longer than 30 min; 2-2, oozing haemorrhage observed on or after the next day of the procedure, in which haemostasis was achieved by simple compression; 3, bleeding required treatments other than wound compression, such as application of compression brace and/or coagulation by electro tome was needed); all patients were visited 1-7 and 15 days after surgery to evaluate post-operative bleeding and they were instructed to show up at hospital if bleeding occur later; also the healing was assessed by visual examination.

Results: There was no great difference in the amount of bleeding among patients in the same group. Group A showed more intra-operative bleeding. In Group A 14 patients showed a post-operative haemorrhagic complication for the next 7 days, while 7 patients in Group B had slight bleeding for 8 hours after surgery. Post-operative healing at 15 days was comparable between the Groups.

Conclusion: This study deduced that using DOAC drugs results in less intraoperative bleeding, fewer post-operative haemorrhagic complications and an easier administration of the drugs. However, further close collaboration between dentists, cardiologists and various medical specialists is essential for patient treatment and follow up in order to eventually modify drug prescription or evaluate temporary anticoagulant suspension.

The prognostic role of perineural invasion in oral tongue squamous cell carcinoma patients

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Aim: Oral squamous cell carcinoma is the most common malignant tumour of the oral cavity, and oral tongue is the most commonly involved site, accounting for about 40% of all oral cancer cases. Furthermore, oral tongue squamous cells carcinoma (OTSCC) presents specific molecular and clinical behavior. The current staging system for oral cancer is based on the 8th edition of AJCC cancer staging manual, which takes into consideration new prognostic morphological markers such as depth of invasion and extranodal extension. Despite of recent advances in diagnostic and therapeutic systems, the prognosis of OTSCC is poor and often unpredictable. The aim of the present study was to evaluate the prognostic value of Perineural Invasion (PNI) in a cohort of patients with OTSCC.

Methods: A cohort of 154 randomly selected patients with primary OTSCC, stratified according to the pathological staging, were retrospectively evaluated. All the patients were treated with a curative intent at the "Ospedali Riuniti" General Hospital (Ancona, Italy), between 1990 and 2014. Hematoxylin and eosin stained sections obtained from formalin-fixed, paraffin-embedded blocks of the primary tumor specimens, were carried out from the most invasive part of the primary tumor. Two experienced pathologists independently performed the histological evaluation, blinded to the clinical and pathological data. The presence of PNI was reported when cancer cells were identified in any of the 3 layers of the nerve sheath and/or tumour was in close proximity to the nerve, involving more than one-third its circumference. Statistical analysis was performed by using SPSS 20.0. Patients were categorized if in the tumor sample there was evidence of PNI or not. Univariate analysis was evaluated by log rank test. Survival time was evaluated in months. Multivariate analysis was built in order to explore the prognostic value of the main

clinic-pathological variables together with the PNI. Age, gender, pathological staging (7th AJCC edition), and grading were used in the model. A p values <0,05 was considered as statistically significant.
Results: PNI was reported in 57 patients (37%). The patients with PNI were at higher risk of death, reporting a worse overall survival. This risk was higher of 2 times compared to patients without PNI. Multivariate analysis confirmed the previous results and PNI resulted to be an independent prognostic factor for the overall survival in patients with OTSCC.
Conclusion: Our findings suggest that OTSCC patients with PNI may represent a more aggressive subtype, probably because the cancer cells spread along the bundle nerves, extending beyond the tumour mass. Indeed, PNI emerged as an independent prognostic factor for overall survival in OTSCC patients. Furthermore, the evaluation of PNI is simple, inexpensive and can be used to augment the risk stratification of OTSCC.

Morphea with oral mucosa involvement: case report

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Aim: Morphea, or localized scleroderma, is an autoimmune skin disorder that causes the sclerosis of the epithelium and underlying tissues due to excessive collagen deposition. The estimated incidence of morphea is 0.4 to 2.7 for 100,000 people; it is more common in Caucasian women, with a female:male ratio of 2.4-4.2:1. The etiopathogenesis of morphea remains unclear and poorly understood, but it is thought to be related to a combination of genetic predisposition, which generates an autoimmune response triggered by factors such as trauma, radiation, drugs, and infections. Vascular dysfunction is one of the earliest changes observed and may represent the initial event in the pathogenesis of the disease. Van der Veken et al. report that morphea differs from systemic scleroderma for the absence of Raynaud's phenomenon and the organs' compromise, such as the heart, lung, or kidneys. Oral localization is rare and can occur as white linear fibrotic areas with a scar-like appearance, atrophy of tongue papillae, gingival recession, and alveolar bone resorption. The aim of this paper is to describe a rare case of intraoral manifestation of "morphea".
Methods: We report a case of a young man who has attended our sector of Oral Medicine (University Hospital Policlinico "P. Giaccone" Palermo, Italy) for the presence of an erythematous area of the tongue.
Results: A 20-year-old Caucasian male presented at the University Hospital of Palermo in April 2018 complaining about an eight-months erythematous plaque surrounded by a white linear fibrotic area in the middle part of the tongue. The patient was not a smoker, not an alcohol consumer and his oral hygiene was good. Moreover, the patient has a medical history of cutaneous morphea, diagnosed two years earlier, and treated with cyclosporine therapy. Oral clinical examination, additionally, revealed the presence of analogous lesions in both mucous membranes of the cheeks; the tongue papillae and epithelium were atrophic. The patient complained about a burning sensation and pruritus. There was no history of preceding trauma. The histopathological evaluation showed mild hyperkeratotic and parakeratinized squamous epithelium with epithelial atrophy and a marked thickening of collagen in the lamina propria, associated with a perivascular lymphomonocytic infiltrate and a strong presence of eosinophils. The blood analysis, including a complete blood count and the search for vitamin deficiencies, were regular. Search for autoantibodies, such as anti-SS-A, anti-SS-B, ENA, ANA was negative. Also, serologies for syphilis, hepatitis B and C viruses and HIV were negative. Concerning the results obtained, the diagnosis was an oral manifestation of morphea. The patient was already taking cyclosporine therapy, so we prescribed topical use of clobetasol in association with a selective diet. After two months, we observed the complete remission of the lesions. At the most recent follow-up, the clinical picture was stable.
Conclusion: We have described here a case of oral morphea. The morphea pathogenesis is still unclear and poorly understood; rare oral localization of morphea should be diagnosed and early treated because it can be related to pain, pruritus, and burning sensation pruritus. Treatment often requires multidisciplinary collaboration, appropriate treatment can stop the progression of the disease and improve patient's quality of life.

Lymph vascular invasion as prognostic factor in oral cancer

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Aim: HNSCC is one of the most common cancers in the world and approximately 600,000 new cases are diagnosed each year. It is caused by multiple factors that can alter DNA in cells. The strongest risk factors for developing this type of cancer are tobacco consumption (including smoking or the use of chewing tobacco) and alcohol consumption. In the "TNM" tumor staging system, the management and prognosis of HNSCC depend on the stage of the primary tumor (T), on the lymph node involvement (N) and on the presence or absence of metastasis (M); to these is added the evaluation of the DOI (Deep of Invasion) of the primary tumor. Subsequently, the histopathological analysis of the infiltration profile of the primary tumor led to the creation of an additional parameter for the staging of the HNSCC (precisely of the OSCC): Lymphovascular invasion. It is defined as the microscopic invasion of the vessels that could be lymphatic, vascular or both.
Methods: 100 patients with oral cancer were included in this study. We evaluated Lymphovascular Invasion (LVI) as foci of tumour surrounded by a clear space and with a well-visualized endothelial lining. Different classifications of LVI were investigated, such as the location and the number of infiltrated vessels, but the inherent subjectivity of these methods hinder their clinical utility. For these reasons, and due to the small sample size, in our study we used a dichotomous score (the presence or the absence of LVI) for the evaluation of this parameter. Statistical analysis was performed by using SPSS 20.0. Patients were categorized for lymphovascular invasion present or absent. Univariate analysis was evaluated by log rank test. Survival time was evaluated in months. Multivariate analysis was build in order to explore the prognostic value of the main clinic-pathological variables together with the perineural invasion. Gender, staging 7th AJCC edition, age and grading were used in the model. Results were reported as Hazard Ratio (HR) and 95% Confidence Interval (C. I.). p values <0,05 were considered as statistically significant.
Results: Lymphovascular invasion was present in 20% of patients. These patients, at univariate survival analysis reported a 3 times higher risk of death compared to patients without lymphovascular invasion. At multivariate analysis this result was confirmed and lymphovascular invasion resulted to be an independent prognostic factor, together with age and gender.
Conclusion: Lymphovascular invasion resulted to be a promising prognostic cancer arising from the oral cavity and our results confirmed what obtained in other studies.

Ozonized water for the management of erosive oral lichen planus

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Aim: Management of erosive Oral Lichen Planus (eOLP) is challenging. Currently, topical corticosteroids are widely used as first-line therapy, but they might be associated with side-effects and incomplete clinical response. Among non-pharmacological strategies, ozone at low medical concentration has proven to induce a mild activation of protective anti-oxidant pathways, thus exerting therapeutic effects in many inflammatory diseases. Given its therapeutic mechanisms, we hypothesize that ozone therapy can decrease the severity of eOLP symptoms, manage the risk of candidiasis superinfection and induce a faster healing of the lesions. Ozonized water was chosen as formulation to overcome the potential issues of gaseous ozone, including gas dispersion, risk of toxicity by inhalation and reduction of local effectiveness. The aim of this randomized controlled study was to investigate the effectiveness of ozonized water in association with conventional topical corticosteroids for the treatment of eOLP.
Methods: Fifty-one patients were included in the study and randomized into 2 groups: study group (n=26) included patients receiving ozonized water treatment; control group (n=25) included patients receiving placebo treatment (i.e. double-distilled water). Water ozonization was carried out at each appointment, 5 minutes before application through Aquolab Professional, Sweden & Martina S.p.A, Padova, Italy - double-distilled water to ozone ratio being 2:3). Treatment protocol consisted of 1-minute oral rinses, repeated for 4 times, twice a week for 4 weeks. All patients received conventional corticosteroid topical therapy (betamethasone soluble tablets, 2 rinses/day for 4 weeks). OLP clinical course was evaluated by assessing the size of lesions (mm), signs (Thongprasom score) and pain score (VAS 0-10 scale). Outcomes assessment was performed before treatment, after 2 weeks of treatment (T1) and at the end of 4-week treatment (T2). Efficacy Index (EI) of treatment was calculated as [(Total score of the lesion before treatment – Total score of the lesion after treatment) /

Total score of the lesion before treatment] X100 ant it was then categorized into a 5-rank scale, ranging from 0 (no improvement) to 4 (healed). Possible candidiasis infection during treatment and relapse rate 3 months after treatment were also recorded.
Results: All patients experienced significant improvement of sign and pain scores with a higher rate of improvement in ozone-treated group (T1 improvement rates: Thongprasom 92.2% vs 28%; VAS pain 76.9% vs 32%; $p<0.05$). Pain and size reduction were significantly higher in ozone-treated group both at T1 and T2 ($p<0.05$). Ozone-treated group showed a higher EI at every time point (T0-T2: 72.77% vs 37.66%, $p<0.01$). Candidiasis (32% vs 11.5%) and relapse (40% vs 34.6%) rates were higher in control group, however the differences were not statistically significant.
Conclusions: Within the limitations of this study, ozonized water seems to be effective as an adjunct therapy, in combination with topical corticosteroids, for the treatment of eOLP.

Extra medullary manifestation of multiple myeloma

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Case report: Multiple myeloma (MM) is an incurable, biologically heterogeneous disease of the plasma cells that results in an overproduction of light and heavy chain monoclonal immunoglobulins. MM is the second most common hematologic malignancy. Internationally, MM constitutes approximately 1% of all cancers worldwide, with approximately 86,000 new cases per year. The median age at diagnosis is 65 years and the current the 5-year survival is approximately 46.6%. Bone disease, the hallmark of multiple myeloma, occurs in virtually all patients during the course of the disease, frequently impairing their quality of life, and represents a major cause of morbidity and mortality. In this case we describe a rare oral manifestation of an uncommon IgA lambda multiple myeloma.
Methods: An 85-years old male patient with refractory multiple myeloma (IgA lambda) presented to our Center. Clinical examination showed a huge tumefaction located in the lingual side of the fourth quadrant with a parenchymatous consistency at palpation. The dental x-ray images revealed a deformation of the right cortical jawbone. The patient history showed that the intraoral mass was firstly observed during the fourth administration of myeloma-specific chemotherapy (Daratumumab, Velcade and Desametasone). The incisional biopsy of the buccal mucosa and underlying tissue was performed. The results confirmed the unexpected diagnosis of extra medullary location of the multiple myeloma with a high quantity of plasma cells (CD20+; CD138+; CD79a+; MUM1+) and restriction for the lambda light chains of IgA. Several therapies may be adopted to treat this kind of multiple myeloma, as for example the radiotherapy or chemotherapy. However, considering the clinical condition of our patient and his age, we opted for surgical removal of the neoplasm to improve his quality of life. The local anaesthesia has been administered and the total surgical removal of the mass was performed, with a curettage of the bone. Stiches were removed 14 days after surgery. No acute or late complications occurred during the surgery or at follow-up. Few months after the surgery the patient died of multiple organ system failure caused by the cancer.
Results: The extramedullary oral location of multiple IgA lambda myeloma has been rarely reported in the Literature and these cases are frequently associated with primary systemic amyloidosis. In this case the patient presented an even more rare form of this extramedullary myeloma.
Conclusions: Further studies on larger population or case series are needed on these issues to better understand the underlying causes of this association.

Effects of fermented wheat germ extract on oral squamous cell carcinoma. An in vitro study

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Aim: Oral cancer represents one of the most aggressive tumors. Despite the advances in cancer therapy, the mortality is still high and the side effects of the current treatments are devastating. A great attention is paid on the natural compounds because of their potential benefic properties for human health. In this study the effects of Fermented Wheat Germ Extract (FWGE) on the cells of Oral Squamous Cell Carcinoma were in vitro investigated.
Methods: Three OSCC cell lines (HSC-3, SAS, SCC-25) and a non-tumoral human cell line (Gingival fibroblasts) were used. MTT assay was performed for evaluate the cell viability after treatment with various

concentrations of FWGE (2-5-10 mg/ml). Invasion and migration capacity of cancer cells were evaluated using two methods: transwells method, coating the filters with Myogel for Invasion assay and spheroids method, both comparing treated and untreated cells. The evaluations were performed at three different timings (24-48-72h). For the timing of evaluation of Spheroids the proliferation and invasion rate of each cell line was considered.

Results: MTT assay revealed a significant ($p<0.0001$) inhibition of cancer cell viability for 5mg/ml and 10mg/ml FWGE treatment, while no effect emerged for the treament with the lowest (2mg/ml) dose of compound. The Fibroblasts subjected to the treatment, showed a negative response only to the treatment with the highest (10mg/ml) concentration of FWGE, suggesting a better tolerance to the compound by non-cancer cells. Migration and invasion capacity of cancer cells was inhibited by the treatment with FWGE, resulting in a significant reduction ($p<0.0001$) of cells passing the transwell filter at every time point. In particular, HSC-3 seem to be more sensitive to the treatment, showing a significant inhibition of migration and invasion already at the concentration of 5mg/ml. SAS, instead, responded only to treatment with the highest (10mg/ml) concentration. The evaluation of HSC-3 Spheroids revealed a significant ($p<0.0001$) reduction of invasion area for the cells treated with 5mg/ml and 10mg/ml at Day 2 and Day4. The Day 7 picture showed a significant effect only for the 10mg/ml treatment. For SAS spheroids, only the highest treatment with 10mg/ml of FWGE produced a significant result in invasion area reduction. Regarding the SCC-25 spheroids, the invasion was very slow, so that the evaluation at Day 2 and 4 have not produced any siginificant result, meanwhile at Day 6, 9, 11 the cells treated with 5mg/ml and 10mg/ml FWGE showed a significantly lower invasion compared to the Untreated cells ($p<0.0001$).

Conclusion: Fermented wheat germ extract shows promising effects in the treatment of oral cancer cell lines, reducing their proliferation and migration/invasion ability. At the same time, normal human fibroblasts seem to be less affected when subjected to the treatment with the same doses of FWGE. Further investigations are needed to better understand the mechanism of action of such compound in view of a potential use in oral cancer treatment.

Evidence of braf and smo genes mutations in ameloblastoma

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Aim: Ameloblastoma is the second most frequent odontogenic tumor, but its molecular pathogenesis and treatment are still controversial. Recently, recurrent activating mutations of the BRAF and SMO genes were identified as potentially important for the pathogensis and the biological behavior of the tumor. These genes encode two receptors of the signaling pathways of MAPK and Hedgehog. This study analyzes the characteristics of these mutations in a series of ameloblastomas treated at the maxillofacial surgery unit of the polyclinic hospital Gemelli in Rome.

Methods: 10 patients, diagnosed of ameloblastoma, underwent surgical treatment for curative intent at the polyclinic hospital Gemelli. All patients were included in this study and a total of 10 specimens were collected and stored. Samples were formalin-fixed and paraffin-embedded. Molecular analysis for the detection of Braf and / or Smo mutations was performed through an amplificability test for a housekeeping gene and DNA was amplified with specific primers for codons 412 and 535 of the SMO gene and for codon 15 of the BRAF gene. The amplification products were loaded and run in 2% agarose gel stained with ethidium bromide and observed under ultraviolet rays. The specific bands, isolated from the gel were purified and directly sequenced with the same amplification primers.

The data relating to: the age and gender of the patient, the location of the lesion (mandibular or maxillary), the radiographic appearance (unilocular or multilocular), the histological type (unicistic or multicistic) and the type of treatment (radical or conservative) were collected and used for the statistical analysis. Statistical analysis was performed by using SPSS 20.0. Patients were categorized if carrying the BRAF or SMO gene mutation. Chi-square test and Mann-Whitney test were used to explore the mutation frequency and difference among the most common clinic-pathological features, such as age, gender, location of the tumor and histological type. Results are shown as test used and p-value for which $< 0,05$ was considered as statistically significant.

Results: SMO resulted wild-type in all patients, meanwhile 5 patients reported a mutation in BRAF gene. There were no difference between genders or young or older patients. BRAF resulted mutated only in the mandibular subsite.

Conclusion: In this study, we show that mutations of BRAF seems involved in the ameloblastoma of the

mandible, as shown also in other studies, meanwhile there were no differences between gender and age of patients.

What are the effects of socket filling with autologous platelet concentrated in patient undergoing antithrombotic therapy? A literature review

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Aim: The aim of this review is to evaluate the protocol used and the effectiveness of PRP and PRF in the management of local bleeding complications in anticoagulated patients and, moreover, to update on the new protocols described.
Methods: A bibliographic search was carried out on Scopus, MEDLINE via Pubmed, Google Scholar, Library Search (https://librarysearch.uniroma2.it) using combinations of keywords and MeSH terms relating to or describing the object of study. The last research was carried out on 18 June 2020. After initial screening, articles that included patients with hemophilia, use of heterologous or bank preparations were excluded. Nine articles written between 2003-2020 were examined to evaluate the effectiveness of PRP, L-PRF, A-PRF + as a local hemostatic tool. The following data were collected and analyzed: number of patients, antithrombotic therapy, intervention, platelet concentrate preparation protocols, bleeding episodes, complication and clinical findings.
Result: In the articles included, the patients were subjected to the intake of warfarin, NAO, anti-platelet agents or combined therapies; and only in one study warfarin therapy was suspended. The literature examined shows that the use of platelet concentrates promote clot stabilization and has the same efficacy as synthetic hemostatic plugs during primary hemostasis. The use of L-PRF or A-PRF+ reported a lower percentage of complications and quicker healing compared to synthetic hemostatic plugs. The new generation of Autologous Platelet Concentrate (APC) seems to have more advantageous results of their three-dimensional structure that makes the release of cytokines and growth factors longer. As already stated in the literature, in patients taking warfarin or combined therapies, the possibility of severe bleeding is greater than in patients undergoing NAO therapy or exclusively on anti-platelet agents.
Conclusion: The investigation about the macroscopic and microscopic structure of PRF, which comes from patients taking warfarin, reported no difference whit PRF from healthy volunteers. In accordance with the previous reviews, we have found that socket filling with PRP or PRF has promising natural hemostatic properties and improves the management of postoperative recovery. APC represents an excellent haemostatic tool in patients undergoing antithrombotic therapy, always paying attention to the personal clinical condition and not underestimating haemorrhagic complications due to the intake of anticoagulants. For these patients, it was recommended a longer centrifugation time of 18 min in order to obtain an excellent polymerization of the fibrin net.

Dental management of the geriatric patient: comparison between the oral health status of the institutionalized and non institutionalized patient

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Aim: Advances in medical research have prolonged the life span of each individual, resulting in an increase of over 65 in the world population. In elderly individuals, systemic pathologies and those of the stomatognathic system, characterized above all by the loss of dental elements and periodontal disease, associated with poor oral hygiene, are more prevalent. The correct management and treatment of the geriatric patient are based on the ability, both of the dentist to know what are the interactions between systemic and oral diseases, thus identifying the complicating factors that can interfere with dental treatment, and of the health personnel who manage patients in the assistance structures, instructing them to correct oral hygiene in order to prevent the onset of pathologies.
Methods: Referring to different questionnaires in the literature, we have developed a test of 10 questions, easy to understand, which gives a subjective picture of how the oral health status of the geriatric patient can have a functional and psychosocial impact on life daily. Each question has 5 answers with a score ranging from 0 to 4, a low value indicates a good perception of one's oral health, conversely a high one is usually found in patients with few dental elements, and poor oral health. The questionnaire was submitted to two groups of subjects, 68 institutionalized and 74 non- institutionalized: institutionalized patients were mainly recruited at the UOSD "Special Dentistry with Protected Paths" at the Tor Vergata Polyclinic in Rome (Manager Prof. Bollero Patrizio); for non-institutionalized patients the test was subjected to different RSA in the Lazio and Marche regions. The aim of the work is to highlight differences in oral health status, between institutionalized and non-institutionalized patients, with the consequent need for dental treatments, focusing on whether it can

emerge from this the need for greater education (patients and professionals) to prevent pathologies borne by the stomatognathic system.
Results: From the sampling of the 142 questionnaires, a worse subjective oral health picture was found in institutionalized patients, with a value of 18.98 ± 5.33 and an average age of 80,88 ± 5,36 years old, differently from the value of 15.74 ± 5.61 and an average age of 77,28 ± 5,07 years old found in non-institutionalized patients.
Conclusion: The results show, albeit with a minimal difference and despite the need for greater sampling, how institutionalized patients within the controlled RSA show a worse sensitivity to oral care than the non-institutionalized counterpart. Dental services aimed at curing algic symptoms, restoring correct function and aesthetics, are provided for those exempt from the National Health System; this may further weigh on care costs in addition to those used in the management of institutionalized patients. From the results emerged, a correct education of health workers on oral hygiene methods, as well as their awareness of institutionalized subjects, could outline an improvement in the state of oral and therefore general health, also leading to possible reductions in care costs.

Simple vascular malformations: laser treatment outcomes in 70 cases

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Aim: Simple vascular malformations, as classified by the most recent update of the International Society for the Study of Vascular Anomalies (ISSVA), are common in the head and neck regions. These lesions derive from blood and lymphatic vessels and present with a varying histology and unique imaging/pathological features as well as distinctive biological behavior; simple vascular malformations usually associate with functional and/or aesthetic limitations, that represent the patients' chief complaint. If simple vascular malformations usually do not regress spontaneously, they often occur after minor traumatic injuries to the oral mucosa (such as: recurrent bruxism in patients not wearing bite, occasional morsicatio buccarum or food trauma), in these cases the lesion has the tendency not to grow in size if the traumatic agent is removed. Different treatment options have been proposed in literature, such as traditional scalpel surgery, cryotherapy, embolization, steroid therapy and high intensity laser surgery. The present study aims to analyze and compare epidemiological aspects of 70 simple vascular malformations treated by photocoagulation with Nd:YAG laser.
Methods: Seventy-nine oral vascular malformations and/or hemangioma were surgically treated at the Center of Oral Medicine, Pathology and Laser Surgery of the Academic Hospital at the University of Parma, between January 2004 and December 2019. After local anesthesia, photocoagulation was performed with Nd:YAG laser (1064 nm, pulsed mode, fiber diameter 300µm, power output 2.00 W and frequency 30 Hz), non-contact mode was maintained with a maximum distance from lesion to laser tip of 3 mm, no suture was needed/applied. Patient was instructed with ice applications for surgery day, semi-liquid diet and pain medications (if needed) for the following week. Minimum follow-up time to be included in this study was 6 months. A retrospective epidemiological analysis was conducted regarding: gender, age, site and dimensions (larger diameter) of the lesion and eventual recurrence.
Results: Thirty-four lesions (48,5%) belonged to male patients and 36 (51,5%) to female, mean age 66 yo (min 19, max 88). Our study showed VAs to be localized mainly on both upper or lower lip (29 patients, 41,4%), less frequently in cheeks (18 patients, 25,7%) and on the body of the tongue (9 patients, 12,9%) or tongue margins and oral floor (7 patients, 10%); in 7 patients (10%) VAs were localized on hard palate. Mean measured diameter was 7,2 mm, with a minimum of 2 mm and a maximum of 30 mm. Recurrence was observed in only 5 patients (17,2%); out of these 5 cases of recurrence: 3 lesions were localized on the lip, one on the body of tongue and one hard palate; 3 lesions belonged to female patients and 2 to male patients, mean diameter was 5 mm.
Conclusions: Nd:YAG laser has arisen as a valid non invasive treatment option as surgical procedures can be performed quickly, easily and safely, with a great postoperative period characterized by minimal pain and complications and optimal aesthetic results associated with low rates of recurrence. Its wavelength has high selectivity for hemoglobin and poor water absorption and it allows to operate rapidly and with good hemostasis. Low rates of recurrence were observed in fewer cases, where lesions where probably to be classified as "combined" rather than " simple" and the arterial component was more represented than the venous; in these cases, photocoagulation can be performed with other wavelengths (such as 532 nm) with higher actaction to blood molecules. Photocoagulation with Nd:YAG laser still represent a valid first step to reduce lesions dimensions allowing future less extensive excisional surgeries.

Prevention and Dental Hygiene

Miswak vs manual toothbrush: double blind randomized trial

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Aims: The first aim of this study is to compare the effectiveness of two oral hygiene aids: Chewing stick and manual toothbrush for plaque removal and gingival health during 8 months. The second one is to evaluate the chewing stick's bleaching effect during 2 weeks of application.
Methods: The sample examined was randomly and consecutively recruited with the following criteria. Inclusion criteria: subjects of both sexes, age > 18 years old. Exclusion criteria: subjects with octaves not completely erupted and orthodontic. A tartar ablation session was performed and clinical indices were reported at the optimal level. Subsequently, the sample was divided into two groups: Group A: Used miswak for two weeks and follow using manual toothbrush for the next two weeks. Group B: Used manual toothbrush for two weeks and follow using miswak for the next two weeks. The study was carried out at double-blind system after careful calibration of the two operators. The instruments used during the trial are as follows: plaque detecter pads, periodontal probe, spectrophotometer. The study was divided into two identical sessions for both groups. They were recorded: Tooth colorimetry with spectrometer, plaque index (PI), bleeding on probing index (%BOP). Each group received a motivational reinforcement at each session for the aid assigned to them. The indices were detected at each session, once a week for a total of 4 weeks of experimentation for each subject. During the last session a small test was conducted which consists of removing the plaque detector from the subject in 3 minutes through the use of the aid assigned to him. The trial process was the same for both aids.
Results: The correlation between the subject's manual abilities based on the sextant cleansed and the working hand (right-handed and left-handed) and the BOP and PI indices was assessed. The working hand allows you to determine which sextant is most accessible by presenting a better performance. After careful statistical analysis, the following correlations emerge: As the IP increases, the BOP increases, the use of the dominant hand decreases the PI and BOP levels. Data recorded after using miswak was recorded at a p – value of less than 0.01 for IP, and a p-value of 0 for the BOP. The 3-minute test performed every two weeks of use lowers the PI and BOP levels performing better on group A. No significant correlations emerged on the Miswak's bleaching action. This result was probably due to several factors, including the choice of the element, the canine, on which it is difficult to assess the bleaching effectiveness. So, it was considered as a future prospect the idea of carrying out another experimental survey based on valute all upper and lower incisors after two weeks of miswak application.
Conclusion: This study has demonstrated a greater effectiveness of miswak in the mouth than manual toothbrush.To assess the bleaching action of the miswak it is necessary to conduct further studies with a greater methodological rigor. The dominant hand affects brushing performance.

Ozone in oral hygiene products for implant maintenance: preliminary data from in vivo and in vitro studies

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Aim: The role of ozone in daily oral hygiene products (mouthwashes, gels and toothpastes) is not supported by strong international literature and numerous doubts arise to date on its real indications. The purpose of this research is to evaluate the action on the oral biofilm of mouthwashes, toothpastes and oral gels containing ozone in a comparative laboratory test, and to verify the benefits on peri-implant inflammation in vivo.
Methods: For the in vitro test, 96 bovine tooth discs were exposed to strains of Streptococcus mutans or Candida albicans. The discs were placed in a bioreactor capable of emulating oral conditions and promoting the growth of biofilms. The discs were exposed to 3 different ozone-containing mouthwashes (Curasept Prevent, Ialozon Blu and Ialozon Rosa), 2 ozone-containing toothpastes (Curasept Prevent toothpaste, Dento3 toothpaste), 3 ozonated olive oil based gel (Curasept Prevent gel and Ialozon gel, Ozoral gel), 1 freshly prepared mouthwash with chlorhexidine 0.2% (positive control), 1 saline solution (negative control). At the end of the incubation period, the biofilm present on the discs observed by means of a spectrophotometer at 550 nm, capable of highlighting the quantity of viable cells. For the in vivo test, 10 patients with rehabilitated dental arches with full-arch implant-supported prostheses (Toronto bridge) and presenting peri-implant mucositis were selected. The patients were divided into 2 groups and then underwent periodontal microbial flora sampling (Periodontal DNA, Gentras, Italy) before and after 90 days of treatment with a mouthwash, toothpaste and gel for daily use with ozonated olive oil (Curasept Prevent) or the same protocol but with standard fluorine-based hygiene products (Colgate Total).
Results: For the in vitro test, none of the 3 mouthwashes showed a bactericidal action on S. mutans higher than the saline solution, while a 0.2% chlorhexidine mouthwash showed a decidedly marked bactericidal activity. On Candida albicans, Curasept Prevent has shown an antifungal activity statistically superior to Blue and Pink Ialozon and chlorhexidine; these last are however more effective than the saline solution. With regard to toothpastes and gels, some of them showed a slight antibacterial and antifungal activity, but never statistically significant compared to the saline solution. For the in vivo test, both maintenance protocols in two groups resulted in a reduction of the inflammatory symphtoms of peri-implant mucositis in the follow-up visits. Evaluation of the bacterial genome by genetic testing revealed a greater reduction in the population of periodontal pathogens in the group that used ozone-containing gel, toothpaste and mouthwash compared to patients who did not use ozonated products.
Conclusion: Preliminary data from this research show that the ozone-based products tested do not have an antibacterial action comparable to chlorhexidine on the S. mutans strains, on which they have been less bactericidal, and they cannot be considered as substitutes for chlorhexidine at least on this category of microorganisms and probably over many others with similar metabolic and cell membrane functions. On the Candida albicans, on the other hand, some products have shown an antifungal action superior to chlorhexidine, being able to limit the proliferation of the microorganism and suggesting that the continuous use of products based on ozonated olive oil could contribute in maintaining the balance of the microbiota by limiting the proliferation of opportunistic microorganisms. With regard to dental implants in the in vivo study, the use of products with ozonated olive oil may be of particular interest not for the antibacterial and antifungal action, but since they seem to be able to select the growth of a microbiota more conducive to maintenance of peri-implant health. Although in fact the resolution of peri-implant inflammations seems to depend mainly on the quality of the maintenance program set by the professional, the possibility of limiting the proliferation of pathogenic species appears to be a tool of particular interest for a targeted prevention plan free of side effects as with antiseptic products.

Physiological tongue coating correlated to intra-oral halitosis

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Aim: Halitosis is a problem with an important response in the life of those who suffer from it, and it can create malaise both on a psychological and healthy point of view. The purpose of this study is to research scientific evidence concerning the correlation between lingual patina and intra-oral halitosis and to sensitize professionals and patients in order to

prevent the onset and improve the prognosis of this condition
Methods: This thesis is based on a review of the literature, which aims to identify mainly the clinical studies concerning the physiological lingual patina and its relationship with halitosis of intra oral origin. The most recently published articles were analyzed as well as the oldest ones, selected on the basis of the most relevant quality scientific production. To carry out the research of the articles and scientific studies relevant to fully arguing the chosen topic, the PubMed Database (www.pubmed.com) was used with a research strategy based on the keywords: "tongue coating", "halitosis "And" oral malodour "," white tongue coating "and" intra-oral halitosis "," psychological "," papillae "," VSC "and" bacteria ".
Results: From the observation of these studies, it can be seen that the attention is focused on volatile sulphurous compounds (VSC) and, subsequently, on which are the more specific microorganisms responsible for their production. The main recognized VSCs are hydrogen sulfide (H2S), methylmercaptan (CH3SH) and dimethylsulphide (CH3) 2S (mainly linked to extra-oral halitosis).First of all, the studies associating lingual patina and periodontal disease have been grouped together, as the pockets (typical of the disease) are in fact one of the main sources of VSC. Another common consideration for multiple studies was to say that VSCs played an important role in the transition from gingivitis to periodontitis. In fact, they penetrate the oral tissues and act on the degradation of collagen. It should be underlined how much the back of the tongue is able to host a microbial load clearly superior to any other type of oral mucosa. Research has, in fact, led to the conclusion that the bacteria that make up PL are parodontopathic, both in cases of disease and in those of oral health and it is thought that they are therefore the ones producing VSC. In one study in particular, the BANA test was introduced, a specific technique that detects three main types of bacteria on the tongue: Treponema denticola, Porphymonas gengivale and Tannerella forsythia. Overall, the microbiome present on the tongue is involved in the production of VSC as in proteolytic activity, as the bacteria that have been detected on it degrade substrates containing sulfur that are found inside our oral cavity. Further studies, focused on the bacterial factor, confirm that Solobacterium moorei is related to VSC, in particular it is a moderate producer of hydrogen sulfide.
Conclusion: The lingual patina has a bond with intra-oral halitosis; Volatile sulfur compounds have a multiple negative effect: they cause bad odor and aggravate oral health; Intercepting halitosis and treating it would benefit our psychological well-being.

Therapeutic indication for molar furcation affected by periodontal disease: decision tree for dental hygienist

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Aim: The aim of the present study is to carry out a systematic review of scientific literature, in order to be able to formulate a decision tree inherent to the surgical treatment of molar furcation defects caused by periodontal disease. The study is dedicated to dental hygienists so that the decision tree can be applied routinely in clinical practice.
Methods: The surgical techniques considered are: root amputation, root separation, tunnel preparation, and guided tissue regeneration. The inclusion criteria used to select the articles are: English publications, experiments focused on human subjects, abstracts are available, the articles are case reports, clinical trials and the post-surgical protocol used are expressed.Four scientific databases are used to review the literature: Pubmed, Embase, Cochrane and Scopus. The protocols used are PRISMA statement and P.I.C.O. The following pre and post-surgical informations has been searched in the articles: instructions, motivation and pre-surgical debridement, indications for pre and post- surgical use of chlorhexidine, usual home oral hygiene and interdental cleansing techniques recommended to the patient and recall for professional oral hygiene. From the analysis of the literature, a decision tree is developed on surgical or non-surgical treatment dedicated to dental hygienists and their clinical practices. This decision tree can also be shown to the dentist to help him in assessing the patient's conditions.
Results: 8 articles are analyzed from 410 articles initially found following the inclusion criteria. To be noted that in the literature there are no pre and post-surgical protocols for maintaining home oral hygiene in patients who have undergone furcation surgery. It is possible to create both a decision tree for the dental hygienist for the selection of patients for surgical treatment and a table on the post-surgical indications for home oral hygiene, as well as a table for the programming of post-surgical recalls.
Conclusion: On the basis of the reviewed evidence, the following conclusions can be drawn. Multi-rooted teeth are most at risk if they suffer from periodontal disease Even if there is no post-surgical protocol in literature, it is possible to create one 3. The figure of the dental hygienist is essential both in the pre-surgical phase, both during the intervention and for the maintenance of the surgical site.

Pilot study of the effect of xylitol on cariogenic bacteria administered through chewing gums or crystals

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Aim: The aim of this pilot study was to comparetwo formulations containing Xylitol in the control of caries risk factors: chewing gum and crystal. The study aims to verify whether the two vehicles were able to reduce the bacterial concentration ofStreptococcus mutansandLactobacillus spp, and some clinical variables related to gingivitis.
Methods: Subjects with at least one active carious lesion or treated in the last two years and a high concentration of S. mutansin saliva (≥ 105 CFU / ml) were enrolled. Sixty students were examined (24 males and 36 females) from the School of Dentistry of the University of Milan, aged between 21 and 29 years. During the dental check-up, the DMFT caries index was assessed, and a salivary microbiological test (CRT bacteria Ivoclar Vivadent) was performed to evaluate the semi-quantitative bacterial count of mutans streptococci and lactobacilli. Twenty subjects withS. mutansvalues ≥ 2were enrolled. A professional oral hygiene section was carried-out on all participants and a toothbrush with medium hardness bristles and a toothpaste containing 1,450 ppm F (AZ Pro Expert, Procter & Gamble) were given to be used for 30 days. Moreover, it was requested not to use other products containing xylitol or other supports to oral hygiene during the experimental period. The subjects were randomly divided into two groups: the group A used four chewing gums daily divided into two administrations for a total 3.5g of xylitol. The subjects were asked to use them for 5 minutes after the oral hygiene procedures following the main meals. The group B used a single crystal containing 3.8 g of Xylitol after the evening oral hygiene procedure, dissolving the crystal slowly in the mouth. A 30-day usage of the two products has been carried-out with two clinical and microbiological evaluations, one at the beginning of the study and the second one at the end of products use. In addition to cariogenic bacteria evaluation, the bleeding score, the plaque index and the buffer capacity (CRT Buffer, Ivoclar Vivadent) were measured in both groups in the two evaluations.
Results: Ten subjectswere excluded from the study because they discontinued the treatment. The final sample consisted of 10 subjects, five in each group. The results showed that using both products, four subjects in each group showed a reduction in the salivary concentration ofS. mutans. The concentration of lactobacilli remained unchanged in 4 out of 5 patients in both groups. The average bleeding index decreased in both groups (75.3% in group A and 74.8% in group B) as well as the plaque index (20% in group A and 7% in group B). All the subjects from group B maintained the same buffer capacity measured at baseline. On the other hand, two subjects from the group A showed an increase in the buffer capacity (from score 1 to 3 and from score 1 to 2).
Conclusion: Although in literature the recommended doses of xylitol for a reductionof theStreptococcus mutanscount are between 5 and 10g daily, this pilot study shows that even 3.8g seem effective in reducing the salivary concentration of the cariogenic bacteria, both through the use of chewing gum rather than crystal.

Analysis of variation in bleeding and plaque index in disabled patients following the use of an ozone toothpaste

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Aim: Ozone is a chemical compound made up of three oxygen atoms; several studies in the medical field have demonstrated the powerful antibacterial effect of ozone which compromises the integrity of the cell membrane through the oxidation of phospholipids. Ozone works by reducing gingival inflammation caused by oral microorganisms present in the bacterial plaqueand its action is aimed toaerobic and anaerobic bacteria, gram positive and negative. The antimicrobial power, the ability to stimulate the circulatory system and to modulate the immune response make ozone an increasingly used therapy also in the dental field as a support to conventional treatments, it is also easy to apply and painless for the patient. Considering the high incidence of gingival inflammation in people with disabilities the aim of this work is to test the effectiveness of an ozone toothpaste on the reduction of the bleeding and plaque index.
Methods: Ten partially collaborating and autonomous patients in the oral hygiene maneuvers were recruited, they are not community residents, in order to maintain the same care giver over time. Patients are neither edentulous nor mobile prosthesis wearers.The protocol adopted in our structure for the realization of this study is the following. T0: detection of the Sillness and Loe plaque index of six elements (12, 16, 24, 32, 36, 44) and general bleeding index; execution

of the professional oral hygiene session which included the motivation for home oral hygiene and the removal of hard and soft deposits. In the home oral hygiene patient, he carried out the hygiene maneuvers taught during the motivation and continued to use the toothpaste he used tu use. T1: two months after T0, plaque and bleeding index was detected again and ozone-based toothpaste was delivered for use in the following sixty days during home hygiene. T2: detection of the indices and evaluation of the final situation.
Results: Plaque index VariationT0: 2,22 T1: 1,16T2: 1,15. Bleeding index Variation T0: 89,42% T1: 52,84% T2: 19,20%.
Conclusions: The data collected showed that, despite a modest decrease in the plaque index between T1 and T2 (from 1.16 to 1.15), the use of ozone toothpaste has actually significantly reduced the BOP (gingival bleeding on probing) of patients with reference to the same time interval. We can conclude that the decrease in the bop is due to a lower aggression of the bacterial plaque, transformed from toothpaste to ozone.

Bone remodeling around implant connections: radiographic retrospective study and a review of literature

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Aim: The purpose of this work is to collect clinical data in order to understand longterm maturation of peri-implant tissues.Itis analized the remodeling of bone for different connections,also evaluating the radiographic loss of peri-implant bone following insertion of implants with normal prosthetic connections and implants with a switching platform system within a 12 months period.This work will allow to healthcare professionals to deal with normal tables and understand if the current event can be assimilated as pathological or as a para physiological event from a radiographic point of view, thanks to characteristics of that specific connections and that specific implant.
Methods: Patients of both sexes with implantoprosthesis for at least one year have been enrolled for this study. The various types of connections that have been used to perform prosthetic work and the presence / absence of the Switching Platform will be taken into account.The radiographic levels of bone around the implants were detected by digital intraoral radiography performed by the dentist upon delivery of the prosthesis, and after 12 months from that delivery (to check for bone resorption in the mesial and distal area of the implant element). All radiographic images have been performed by means of intraoral radiographic images with the technique of the long cone and individualized Rinn centerer (1:1 grinding on diameter/implant length) with the aid of photoshop tool to have a repeatable position over time.
Results: The results show that peri-implant bone resorption of prosthetic restoration after one year is lower in the type of Switching platform connections than in other types of implant connections.
Conclusion: A certain proportion of bone resorption around the implants is considered physiological. According to studies carried out by Albreketsson, peri-implant bone remodeling is considered normal if there is a bone loss of 1mm during the first year after implants usage. The prosthetic connection represents an area of relevant importance in implant-supported prosthetic rehabilitations. The most important factors involved in bone remodeling are represented by the bacterial passage from the implant screw through the prosthetic connection, with the consequent chronic peri-implant inflammatory infiltrate and micro-movements of the stump with respect to the implant. Several studies indicate that after one year of prosthetic restoration, the crestal bone levels around the implant are 1.5 - 2 mm below the abutment junction. Scientific researches also suggest that the usage of the lower abutment (platform switching) allows for lower bone absorption. By the results of the study, it is tangible that the Switching Platform technique allows a lower loss of mesial and distal bone compared to the traditional model.

Comparative evaluation between two dental prophylaxis methods: a clinical study

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Aim: Polishing on natural teeth is a common practice for dentists and dental hygienists and nowadays manual methods are more and more replaced with innovative devices and cutting- edge materials. The aim of performing this treatment is not only to polish and remove the bacterial plaque deposited immediately but is also performed to minimize bacterial recolonization on tooth surfaces. It is, therefore, necessary to know the advantages and disadvantages of these types of instruments. This study aims to evaluate and compare the status of periodontal tissues after being treated

with the two different methods of plaque removal: polishing with a silicone cup and prophylactic paste and air polishing with erythritol powder
Methods: This clinical study was performed on a sample of 20 patients aged between eighteen and sixty-four. Each patient underwent two plaque removal treatments with alternating dials: first and third quadrants using a silicone cup and prophylaxis paste (RCP) while second and fourth quadrants using air polishing and erythritol powder (APE). Data were collected by Index of Plaque Löe and Silness 1964 and Ainamo and Bay 1975 Bleeding Index. 3 months before the session the patients were subjected to professional oral hygiene (T0). After 3 months the data were collected: just before the session (T1), immediately after the session (T2) and one month after the session (T3)
Results: Both treatments led to a statistically significant result in terms of plaque removal, but did not lead to bleeding results. In the treatment with silicone cup and prophylaxis paste (CPR) it can be seen how compared to T1 the use of the treatment has proven its effectiveness in removing the plaque (T2). The difference is therefore statistically significant (p value <0.05). Even after one month (T1-T3) the difference was MAINTAINED statistically significant (p-value <0.05) in the areas treated with silicone cup and prophylaxis paste (CPR). The difference, in terms of plaque, between T1 and T2 treated by airpolish and erythritol (APE) was statistically significant (p-value <0.05). Even after a month, the difference was maintained significant (p-value <0.05) in the areas treated by airpolish and erythritol (APE). The use of the treatment with silicone cup and prophylaxis paste (CPR) did not lead to any statistical difference in bleeding (p-value> 0.05) immediately after performing the treatment. In the same way as the treatment with silicone cup and prophylaxis paste (CPR) also in the treatment with airpolish and erythritol (APE) there was no statistically significant difference (p- value> 0.05) between bleeding before and after the treatment (T1 and T2). There is no statistically significant difference (p-value> 0.05) in the bleeding on survey between time T1 and time T3 in the areas treated by airpolish and erythritol (APE), one month after treatment. There is therefore no change in bleeding 1 month after treatment. There is no statistically significant difference (p-value> 0.05) in bleeding on probing in the treatment with silicone cup and prophylaxis paste (CPR) between time T1 and time T3. Therefore, there is no change in bleeding statistically 1 month after treatment. However, a decrease in the number of bleeding sites was observed.
Conclusion: Both treatments led to similar results in terms of bacterial plaque at both T2 and T3. Bleeding did not undergo statistically significant changes even though the number of sites with bleeding decreased from T1 to T3.

The importance of oral health related to celiac disease

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Aim: To assess the level of knowledge and habits related to the oral health of people with celiac disease or with suspicion of celiac disease or gluten intolerance.
Methods: Epidemiological investigation carried out through the administration of a voluntary questionnaire of twenty-eight questions, in digital, anonymous and voluntary format. The questionnaire was subjected to people on the main social medias during the lockdown caused by Covid-19. The sample consisted of 323 subjects (age range 2-80 years) of which 40 males and 283 females. The first thirteen questions were made in order to collet personal data (gender, age group, geographical area of origin, level of education) and to identify the type of sample (type of relationship with the disease, the age in which the symptoms and/or diagnosis appeared, if it is a smoker or not, if it has other concomitant autoimmune diseases). Five questions were on the knowledge of celiac disease, in particular were made to evaluate the level of awareness of the manifestation of the symptoms of the disease in the oral cavity. The last ten questions, concerned the knowledge of individual habits of home oral hygiene: the first four focused on the importance of one's dental health, brushing technique, frequency of the use of mechanical and chemical devices; while the last six were focused on the individual ability to evaluate their own oral cavity by observing three conditions such as the presence of aphthae (minor; major), bleeding during brushing and dentinal sensitivity respectively during the diet with and without gluten.
Results: f the 323 subjects, 90% have celiac disease diagnosed, 6% have a suspect and the rest says they have gluten intolerance. Almost all of them claim to be Italian, non-smokers (80%) and among the concomitant autoimmune diseases, only 16% of subjects with autoimmune thyroid diseases stand out. At the onset of symptoms, the gastroenterologist specialist (38%) and the doctor of general medicine (33%) were mainly taken into consideration and

in general most of the subjects have sufficient knowledge on the causes and symptoms of the disease, consulting mainly the Guidelines and the official website of the celiac disease "ACI" (58%) against 24% who consult non-official blogs and sites not officers e.g. Facebook, Wikipedia etc. Half of the sample says they do not know, or they only partially know, the possible symptomatic manifestations of the disease in the oral cavity and, although the majority of them consider their dental health very important, 46% uses an incorrect brushing technique - including an horizontal movement - with a daily frequency of twice a day. The most unused mechanical devices are the single-brush toothbrush (95%), the interdental brush (68%) and the tongue cleaner (52%). Finally, a decrease in the presence of aphthae was found in a with-gluten diet (presence of aphthae 51%) compared to a gluten-free diet (absence of aphthae 69%); however, no significant changes were observed for bleeding during brushing and dentinal sensitivity.
Conclusion: The survey highlights a good knowledge of the causes and symptoms of celiac disease, but the importance of the oral cavity related to it is still not clear. It would therefore be ideal to make further assessments and programs aimed at raising awareness.

My-denty-kit, oral hygiene in prison

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Aim: The right to health of prisoners follows two basic principles: the right to maintain good health and the right to care. Studies on health conditions of prisoners are very limited, despite the large number of this population, it is notable that prisoners are excluded from health national surveys (e.g ISTAT). Along with a substantial global decrease in dental caries prevalence and the loss of permanent teeth, a strong disparity persists in oral health: overall, prisoners have a worse oral health than the general population. Prisoners' oral health issues depend, consistently, on general health risk factors, from alcohol and drug abuse, infectious diseases, heart diseases, psychosocial and psychiatric problems. The lack of personal oral hygiene tools (toothbrush and toothpaste) has to be considered in the prison context, that must be assessed when prescribing personal oral hygiene instructions: for security reasons, in fact, in prison is not possible to have dental floss, which represent an integral part of the daily oral hygiene. The aim of the projectMy-Denty-Kit is the realization of an oral health prevention campaign with the delivery of oral hygiene kits and explanatory brochures for the daily care of the mouth to prisoners in the prisons of the Lazio Region. The project has been granted by Sapienza University as the third mission project of the Department of Oral and Maxillofacial Sciences.
Methods: The project involves the involvement of associations related to prison life, Oral Care. Substantial is the partnership with an institutional and professional network of penitentiary medicine with proven experience in Public Engagement, with active projects in targeting prison population and internal health personnel, whose collaboration makes the initiative feasibility and sustainability even more important. In order to measure the project impact, 4 indicators have been identified, linked primarily to the ability of the project to involve the main stakeholders, specifically, (i) the number of prison structures concerned, (ii) the number of oral hygiene kit and (iii) the number of multilingual oral instruction brochures, produced and distributed to prisoners in Lazio Region, (iv) the project communication and dissemination capacity, i.e. scientific and popular articles and news related to the project, conveyed through the local and national media system, during its implementation and in the quarter following its conclusion.
Results: Among the determining factors of the poor oral health conditions in this population there is the lack of availability of oral hygiene devices in prison, which causes a neglected condition, with consequent deterioration of pathological conditions.
Conclusions: The involvement of all detainees in detention facilities of the Lazio Region aims to overcome the prisoners' dental hygiene weaknesses and to reduce the disparities in access to oral hygiene by providing to all detainees a personal dental hygiene kit.

Oral Health Observatory in prisons through a dental epidemiological network

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Aim: Legislative Decree 22 June 1999, n. 230 "Reorganization of penitentiary medicine", establishes that prisoners, like citizens in a state of liberty, are entitled to the provision of prevention, diagnosis, treatment and rehabilitation services provided for in the essential and uniform levels of assistance. Studies on the health conditions of prisoners are limited (e.g. they

are excluded from ISTAT national investigations), and data on oral health are even more scarce. In the face of a global decrease in the prevalence of oral pathologies, prisoners have an overall worse situation than people in freedom, probably due to the greater presence of risk factors such as alcohol, drugs, infectious diseases, heart diseases, psychosocial, psychiatric problems and lack of economic resources. Among the most common pathologies in prisons, dental ones represent one of the most disregarded treatment needs; a 2007 study found that 98% of inmates had missing permanent teeth and that 93% needed periodontal treatment. The presence of an adequate assistance service is therefore increasingly important. With this project we want to evaluate the customer satisfaction of internal dentists and map resources in the penitentiary clinics of the Lazio Region.

Methods: A Google Form questionnaire was used consisting of 14 dichotomous and one open-ended questions. The questionnaire was administered online to all dentists operating in the penitentiary clinics of the Lazio Region. The questions investigated: logistics, instruments and organization of clinics; material supply; support staff; cure times; any health promotion and training programs.

Results: 80 of the professionals involved replied. 50% confirm the adequacy of spaces, materials and tools; more than 60% report an inadequacy of support staff. For 83.3% of the interviewees, the hours available are not sufficient, however hospital interventions are well organized; there are no oral health promotion programs or dedicated materials and almost all of them hope for them. 100% would appreciate training courses and professional exchange meetings. The most important critical issues emerging from the survey relate to support staff and the promotion of oral health in institutions. The logistical and organizational structure is inadequate in a high percentage of cases and the comparison with the other regional realities represents an objective of the project, also with a view to contributing to provide useful elements for a minimum homogeneity of performance between the regions.

Conclusions: the strong disparity in oral health between the prison population and the general population requires an organizational logistic enhancement of the internal clinics and the implementation of specific training and promotion projects for oral health.

Perceived oral health and self-report of the extraintestinal oral manifestations in patients with Crohn's disease

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Aim: Systemic autoimmune andinflammatory diseasesoften manifestoral lesionsin their earliest stages, and early diagnosis, which may be spurred by a dental examination, is key for improved outcomes. After systemic diagnosis, oral lesions benefit from specialized care by dentists in collaboration with the medical team. Recent studies suggest that the mouth may be involved frequently in patients with Crohn's disease (CD). The presence of oral manifestations is hardly detected by general practitioners and gastroenterologists in patients with Crohn's disease. According to the evidences published, the aim of this study is to evaluate the perception of oral health in patients with Crohn's disease and to investigate with a self-report the extraintestinal oral manifestation during the disease evolution.

Methods: In January 2020 an on-line questionnaire was set up and published on "Google Form". The study starts in February 2020. The population comprised 114patientswith Crohn's disease recruited from the inflammatory chronic boweldiseaseassociation (A.M.I.C.I. Onlus). All participants received a direct link to the on-line questionnaire "Morbo di Crohn e Cavo Orale" (Crohn's disease and oral cavity). The questionnaire had 3 sections: the first section asked for personal data, place of residence and education, the second section asked questions about Crohn's disease (onset, evolution, therapy, familiarity, extraintestinal manifestations) and tobacco use, the third section asked about the perception of oral health, the presence of oral lesions or pain and the relation between the evolution of the oral pathologies and the dentist.

Results: The answers arrived from 17 Italian regions and the patients were 78.1% F (89 female) and 21.9% M (25 male), of all ages with a higher percentage between 19 and 29 y. Lots of patients (54%), during their clinical story, waited lots of time before the diagnosis. 66.7% of patients have gone to the dentist in the past 12 months and 1,8 % have never been to a dentist. 76,3% of patients have had sore points in their mouth during their life. Regarding extra-intestinal manifestations of Crohn's disease, we investigate both specific or non-specific, 38.6% of patients reported one or more: 66.7% suffered from oral aphthae, 16.7% found red lesions, 9.6% found white lesions, 10.5% reported mucosal tags, 23.7% had lip swelling and fissurations, 3.5% reported cobblestoning and 21.9% didn't find any lesions. 54.8% of patients had lesions before the diagnosis and 69,1% after the diagnosis. Only 10,5 % of patients say that these lesions were the first sign to investigate on a chronic pathology and 58.8% didn't know that these manifestations are related to their disease.

Conclusion: The results of the present study show that patients with Crohn's disease have different perception of their oral health: 73,7% evaluate the general status of their mouth tolerable, 14.9% excellent, 11.4% terrible.

Oral manifestations are diverse and common in Crohn's disease, even if lots of them are not specific for this pathology, like aphthae. The dental practitioner is in the best position to detect them before the diagnosis and also lead to early diagnosis for a better outcome in affected patients.

Effectiveness of oral irrigators in post-orthodontics patients during periodontal support therapy: phase contrast microbiological evaluation

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Aim: The aim of the study is to evaluate how the use of the oral irrigator affects the modification of the bacterial flora within the oral cavity, examined with phase contrast microscope analysis, in patients, doing support therapy, that underwent orthodontic treatment in the past.
Methods: It's known the higher risk of development of periodontal disease after multi brackets orthodontic treatment. Therefore for this study, 60 patients that underwent orthodontic treatment in younger age were recruited. All of them had received between 2016 and 2018, a diagnosis of moderate generalized periodontitis and had undergone laser-assisted non-surgical periodontal therapy and trained in oral hygiene protocols. The home protocol provides the use of sonic toothbrush with vertical movement, interdental brushes and oral irrigator. Re-evaluated subsequently and ascertained the arrest of the progression of the periodontal disease, they were included in the support therapy at half-yearly calls. We recruited the 60 patients included in the periodontal support therapy, having the following inclusion criteria: (1) aged between 35 and 55 years, (2) absence of systemic diseases, (3) loss of clinical attack less than 5mm in at least two non-adjacent teeth, (4) absence of mobility, (5) plaque index less than 30%. Each patient underwent plaque removal from gingival sulcus using a curette. Phase contrast microscopic analysis showed the presence of compatible flora in the whole sample. The patients were then randomly separated into two groups, A and B. After a professional hygiene session, at group A was asked to suspend the use of oral irrigator and to continue the home hygiene protocol only with sonic toothbrush and interdental brushes. Group B after the hygiene session was motivated to continue the home protocol already in use. Three months later, the patients were subsequently subjected to microscopic analysis of the bacterial plaque.
Results: Group A patients, who for three months suspended the use of the oral irrigator following a home protocol that included only sonic toothbrush with vertical movement and interdental brushes, showed in 90% of cases an incompatible bacterial flora changement. In fact, the collection of plaque from 27 out of 30 patients showed an active plaque in the phase contrast microscopic analysis,on evaluatingan incompatible flora. 100% of the patients in group B, who for the three months of the study continued to use the standard protocol with sonic toothbrush, interdental brushes and oral irrigator, showed immobile plaque on phase contrast microscopic examination. 30 out of 30 patients were still with compatible flora after 3 months.
Conclusions: The study shows how the use of the oral irrigator is decisive in the long-term maintenance of a compatible bacterial flora in the periodontal patients.

Efficacy of a Zinc-L-Carnosine-based mouth rinse on periodontal tissues and pain after scaling and root planing: a randomized clinical trial; a randomized controlled trial

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Aim: This trial aimed at assessing the effectiveness of a Zinc -L-Carnosine-based mouth rinse on the healing of periodontal tissues and alleviation of pain after scaling and root planing, in comparison with Chlorhexidine and water as placebo.
Methods: A double-blind, randomized controlled trial has been carried out at the dental clinic of IRCCS Cà Granda, Polyclinic Senior Hospital, Milan. Fifty-seven patients with a PSR score greater than 2 were enrolled in this study. Following professional oral hygiene measures and mechanical debridement, the participants were randomly allocated to one of three groups; Zinc L-Carnosine mouth rinse, Chlorhexidine mouth rinse or placebo (water) group, with nineteen patients included in each group. Subjects excluded from the study were those who had used mouth rinses or local or general medications in the previous three weeks, showed allergy or sensitivity to any of the mouth rinses ingredients; or had current systemic or chronic diseases. Three days following a professional oral hygiene session, which aimed at the normalization of the periodontal index, the primary (HI, VAS) and secondary (mSBI; FMPS; VMI; SI) outcomes of the study were measured by the same operator. The participants were advised to keep following their

regular oral hygiene procedures other than the allocated mouth rinse, such as tooth brushing. All participants were subsequently re-examined for primary and secondary outcomes at 7 and 21 days, and were asked to report any adverse events they may have encountered. A double-blind procedure was applied during the analysis of results.
Results: After twenty-one days, the subjects in the Zinc-L-Carnosine group revealed a statistically significant improvement in HI, VAS and SI compared to the Chlorhexidine and placebo groups. Chlorhexidine was observed to be more effective than Zinc L-Carnosine and water in terms of improving mSBI, FMPS, and VMI. Both groups showed significantly higher improvements than the placebo group.
Conclusion: Zinc L-Carnosine, a compound that had proved remarkable efficacy in promoting the healing of mucosal tissues, seems to have promising effects on resolution of plaque-induced gingivitis and subsequent relief of pain. The antibacterial and antiplaque action of Zinc L-Carnosine is comparable to that of Chlorhexidine, with the advantage of reduced staining to tooth structure

A retrospective study on the survival of dental sealants in disabled children: a long-term follow-up

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Aim: Prevention of the occlusal surface is essential in children and dental sealants are highly effective in preventing lesions and treating incipient lesions. A retrospective study on the survival of resin-based dental sealants in a group of disable children with a low degree of collaboration was carried out. The aim of the study was to evaluate the survival and preventive efficacy of resin-based sealants in a sample of subjects with high risk of caries affected by autism spectrum disorder for a period from 2 to 15 years.
Methods: The dental charts of 321 children (8-22yy at the moment of the study) with neurodevelopmental disorders were scrutinized; children with at least one resin-based sealant on first molars and grade 1 or 2 of the Frankel scale of collaboration were enrolled. Hundred-fifty-two patients were included with 551 sealed teeth. Patients were included in a preventive protocol that included applying a fluoride varnish every three months on all teeth. Data on the date of sealant first application, any subsequent re-application and any restorative treatment needed for failure of the sealant and presence of dentinal caries, type of sealant materials used, check-ups dates were extracted. Associations were assessed using Fisher's exact test at a 5% level of significance. Kappa Meier survival analysis was used to evaluate the survival of the sealants.
Results: The follow-up period ranged from 2 to 15 years. Overall 369 (66.97%) sealants showed total retention and survived, with no statistically significant differences among the four first molars (ranging from 62.12% for 4.6 to 70.42% for 1.6). Partial retention of resin sealant was observed in 102 (18.51%) sealant, 59 in the upper jaw and 43 in the lower jaw ($p=0.04$) that were replaced. Total failure was observed in 80 teeth (14.52%) and for 52 (9.44%) a caries lesion developed needing so a restoration. It was observed that the time interval with the greatest number of fillings performed were 13-19 months after application of the sealant.
Conclusion: Dental sealant is still considered by the scientific community one of the best methods for caries prevention in the occlusal surface of permanent molars. Comparing the results obtained with other similar studies in the literature, but with lower follow-up, it is possible to affirm that the resin-based sealants are effective to prevent caries in the permanent first molars even if applied without the rubber dam in children with poor collaboration and associated with the regular fluoride varnish application.

Special needs dentistry under general anaesthesia at the Piacenza hospital: 20 years retrospective analysis

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Aims: The provision of dental services to the population with disabilities implies the need to provide alternative ways to the usual outpatient treatments. In the field of disabilities (intellectual, psychiatric, physical and medical), to achieve therapeutic success in outpatient treatments, the dentist is permanently committed to developing the patient's trust, collaboration and compliance. It is however known that in some cases, it is possible to perform necessary treatments only under general anaesthesia. The path for narcosis in patients with disabilities generally configures an anaesthesiological risk "ASA" higher than that of the "healthy" population, therefore, the primary objective is the control of clinical risk. The outpatient therapeutic offer is therefore completed with a weekly availability of an operating room for general anaesthesia reserved for selected clinical cases (reduced ability to

collaborate, decompensated systemic pathologies or complex surgical diseases).
Methods: This work aims to review all the medical records of "special needs" and surgical patients who have undergone general anesthesia in the last two decades (from 1998 to 2020) at the operating room of the Piacenza hospital. The retrospective analysis of over 1,500 operations performed from 1998 to today has highlighted the number of treated patients, the reason why general anesthesia was necessary (primary disease or type of surgical procedure), the type and number of dental treatments performed in each session, the possible presence of pre, intra and post-operative complications, the anaesthesiological risk, the duration of hospitalization and the need to re-treat the same patient.
Results: The analysis of data allowed to show the absence of major medical complications (cardiorespiratory events and deaths) and revealed satisfying results for the low number of minor anaesthesiological complications (eg: repeated vomiting preventing the regular discharge on the same day), local immediate (eg: pain and bleeding) and late (eg: pain, bleeding, infections) complications. Only one patient was hospitalized the second day with a diagnosis of pneumonia while there were no other adverse events that forced patients to return to the hospital. Conclusion Only the development of a clinical-organizational model reserved for "fragile" patient candidate for general anaesthesia and its control in every single step can ensure the reduction of risks with effective prevention of complications and satisfactory therapeutic results. The following points are mandatory: - the strict selection of patients for general anaesthesia (balance between the severity of the dental status and disease and the operational difficulties in order to guarantee the appropriate therapy with respect to the anesthesiological risk); - the correct information of patients, carers and relatives about the advantages/risks associated with the intervention; - the realization of a punctual pre-operative clinical-diagnostic path (anaesthesiological evaluation, laboratory tests, ECG, specialist consultations, evaluation of thromboembolic risk and indications for antibiotic prophylaxis) with particular attention to the patients with behavioural disorders and to the planning of surgical times; - shared assessment and discharge (anesthesiologist and dentist) to encourage, when possible, the early and safe return to home for the patient with disabilities (cognitive and psychiatric).
Conclusions: The pivotal role of the health professionals working in this medical-surgical field is to maintain a high level of attention for clinical and organizational variables influencing the right performance of the surgical sessions and the achievement of a favourable outcome. Only the regular evaluation of the adverse or potential adverse events allows the adoption of any improvement actions useful for the drastic reduction of the clinical risk.

Can tooth bleaching improve the perception of beauty?

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Aim: Undergoing cosmetic treatment to improve physical appearance has become increasingly popular. Copious studies and articles on external beauty have been taken into account along with the considerable social impact dental aesthetics has had and continues to have in the community. It has been estimated that among patients presenting for cosmetic treatments up to 15% suffer from a psychiatric condition termed Body Dysmorphic Disorder (BDD). The main purpose of the present population-based study was to establish the role of dental aesthetics on beauty perception. In detail, the aim was to assess the impact that a minimally invasive dental cosmetic treatment like tooth whitening, could have on the quality of life of those patients who want to undergo or have already undergone this procedure. Some surveys and statistical data have been collected for this purpose.
Methods: : A multiple-choice questionnaire consisting of twenty-nine questions divided into three main parts, each of which corresponds to a macro area of detection, was prepared. Between July and September 2019, the questionnaire was administered to three hundred patients who went to visit private clinics. It was carried out a survey on the oral hygiene habits of those patients and their perception of beauty, as well as the importance related to the mouth and teeth. The samples were then divided into two different groups: those who had already undergone aesthetic or cosmetic dental procedures (138 samples) belonged to the first group; those who had not undergone such procedures (162 samples) belonged to the second. The focus was on the analysis of the first group, and a descriptive statistic was conducted on this survey. However, from a first percentage and non-specific observation of the samples of the second group, the results proved to be remarkable and therefore taken into account as a comparison with those of the first group.
Results: Among the patients who have undergone dental cosmetic treatments, women (86%) have proved to be the largest applicants, mainly in the 18-25 age group (49%). These participants also smoke at least 5 cigarettes a day and take pigmented substances more

than once a day. Who cares about the health of the oral cavity, diligently follows the instructions of home oral care guide, uses different aids in addition to the simple toothbrush and toothpaste, attends the dental office at least once a year (89%) and is often and willingly looking for treatments that improve the aesthetics of the smile. Fads and television exert a modest influence on the choices of more than half of these patients, and concern about an alleged defect in appearance, which is often attributable to an imperfection of the smile. Sometimes this also generates anxiety and prevents the patient from smiling in 80% of cases because of the color. Outward beauty is of considerable importance and a beautiful smile affects a person's presentation and good consideration. The degree of satisfaction with the appearance and color of teeth, influenced the choice of the type of treatment: the belief that one's body part is not attractive enough, not only sometimes prevents the patient from smiling, but it is also the reason why tooth whitening and orthodontic therapy are the treatments of choice and, why not, resolution. Almost all of the samples use a wide range of whitening products for home use on a daily basis, including toothpastes and mouthwashes that are also available outside the dental office.

Conclusion: Age and gender have proven to be significant data in the choice to undergo a dental cosmetic treatment and the degree of satisfaction with the appearance of one's teeth. All respondents believe that tooth whitening can be a minimally invasive procedure that can be beneficial and healthful for a better quality of life.

Space to Curare Curantes: the management of burnout and stress. Intervention at the service of the health and well-being of health workers

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Aim: In the healthcare environment, work-related stress is increasingly experienced and syndromic burnout patterns occur. This issue was officially recognized by the WHO on May 29, 2019, which included burnout syndrome on its list. The Faculty of Medicine and Dentistry of Sapienza University of Rome, having observed the need to take care of those who care, in the vision of the Third Mission, has set itself the goal of making available useful tools such as additional and necessary personal protective equipment for health with the aim of protecting health and well-being and offering concrete support and with the future goal of involving training, students, teachers, administrative staff and all the staff of the University Hospital. Objective: It aims to encourage the acquisition of professional knowledge and technical awareness to facilitate the recognition of the conditions of wear and professional demotivation associated with stress and burnout and to promote health through better management, competence and use of strategies and solutions to identify, decongest and neutralize the responsible mechanisms, burn-in so as not to fall into emotional exhaustion.

Methods: We have identified a program to offer to the entire health community with lessons, teachings, delivery of ECM courses and physical activity dedicated and selected by yoga, useful for the problematic and totally depending on the work areas. The program represented by the Curare Curantes logo and its COSMOS Project, aims to provide simple but at the same time effective and influential tools on the psychophysiological state to help carry out the work of care providers in the best possible way, to counteract the problems of profession in its context and favor an excellent "training" for students.

Resultas: Increasingly in the scientific literature it emerges that work-related stress is responsible for problems and pathologies. For the maintenance of the state of health, both physical and nervous or emotional, prevention, education in this regard and methodologies are an effective means of guaranteeing health and well-being as well as the physiological sphere, including the psychological and social one. Education in a lifestyle that contemplates time and willingness to dedicate oneself with attention to one's own person, to breathing, to nutrition and to exercise as natural essential formulas for maintaining health is essential. Sapienza University of Rome itself has produced studies that highlight the effectiveness of the protocols proposed in highly problematic hospital wards. Never as in this historical moment is it important to take care of the health of health workers. Working in hospital means dealing with administrative problems every day, difficult cases, both for diagnosis and for the management of certain pathologies, the permanent possibility of an emergency and other factors play an important role; especially persistent contact with patients who suffer, deeply involves health professionals on an emotional level, as well as physical effort.

Conclusions: The consequence of continuing high levels of stress affects both the person and the company. By activating these protocols, we aim to alleviate the task of health professionals, an act of due gratitude to a working class that, as we have observed in this latest dramatic emergency, has not shied away from the generous self-expression, not only as professionals but as human beings. Aware that the extraordinary expression of Italian Health is manifested daily through the work of each individual health professional.

Cuarare Curantes: the COSMOS project (Course Health Doctors and Dentists of "Sapienza")

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Aim: Burnout, included in the list of ailments and diseases by WHO in May 2019, is defined as "emotional exhaustion syndrome, from depersonalization and reduction of personal abilities that can occur in people who professionally deal with people". It is a form of reaction to work stress typical of the helping professions, in which not only technical skills are used but also social skills and psychic energies to meet the needs of users. It derives from an imbalance between professional requests and the individual ability to face them. In the scientific literature of reference, studies and research are increasingly frequent which show the importance of meditative techniques and in particular of yoga as a useful tool for reducing stress and burnout in health personnel. The main objective of the project is to evaluate the effectiveness of specific techniques for healthcare professionals selected from the numerous currents of the meditative disciplines to contrast, eliminate or reduce work-related stress and burnout, with the aim of codifying a specific technique dedicated to the healthcare professional.
Methods: In order to identify a path and moments of decongestion and "reset" with respect to work-related stress, the third mission COSMOS project - Yoga health course, for Doctors and Dentists of Sapienza University of Rome was launched. The study is part of a broader path of health management for the medical and administrative staff of the Umberto I polyclinic "Curare Curantes", but the trial took place at the Department of Odontostomatological and Maxillofacial Sciences. Through the design of a randomized clinical trial, under the guidance of Prof. ssa Antonella Polimeni prinicplae researcher of the project. Dentists belonging to the MOMAX (Oral and Maxillofacial Medicine) and Pediatric Dentistry departments of the Dental Clinic of the Policlinico Umberto I in Rome have been selected, whose main task is the interception, diagnosis and treatment of patients whose management requires a lot competence and commitment. The intervention is structured with yoga sessions proposed in ten-minute meetings for eight appointments within a month to be carried out at the beginning of the department work and at the end of the work and includes the compilation of specific questionnaires to evaluate the effectiveness of the method.
Results: 17 professionals in the experimental group and 16 in the control group participated in the trial, without differences by age (average 36.8 and 36.1, respectively, p = 0.830), by gender (p = 0.611), by marital status (p = 0.169), to have children (p = 0.829) and educational level (p = 0.909). In relation to the dimensions taken into consideration, significant differences emerged in the post-intervention for the mental score (MCS equal to 51.1 in the intervention group and 43.2 in the control group, p = 0.006). No significant differences were observed between the two groups in the post-intervention for the Physical component score, the positivity score, and the dimensions of the work-related stress (decision latitude and job demand).
Conclusions: The healthcare environment can be a cause of stress for several factors and more and more syndromic burnout occurs in healthcare personnel in facing daily problems related to their profession: the relationship with patients, in addition to the performance of the treatments, it needs containment capacity, ability to take charge of the emotional impact that accompanies the experience of the disease in the patient and in his family. For these reasons, this project aims to extend the application of the COSMOS project to healthcare personnel working in the Policlinico Umberto I, especially in the departments with the greatest impact, in order to strengthen scientific evidence, for better management of work stress- related, prevent burnout, contributing effectively to the well-being of the operators, the healthcare company and optimizing the perception of service in the user.

Oral health in adolescents

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Aim: By administering a questionnaire about health, bad habits and the determinants related to them, the purpose of the study is to identify and monitor the habits and behaviors of teenagers, in order to determine the effects that they could have on the health of their oral cavity.
Methods: The survey was carried out by administering an anonymous questionnaire with closed answers to a representative sample of 829 students (350 males and 479 females, aged between 13-20 years) attending high schools in Milan and Provinces.

The total sample is divided, in quantities more or less proportionate, between those enrolled in high schools, technical institutions and professional ones. Moreover, the chosen schools were identified mainly in the southern part of the city because, thanks to the variety of the social variety present in that area, they were the most suitable for the type of study that was intended to be conducted. The questionnaires were distributed in the first semester of the 2019-2020 school year and filled in during class hours, in the presence of a teacher and/or an interviewer in charge. The questionnaire produced by "Adolescent Laboratory", in collaboration with the IARD Institute and the University of Milan, provides answers to questions related to three issues such as integration, work and oral hygiene, section on which the data analysis is focused. The oral hygiene section consists of 10 questions (5 multiple choice questions and 5 double-entry tables) focused on oral hygiene habits: how often and when are teeth brushed, devices used, brushing movements and other questions focused on risk factors, tooth decay experience and behaviors in this regard.

Results: The analysis of the data collected shows that only 26% of the sample always brush their teeth after lunch and 80% before bedtime. Only 33% of the teenagers undergo one, sometimes two, dental health check in a whole year. Of these, one in two say they have experienced tooth decay or gum bleeding. With regard to the oral hygiene facilities used, it appears that only 8% of them uses to floss daily compared to 33% who doesn't, and the remaining percentage of teens the floss occasionally. The research highlights that teenagers (around 80%) are aware of the importance that the type of diet, bad habits such as alcohol intake and even light narcotics affect the condition of the oral cavity.

Conclusions: The observation of the obtained data shows that more awareness of oral health is needed among young people, in particular on the importance of the time of day when to brush their teeth, on the utensils for mechanical control of the plaque to be used and on regular dentists' checkups.

Randomized controlled trial on 3 dentin desensitizers

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Aims: The increase in average age, the maintenance of natural teeth for longer and the consumption of acidic drinks are followed by an increase in the incidence of dentinal hypersensitivity. The aim of this study is to compare 3 desensitizers: Admira protect®, Bifluorid10®, Profluorid Varnish® and to identify the most effective and resistant against the erosive effect of acidic drinks, also identifying the harmful effects of the same drinks on tooth enamel.

Methods: Recruited total sample of 45 extracted teeth with no carious lesions. Admira Protect based on Ormocer®, Bifluorid10 containing sodium fluoride and calcium fluoride, Profluorid Varnish® (PV) based on fluoride (5% NaF equal to 22,600 ppm fluoride) The acid drinks chosen were Coca Cola®, pineapple juice and saline. The teeth were randomly assigned to three working groups, 15 teeth per group: Group 1: Admira Protect® (AP); Group 2: Bifluorid 10® (BF); Group 3: Profluorid Varnish® (PV). The pretreated samples are scanned with 3D scanners (3Shape TRIOS, 3Shape DK) and then immersed in trays with the previously selected liquids. 5 elements for groups was immersed in physiological as control group, in Coca Cola® and in pineapple juice. The 2-litre capacity trays are filled with liquids at a constant temperature of 35°C for 7 days with aquarium thermostat, changing liquid once a day and applying the products once a day according to the instructions in the package insert. The scan is repeated after treatment and the results superimposed with the initial results to proceed with the statistics. The three dimensional matching of the scan was carried out by the use of Geomagic Software®.

Results: According to Bonferroni, significant differences in the quantitative comparison between the different acids, groups immersed in Coca Cola® stands out most effectively while the teeth in physiological and in pineapple juice do not show effective dissolution of the enamel surface. Significant differences were found between the AP and PV treatments. The PV treatment had significantly the best results ($p=< 0.016$) with constant performance in the 3 groups, acting both as a protective agent against the action of the acid and as a remineralizing agent, determining a volumetric increase of the dental elements. AP and BF are not effective in Coca Cola® ($p> 0.05$): the dispersion of data from these two treatments demonstrates the low predictability of treatment results. Significant differences were found between the AP and PV treatments. BF and PV with greater predictability increase the volume of dental mass.

Conclusions: Profluorid Varnish® has shown better performance than Bifluorid10® and Admira Protect® for acid treatment. The AP shows less efficacy than the other two treatments, which were subjected to the action of acidic agents and a mass reduction of the elements was recorded. The difference between the treatments is significant, particularly between the two Admira Protect® and Profluorid Varnish®

treatments in favour of the latter. Bifluorid10® and in particular Profluorid Varnish® with greater predictability act as remineralizing agents, the more constant and predictable efficacy is of the second treatment.

Periodontitis in the developmental age: pathogenesis, epidemiology, differential diagnosis and treatment

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Aim: Periodontal disease is one of the most widespread diseases in the world and is, as a prevalence, immediately after diseases such as diabetes and hypertension. Its clinical aspects have long been analyzed since it constitutes a worldwide problem. The pathology affects subjects of every race, sex and age and also some risk factors are needed in addition to the individual susceptibility for it to develop. Even today there are not enough scientific certainties to establish the behavior of periodontal disease in the age group that affects children and young adults. The purpose of this study is to deepen the description of aggressive periodontitis in developmental age patients going through pathogenesis, epidemiology, diagnosis, treatment and differential diagnosis.
Methods: For this study, the database searching was performed on PubMed and Scopus using the following keywords: "prepubertal periodontitis, aggressive periodontitis, periodontitis in children, periodontal disease in children and adolescents, early- onset periodontitis", the investigation then focused on evaluating the specific aspects of aggressive periodontitis in children, consequently the following words have been introduced: "epidemiology, classification, progression, treatment, diagnosis". Clinical and laboratorial studies were taken into consideration as well as literature reviews. The last database search was performed in September 2019.
Results: Aggressive periodontitis affects a low percentage of children, and in those patients, Actinomycetemcomitans is the main bacterium identified in affected sites. Moreover, it has been found that Genetics plays a fundamental role in development and progression, which is important to distinguish the various oral manifestations excluding the possibility that they are a consequence of systemic pathologies. Although it mainly affects young patients, the treatment does not differ from that applied in adult subjects and it consists of a causal therapy, a mechanic and a pharmacological one, in particular the antibiotics associated with professional hygiene has shown very satisfactory results.
Conclusion: To date there is no specific criterion for defining a high-risk group for prepubertal pathology, and further research is needed to identify a robust set of genetic, microbiological risk markers and host factors that favor a diagnosis of the disease in association with young people and adolescents. The identification of aggressive periodontitis can be implemented through periodontal screening associated with radiographs, and the routine use of BPE can be helpful for early diagnosis. The treatment consists of the same methods applied also to adult patients, that is to say a causal therapy, a mechanic and a pharmacological one, in particular the studies have shown that antibiotics associated with professional hygiene in patients with aggressive periodontitis give very satisfactory results.

The approach of the dental hygienist in the treatment of peri-implantitis

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Aim: Peri-implantitis is a destructive inflammatory periodontal disease of bacterial origin which targets the hard and soft tissues surrounding the osteointegrated dental implant causing the loss of retention over time. The objective of this study was to identify the disease highlighting the microorganisms present during the manifestation, the possible risk factors, the source and the symptoms and especially the non-surgical approach for the recovery in general.
Methods: Three data bases have been used as a research method for the articles: Pubmed, Elsevier and RearchGate. The reference language was English and was given preference those articles published between the years of 2005-2020.
Results: Peri-implantitis is a fairly common pathological condition verified in 56% people and in 12-46% of implantation sites. In relation to its microbiota, species of bacteria has been identified prevalent for this disease, such as those species belonging to genus: Butyrivibrio, Campylobacter, Eubacterium, Prevotella, Selenomonas, Streptococcus, Actinomyces, Leptotrichia, Propionibacterium, Peptococcus, Lactococcus e Treponema. Thus, proving that it is a pathological condition caused by a mixture of bacteria with a large variability of genus and species, having

as its prevalent factor: gram-negative bacteria. The identified risk factors: The location where the dental implant was inserted into the alveolus bone can be an etching factor of plaque; presence of diabetes, the splinting prosthetic and the inter-implant portion of the prosthesis found to be an area difficult for the patient to hygienize. Aside from the risk factors listed above, the presence of autoimmune diseases, the use of bisphosphonates, the diameter and the type of dental implant used are all the other risk factors identified to be associated to the disease. The peri-implantitis, before settling as a disease, has the onset of mucositis as its first clinical sign. The mucositis is the inflammation that affects only the soft tissues that surround the dental implant inducing characteristics like redness and swelling of the gums or spontaneous bleeding on probing and suppuration. In mucositis, the bone is not affected. In addition to the clinical signs of mucositis, the initiated peri-implantitis compromises the bone around the implant, depending on the type, can occur in a vertical manner; Consequently, can thus create deep periodontal pockets measuring more than 5mm deep due to bone resorption, which can lead to the loss of retention of the implant. Due to the fact that there is no surgical treatment of choice: mechanical devices, such as carbon fiber curette, titanium coated curette or plastic curettes are used; In addition to the oral hygiene instruction, with or without the use of antiseptics like clorexidina, the use of systemic antibiotics associated with the removal of biofilm and tartar mechanically and proper home care, and finally the use of powders of glycine or erythritol can help bring further the treatment to a successful rate. It is also increasingly common the use of a diode laser as an adjunctive treatment than those conventional.

Conclusion: The peri-implantitis is rather a reality in dental clinics. It is often the result of non-successful peri-implants. This arduous to be healed disease can only be avoided with preventive measures like a thorough oral dental hygiene and frequent dental check-ups with the dental hygienist or with the dentist.

Comparing real time PCR: innovative technique, patent Bari University and University Pham Chau Trinh Vietnam, method and diagnostic kit for the multiple detection of viruses of the coronaviridae family: SARS-CoV-2, SARS-CoV, HCoV e MERS-CoV

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Aim: A novel corona virus, detected as SARS-CoV-2 (severe acute respiratory syndrome corona virus), is the agent responsible for the pandemic COVID-19. Pandemic affected 188 countries with 12.498.722 of infections and 560.215 deaths. Healthcare professionals and in particular Dentists are most exposed to the coronavirus infection risk and transmission. After detecting and isolating the virus, many researchers have been working to establish most reliable strategies to diagnose the infection and limit its spread.

Methods: The diagnosis procedures use serological tests and salivary, nasal and oral-pharyngeal buffers. Serological tests detect the increase of viral antibody titles of the IgM and IgG, IgA. The reliability and sensitivity of the serological diagnosis would increase if it is associated to the diagnostic technique called REVERSE REAL- TIME PCR (rRT—PCR). The clinical diagnosis with the rRT-PCR technique is the best one for the SARS-CoV -2 for it speed and reliability. It is based on the RNA extraction of the virus through the viral isolation through nasal, oropharyngeal, salivary and sputum buffers of the respiratory tracts. Even if the rRT-PCR is a highly sensitive test, its reliability is not full. As all the molecular tests in diagnostic, there are some possibilities of false negatives and positives. Indeed, the important reactants, namely the oligonucleotides primers and the probe to perform the rRT-PCR tests, based on the sequences stored of some regions of the viral genome. In the reality the corona viruses frequently show mutations and recombination of the genome, bringing some read errors. The detection and the molecular investigations may generate some false negatives because of the low viral concentrations in the samples, the inadequate quantity and quality of the samples, incorrect transportation and conservation (e.g. long time for transportation), samples contamination, etc. For what concerns the positivity, the presence of another corona virus in the body may give a crossed reactivity. As the first genomic sequences of the SARS-CoV-2 have been deposited in the public databases (GenBank e GISAID), the International scientific community has developed assays to distinguish the SARS-CoV-2 infection and SARS-CoV according to the nucleotide sequence of the RNA-polymerase-RNA-dependent-gene (RdRp). Another research group of the HONG KONG University developed a quantitative test to detect two different regions of the genome SARS-CoV-2: the assay on the gene N region and the ORF1b. The former is about 10 times more reliable than the latter.

Results: Currently the most sensitive diagnostic test in the RNA research is the one patented by the University of Bari "Aldo moro" in collaboration with the University Pham Chau Trinh, Danang City

(VIETNAM). This patent has been registered on 20/05/2020 in Italy with number: 102020000011701 and it is being extended in U.S.A., Europe and Honk Kong. This test is also based on the test of the chain reaction of polymerase with reverse transcription rRT-PRC, for the quantitative detection of the nucleic acid of more viruses coming from the corona family, such as SARS-CoV-2, SARS-CoV, MERS-CoV and HCoV on samples of the upper and lower respiratory tract (such as nasopharyngeal or oropharyngeal buffers), sputum, aspired by the lower respiratory ways, bronchoalveolar wash, nasopharyngeal and nasal wash/aspired, picked by patients suspected of COVID-19 and also on peripheral blood samples. This method and diagnose KIT is extremely sensible in a very short time. This method, including the extraction of the RNA and the rRT-PCR, requires less than 3 hours and may be performed in any laboratory using the technique rRT-PCR. Generally, during the acute step, the RNA of the virus SARS-CoV-2 is detectable in respiratory samples. The positive or negative results, related to the clinical condition and symptomatic of the patient, constitute a confirmation to the infection SARS-CoV-2. In case of positivity, this method also considers the possibility of a co-bacterial infection or with other viruses belonging to the Coronavirodae family. In this case, the pathogen agent detected is the cause of the disease.

Conclusion: The method patented by our school of the University of Bari "Method and diagnostic kit" gives a reliable response to the identification of the 4 several strains of the Coronaviridae family as SARS-CoV, SARS-CoV-2, H-CoV and MERS-CoV, thanks to the high degree of sensitivity and specificity of the adopted target, so it allows an early diagnosis of the infection, by cancelling the risk of the false negatives by limiting the infection possibility. This patent has been issued on an International European Review for Medical and Pharmacological Sciences https://www.europeanreview.org/article/21713.

Let's smile to health: hygiene and oral health in special needs patients

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Aim: To highlight the issues related to poor oral hygiene and health in order to improve health status and quality of life in patients with special needs. Oral health and hygiene issues are often connected as cause or effect to the overall health status. The observation during ambulatory visits and the related reports by the health care providers (nurses, social workers et al.), who assist these patients on a daily basis, have acknowledged the lack of awareness of the problems which can arise due to poor oral and prostheses hygiene. In fact the oral cavity remains often an unexplored area and it's management can be at times complicated for various reasons: Self-sufficiency limitation in oral hygiene care due to disability and/or comorbidity; Collateral effects which target the oral cavity related to multi-drug treatments (xerostomy, candida infections...); Limited economical resources; Lack of knowledge and information in the patient or in the caregivers, either sanitary or not. The psychomotor impairment can present itself with an acute onset, therefore the family may not be aware of the oral condition of their relative and fail to inform the institution or the assigned caregiver.

Methods: Thus, we have come to the idea of the necessity to prepare and fill out a Dental Passport to be included in the clinical history of the patient.

The Dental Passport is divided into 3 sections. A first section with more technical data - a real dental medical chart - available for Dentist and Dental Hygienist colleagues as well as for General Practitioners. A second section with basic information about the oral cavity of the patient such as: presence or absence natural teeth, presence or absence of partial and/or total removable dentures for immediate and easy access for the caregiver. A third section with information specific to the individual patient by the Dental Hygienist on how to maintain proper oral and protheses hygiene and indication of specific products usage.

Results: Including the Dental Passport to the special needs patient's clinical chart will overcome the lack of verbal communication which is not always possible although fundamental for a correct dental anamnesis. This will reveal issues that would otherwis remain unknown and therefore not treated adequately.

Conclusion: We hope and wish that this important informative and practical document will be included in the clinical history of these patients and updated by the colleagues who provide the dental care in order to monitor and prevent dental and stomatology related issues with the involvement not only of the patient but also of the family, the caregivers and the Sanitary Operators.

Sustainable dentistry. To reduce our impact on the environment

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Aim: The European Parliament has voted In march 2019 for a ban of single-use plastics to come into

force by 2021. Dentistry objectives are to diminish its environmental footprint by adopting the 4R's concept-reduce, reuse, recycle, rethink-and through the switch to eco-friendly home oral hygiene products. Aim of this study was to evaluate the impact of at-home oral hygiene products on environment.
Methods: Literature searches of free text and MeSH terms were performed using MedLine (PubMed), Scopus, and the Cochrane Library (from 1950 to March 2020). All searches were conducted using a combination of subject headings and free-text terms; the final search strategy was determined through several pre-searches.
Results: The search strategy identified 23 potential articles: 8 from PubMed, 10 from Scopus and 5 from Cochrane. Most of the available studies focused on the environmental impact of toothbrush and on green alternatives. Precise data on Italian market were not available, as only estimates of consumption were found by search. More detailed data were available about the US market, where 1 billion toothbrushes are thrown away every year and this amount is enough to run around the Earth 4 times. Fifty million pounds of toothbrushes end in landfills in the US every year. Toothbrushes are made from propylene plastic and nylon, which are sourced non-renewable fossil fuels. The handle is made of polypropylene plastic, and when discarded isn't recycled and it doesn't biodegrade. The bristles are made from nylon, and manufacturing it creates nitrous oxide, a greenhouse gas 300 times more potent than carbon dioxide. These plastics may end up in the oceans. It's estimated that by 2050 there will be more plastic than fish in the oceans. The same concept may be used when talking about dental floss, that is 100% nylon made. Eco-friendly alternatives for toothbrushes are: i) wooden toothbrush with pig bristles, 100% biodegradable, not suitable for those with ethical concerns or vegan; ii) wooden toothbrush with nylon bristles, that have to be separated and thrown in the mixed waste; iii) silicone based toothbrushes; iv) plastic handle toothbrushes with changeable bristles. Alternatives for nylon dental floss are: i) silk wax floss, contained in glass and aluminum dispensers with floss- refills on sale; ii) silk and beeswax floss, in a cardboard or bio-plastic box, that are completely biodegradable. Scanty data are available on the efficacy and efficiency of these products on oral hygiene. Further clinical studies are needed to validate the eco-friendly alternatives of traditional toothbrushes and dental flosses.
Conclusion: In conclusion, consciousness about the environmental impact of oral hygiene products should increase among stakeholders and decision makers. Further research should concentrate efforts on development and production of sustainable and eco-friendly alternatives with proved clinical efficacy.

Animal-assisted dentistry for patients with disabilities: the new approach of the Piacenza Hospital

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Aim: Over the past few years, interest in the therapeutic applications of animals in the medical field has become more and more important, in particular for patients with disabilities at different levels, for example with physical, emotional, and mental problems. The purpose of the project we started was to export and apply the potentialities of the animal-assisted approach in dentistry, in particular with young patients with disabilities for their dental treatment and preventive approach when the traditional one is not possible or not completely successfull.
Methods: The project was realized thanks to the cooperation between the Odontostomatology and Maxillo-Facial Surgery Unit - Special care dentistry of the Hospital of Piacenza and the Association CERPA (Cura Educazione Riabilitazione Piccoli Animali) working with animal for different purposes. Dogs and rabbits were chosen for this project: dogs to wait with patient in the waiting room and rabbits to stay with the patient on the dental chair during the treatments. Before the project beginning, were realized some sessions to show to the animals dental unit and chair and every kind of noise of dental treatment (bur, ultrasounds, aspiration). To include patients in this project, parents were interviewed about possible contraindications about animals fears or allergies, and they signed an informed consent. Every animal included in the project was tested for both infectious zoonotic diseases and the ability to work with patients. Questionnaires for the evaluation of compliance, collaboration and behaviour of the patients was filled by caregivers and relatives at the end of every session; was also filled a questionnaire for the evaluation of animal behaviour and/or stress. Sessions were organized to allow, between two patients, the reconditioning of dental unit and chair and to the animal a time for rest.
Results: Twelve patients participated to the Animal-Assisted sessions and in all cases treatments and/or evaluations was completed. The evaluation of questionnaires filled by both caregivers and relatives highlighted an improved compliance with dental treatments and a lower level of stress and anxiety compared to the sessions performed without the help of animals.
Conclusions: The improvements evaluated thanks to the

questionnaires' analysis suggest that animal-assisted dentistry can be an effective form of treatment to improve compliance within a population of patients with intellectual, psychical or physical disabilities.
The evaluation of larger group of patients might help us to draw a more complete picture of therapeutic possibilities for this kind of approach.

Stress and oral health. An overview

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Aim: The purpose of this study was to conduct a narrative review of the literature aiming to analyze the relation between stress and oral health. Stress is a non-specific reaction of the body to every request made by the environment. Chronic stress is likely to contribute to the progressive, long-term development of oral disease. Stress, both physical and psychological, has different effects on an individual's health by involving different systems. In fact, if excessive, stress can cause a series of ailments that can affect the health of the mouth, teeth, gums and oral cavity in general. Potential stress and anxiety effects that can affect oral health include: aphthae and cold sores, bruxism, inadequate sea bream hygiene and incorrect eating habits, periodontal disease or aggravation of a pre-existing periodontal condition.
Methods: This systematic review was conducted according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement and the guidelines from the Cochrane Handbook for Systematic Reviews of Interventions. Literature searches of free text and MeSH terms were performed using MedLine (PubMed). The keywords used in the search strategy were as follows: ("periodontal disease", "stress", "saliva" and "cortisol").
Results: Six articles were included in this study. Evidence exists on the correlation of salivary cortisol level with periodontal disease and the trigger action of stress. Comparing all the examined studies, it is shown that cortisol is present in all the evaluated cases. Moreover, when patients are experiencing a period of stress, the level of salivary cortisol is expected to increase.
Conclusion: The included studies showed that higher levels of perceived stress are associated with an increased level of salivary cortisol. Cortisol induces changes in the biofilm gene expression, influencing the susceptibility of the host (29). Moreover, salivary cortisol correlates with an increase in inflammatory cytokines IL-1beta AND IL-6 (serum and crevicular). In addition, the biochemical mechanisms of stress may influence bone remodeling; by inhibition of collagen synthesis by osteoblasts with effects both on timing and quality of healing processes. Dehydroepiandrosterone (DHEA) increase induces the secretion of proteases in the gingival epithelium, leading to the destruction of the supporting tissues.
Based on the findings of this study, cortisol as the "stress hormone" may be correlated with onset and acceleration of periodontal pathology. The level of salivary cortisol may be used to identify the high risk patients.

Organic toothpaste formulations: an overwiev

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Aim: Aim of this study was to conduct a literature overview to: (i) identify and classify the ingredients of organic toothpastes; (ii) evaluate each ingredient adverse events associated with use.
Methods: A list of available organic toothpastes currently marketed in Italy was compiled. Then Google Scholar database was searched to classify each ingredient. The known adverse events associated with use were listed.
Results: Twenty organic toothpastes marketed in Italy were included in this study. A total of 70 single ingredients were coded: 62 (88.2%) and 8 (11.8%) ingredients were classified as active and inactive, respectively. Overall, 15 (21%) ingredients were associated with an adverse event. Almost half of the inactive ingredients presented an adverse known event associated with its long-term use. Enamel demineralization, skin and eye irritation were the main reported adverse events.
Conclusion: Based on the findings of this overview, organic toothpastes formulations are characterized by favorable biocompatibility. Toothpastes ingredients with potentially known adverse events, like synthetic polymers like PEG and carbomers, detergent agents like sodium lauryl sulfate and Triclosan were not listed in the organic formulations. Organic formulations may be preferred for daily use, however further research to validate the clinical efficacy is required.

Damage caused by cigarette smoke: comparison between traditional cigarettes and electronic cigarettes

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Aim: In Italy, 50% of periodontal diseases and 75% of oral mucosa carcinomas are caused by cigarette smoke but studies have not yet laid out in detail which is the most harmful between traditional cigarettes and electronic cigarettes (e-cigs). With this premise, the aim herein is the study of habitual smoking and the role of the traditional cigarette versus its electronic evolution and the correlation of the same as primary origin of disease and/or potential for the aggravation of pre-existent pathological conditions.
Methods: A digital questionnaire of 24 questions, in anonymous form and with autofill options, has been distributed to a random selection of 141 smokers between the ages of 18 and 79 (51 female and 90 male) all resident in Italy. The first four questions were to do with personal data and classification of the subject. The five central questions were to do with the subject's awareness of the correlation between cigarette smoke and oral health, with focus on the frequency of use and for how long the subject has been smoking. A further question has been added regarding any eventual variation to the subject's habitual use of traditional cigarettes or e-cigs as an effect of the recent lock down. Because of the covid-19 pandemic, the study was implemented through the publication of the questionnaire on the principal social media platforms, asking subjects to effect an auto-analysis of any repercussions this bad habit has had on the health of the oral cavity throughout the subject's years of use.
Results: The elaboration of the data gathered has shown that the cross-section is made up of elements of various racial origin from South West Europe mainly resident in the North of Italy (Emilia- Romagna and Lombardy regions, 40%). The average level of education of the cross section appears to be secondary high school diploma level (53%). From data gathered in reference to the level of awareness of instruments for the health of the oral cavity, tongue scrapers and electric toothbrushes resulted infrequently used (respectively in 68% and in 52% of cases) whilst the remaining options suggested were found to be of common use. Of the entire cross section 62% of subjects were found to be traditional cigarette smokers and the remaining 48% were found to be e-cig users. From the automatic evaluation of the traditional cigarette smokers it emerged that 62% of subjects present teeth discolouration compared to natural colour, 36% accuse halitosis and 32% report episodes of Gastro-Esophageal Reflux. As to e-cigarette users, 11% report gum bleeding when brushing teeth and 9% report teeth discolouration.
During lockdown the study shows that e-cig and traditional cigarette smoking use increased by 49%
Conclusions: The study, albeit effected on a cross section of a non-homogeneous number of subjects in respect of one group to the other, shows that e-cig users do not present halitosis or Gastro-Esophageal Reflux. The episodes of gum bleeding during brushing, reported only by a small number of e-cig users, require further clinical examination; this would ascertain whether e-cig users or traditional cigarette smokers are more exposed to gingival/periodontal disease or if the former are less subject to masking of bleeding typical of traditional cigarette smokers.

Phoral: effects of carnosine supplementation on quality/quantity of oral saliva in healthy volunteers and in subjects affected by common oral pathologies

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Aim: The pH of the oral cavity is a parameter that underlies a multifactorial process of continuous adjustment that includes the effect of saliva as a buffer and the contribution of the oral cavity microbiome. In some diseases of the oral cavity a modification of these adjustment mechanisms is supposed to alter the normal flow of saliva and, consequently, the pH and the oral microbiome with the expansion of potentially pathogenic strains such as e.g. streptococcus viridans. The main objectives of this study are to estimate the quality and quantity of oral saliva and oral microbiome in healthy volunteer before and after seven days of treatment with a food supplement that has proven potentials to normalise the saliva production: AqualiefTM.
Methods: The study is a prospective trial undertaken at Istituto Stomatologico Italiano in Milan. Patients had to take three tablets of Aqualief TM (after breakfast, lunch and dinner) daily for seven days. The partecipants had to avoid oral hygiene practices including flossing, brushing and mouth-rinses as well as eating and drinking for at least two hours before collection. Before sampling, the mouth was rinsed with water for two minutes and it was asked to the subjects to wait for ten minutes. The samples of saliva were obtained in the morning (8.00 am–10.00 am) according to the circadian rhythms in salivary flow.

The unstimulated saliva (Us) samples were collected by expectorating into sterile 50 ml tubes every 30 sec. for five min. The samples collected by an operator, were weighted, centrifuged for 15 minutes at 4°C, then the pH was measured by a pH – electrode. The collected samples were analysed at the Department of Pharmaceutical Sciences "Pietro Pratesi", University of Milan, Milan, Italy (DISFARM) research laboratory. The same procedure was repeated after 7 days of active treatment with Aqualief TM three times a day.

Results: Seven subjects have been analyzed.It has been seen that AqualiefTM has normalized the pH to the natural value of the buffer system (pH = 7). It is interesting underline that the subjects, who have an acid pH around 5.5 in the first sampling, have a pH value tending towards neutral, after using for a week AqualiefTM. Moreover it has seen an increase of salivation in6subjects with a SD of 0.4154 and a mean of differences of 0.6200. At the end the buffer system of saliva increases 3 times using Carnosina 10mM.

Conclusion: Saliva buffers 0.03 mmol of H3O+ before reaching pH 5.5; whereas using Carnosina it buffers 0.105 mmol. This reaction is a consequence of a sinergical activity, caused by an action of Carnosina on the isophorme VI of carbonic anhydrase. However the effect on pH is maintained not only during the assumption of the tablet, but also after some hours, because of the upregulation of some proteins.

Thanks to these positive results, the study is going to continue analysing other cases and improving withproteomics analysis.

Prospective study and three-dimensional analysis in treatment of minor recessions: indications and role of the dental hygienist

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Aim: Assessment of the hygienic maintenance of the tissues withan increase/restoration of the emergence profile, implemented through conservative-periodontal therapy on minor vestibular recessions (Class I Miller/RT1 Cairo) with and without abrasions of the CEJ.

Methods: The analysis has been conduced on 7 subjects between the ages of 22 and 46 were recruited, that means a total of 50 dental elements of which 47 with the vestibular recession, 17 with abrasion/recession and 3 only with abrasion. All subjects did not have to present periodontal probing > 3 mm and did not have to be smokers. Conservative therapy has been implemented to restore/increase the thickness of the CEJ on the elements affected by gingival recession and abrasion. The following values have been recorded: the totality of recessions belonging only to the class I Miller/RT1 (Cairo et al); 17 elements with class B+ abrasion, characterized by cervical step formation, precision impressions to record the differences in the emergence profiles before and after conservative therapy. 3 subjects (30 dental elements) had type 1 phenotype (thin and festooned), 4 subjects (20 dental elements) had type 2 phenotype (intermediate). Clinical protocol: professional oral hygiene session, home hygiene motivation, and education, class V fillings associated with motivational reinforcement, check after 60 days for access to mucogingival surgical therapy. Periodontal probing (PPD) and Plaque Index (PI) were assessed at T0 and T1 (after 2 months from conservative therapy), to monitor hygiene maintenance and periodontal health concerning the new emergence profile.

Results: In dental elements with cervical abrasions associated with gingival recessions, the combined restorative-periodontal treatment allows changing the emergence profile obtaining a "gull-wing" conformation. The reduction of the recession was significantly influenced (p=0,038) by the different phenotypes; in particular, on the intermediate one (type 2 in the study) there was a greater reduction of the recession. The probing depth decreased significantly between T0 and T1 even in those elements that did not present an evident reduction of the recession. Moreover, the Plaque Index (PI) decreased statistically significantly (p=0,012).

Conclusion: The modification of the emergence profile, obtained through conservative therapy, was easily maintained from the hygienic point of view by the subjects. The new "gull-wing" profile facilitates cleansing and prevents a traumatic impact on the marginal gingival tissues, thus leading to a more favorable variation and the mechanical action of the brush bristles. Furthermore, it can provide mechanical protection and support to the gingival margin, also favoring a reduction of food impaction at the cervical level, as it moves the line of application of these forces in the vestibular direction. At the end, the choice of waiting timing between conservative and surgical therapy was also effective in terms of increasing the textual thicknesses associated with the hygiene protocol.

State of the art on correlations between periodontal disease and systemic pathologies. A critical review of the literature of periomedicine associated with a survey in adult population

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Aim: Periodontal disease represents the first cause of tooth loss in the adult population of industrialized countries, resulting in a serious impairment linked to the consequent loss of chewing and phonation. It also leads to a serious problem in relationships and in the aesthetics of the smile. In addition, for years now, it has been known that periodontitis can cause changes in the whole organism. Numerous clinical and experimental studies have in fact highlighted the presence of a strong association between this pathology and some systemic diseases, in particular, cardiovascular diseases, diabetes mellitus, Alzheimer's disease, respiratory diseases and complications during pregnancy. The aim of this work is to evaluate the knowledge of the correlation between periodontal disease and systemic diseases in the population, by submitting a questionnaire.
Methods: This work was carried out through a review of the scientific literature on the correlation between periodontal disease and systemic pathologies. Furthermore, a survey to assess knowledge of these correlations was given out to the population and it was answered by a sample of 907 people. In addition, the review of the literature has allowed to develope protocols for the management of various types of patients.
Results: This study confirmed the existence of a correlation between periodontal disease and the onset of the previously mentioned systemic pathologies. In particular, there are two mechanisms mostly involved in the pathogenesis of these associations: the passage of periodontal pathogens in the systemic circulation and the systemic production of inflammatory mediators. In the first case samples of periodontal pathogens were indeed found inside the atherosclerotic plaques of patients with cardiovascular pathologies, inside the amniotic fluid and the placenta and in the brain and cerebrospinal fluid of patients affected by Alzheimer's disease. Also pulmonary translocation of oral pathogens has been shown to cause bacterial pneumonia. Instead in the second case it has been shown that the constant presence of pro-inflammatory cytokines can cause further vascular and brain damage. In addition, some of these cytokines can induce premature birth and increase insulin resistance in diabetic subjects. Furthermore, the survey has shown that, although most of the respondents knows about periodontal disease and its possibilities for prevention and treatment, knowledge of its correlation with the development of systemic diseases is still not very widespread. In fact, only a third of the sample is aware of these correlations and with regards to Alzheimer's disease, this percentage reaches 5%.
Conclusions: In the future further studies will have to be conducted to determine the mechanisms involved in the correlation between periodontal and systemic diseases, especially with regard to Alzheimer and some respiratory diseases. Finally, the dental hygienist appears to be extremely important in informing patients that the maintenance of correct oral hygiene can also bring benefits at a systemic level.

Oral hygiene habits in teenage patient: a clinical study through interviews

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Aim: Oral health plays a key role in a person's well-being. The main tool to achieve it and maintain this condition is through prevention. However, its spread doesn't seem to have reached the whole community. In particular, youngest subjects, belonging to the pediatric and adolescent groups, are the ones who, on average, are less inclined to assume and adopt correct oral hygiene habits. The aim of this study is to investigate teenagers'oral, home and professional hygiene habits, as well as their level of education as far as such maneuvers are concerned. More attention is paid to the teen type of patient, as they go through a particularly delicate period, in which several factors can negatively influence the health of the oral cavity, one of which is the orthodontic treatment.Therefore, it's essential to check its degree of maintenance.
Methods: The study made use a of questionnaire, distributed both in paper form and on an online platform, containing open and closed questions. The only inclusion criteria that was set, is the chronological age, specifically only subjects born between the years 2000 and 2005 were accepted in the study.
Results: 213 teenagers took part in the study, and most of them were women (78%). Of all subjects, 206 declared they had undergone, at least once in their lives, through a dental examination, while 144 subjects declared that they had undergone at least one session of professional hygiene. Data were also collected from 46 orthodontic patients, of whom 8,95% reported brushing two or more times a day, compared to 82,04% measured among standards patients. As far as dental floss is concerned, 43,49% of the former and 30% of the latter used it. In 60% of the cases, out of the total, the children stated they had been given some kind of teaching on oral hygiene rules and methods by their parents.
Conclusion: The study revealed some pretty interesting

data. In most cases, the first dental examination takes place between 5 and 9 years, too late compared to what is recommended by the scientific literature. In 60% of cases, before and after the first visit, oral hygiene maneuvers are handled by parents alone, without consultation and education by professionals. The habit of brushing the teeth at least twice a day is widespread but much less widespread is the use of dental floss and other supplementary instruments. Between men and women, the latter seem to pay more attention to these maneuvers. Among orthodontic appliances, greater compliance is evidenced. However, in the view of the relatively low number of subjects considered, more extensive studies are needed.

Re-mineralization effectiveness of a prophylaxis paste on bleached enamel: a way to prevent negative microscopic side effects

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Aim: This study looks to enamel micro hardness after two different bleaching treatment with an in-office agent (Perfect Bleach Office+), based on hydrogen peroxide 35%, and an at-home agent (Perfect Bleach), based on carbamide peroxide 16%; evaluation of Vickers Hardness number (VHN) after exposure of a prophylaxis paste (Remin Pro), based on hydroxyapatite and sodium fluoride, wants to contribute to understanding the performance of any protective action after bleaching.
Methods: 40 human incisors extracted and disinfected by immersion in a solution of 5% sodium hypochlorite for one hour, were evaluated on their labial enamel surface. Specimens were prepared by cutting at the dentin-enamel junction using a diamond rotary bur; labial surfaces were ground under water irrigation using silicon carbide paper, so that the surface appeared smooth and flat. Finally, they were placed into Teflon molds and embedded in flowable composite resin and polymerized. Before any procedure, each specimen was half covered with adhesive tape for preventing contact with whitening agent, so that every sample had one half surface used as negative control. Specimens were assigned to four investigation group that differ for the treatment carried out: 1) Perfect Bleach Office +; 2) Perfect Bleach; 3) Perfect Bleach Office + and Remin Pro; 4) Perfect Bleach and Remin Pro. Bleaching and re-mineralizer agent were used in according of supplier instruction. Perfect Bleach Office + was distributed on teeth surface without brushing; after 15 minutes of exposure the product was washed off with water. Perfect Bleach was distributed for 2 hours without brushing and washed off with water. For both agents, the treatment was repeated after 8, 24 and 36 hours; among the experimentation phase, specimens were stored in artificial saliva in order to simulate the physiological oral conditions. Remin Pro was applied without brushing and removed after 3 minutes. Micro hardness was measured after treatment by a tester (Galileo Isoscan HV1 OD; LTF Spa, Antegnate, BG, Italy) composed of a Vickers diamond indenter which was applied with a load of 100g for 10 seconds; five indentation were realized on each specimen's surface.
Results: The null hypothesis of this study is that the tested product does not perform any protective action after bleaching treatment and that there is no difference on the mechanical properties of the enamel bleached with a professional or a home agent; statistical analysis showed the presence of significant differences among all tested groups; Tukey's test showed that both the application of two bleaching agent resulted in significantly decreased micro hardness values, and the application of the prophylaxis paste after bleaching increased micro hardness specially if enamel had been bleached with hydrogen peroxide 35%.
Conclusions: The null hypothesis of the study has been rejected. The study confirmed that teeth whitening procedures led to enamel alteration like dissolution of organic dental matrix. It also revealed that micro hardness of bleached enamel treated with prophylaxis paste appeared significantly higher even that the ones registered in no treated enamel, suggesting the application of Remin Pro is always advisable even on teeth that didn't undergo a bleaching procedure.

Alterations induced by non ionizing radiations emitted by mobile phones on the stomatognathic system: a systematic literature review

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Aim: The aim of the present study is to review the scientific literature/ the available evidence to investigate possible adverse effects associated with exposure to non-ionizing radiation when using phones mobile phones. In particular, we want to investigate the effects deriving from the absorption of these emissions by the stomatognathic district. In addition, salivary nickel levels in patients on fixed orthodontic treatment and any changes in salivary pH were assessed.
Methods: This systematic review was conducted on the main databases (PubMed [MEDLINE], Google Scholar), following the methodology of the PRISMA Statement

protocol for reporting systematic reviews and meta-analysis (Liberati, 2015) available on the Evidence website.
Results: Twelve studies met the identified inclusion criteria and were analyzed. Randomized controlled clinical trials, cohort and cross-sectional studies were selected, aimed at adults (from 18 to 85 years). Individuals with healthy periodontium who have not suffered from were recruited xerostomia, free from systemic diseases, without smoking or alcohol habits or previous pathologies in the head-neck district. The subjects were exposed to radiation non ionizing devices emitted by mobile phones which did not exceed the limits imposed by law (2.0 W / kg). Functional alterations of the parotid glands have been detected, resulting from the heat generated by the thermal effect induced by radiation. The exposed subjects suffered greater salivary oxidative stress, changes in total protein concentrations and salivary flow; moreover, there was an increase in nickel levels in saliva and a decrease in pH in the wearers of fixed orthodontic appliances.
Conclusions: Further large-scale studies of greater methodological rigor are needed. However, assiduous users of mobile devices, were more subject to adverse effects, compared to sporadic users. We recommend, on the basis of what is reported in the literature: avoid long exposures, especially telephone calls, giving priority to messaging; to use hands-free devices and / or Bluetooth, in order to improve the distance between the subject and the device; to introduce anti-oxidants in the diet (vitamin C, E and probiotics), useful for counteracting the formation of free radicals, to reduce exposure to the most susceptible subjects, such as: children, adolescents, pregnant women, wearers of medical implants. Finally, a greater diffusion and application of metal-free orthodontic appliances would be desirable to avoid the release of nickel in saliva and hypersensitivity phenomena

Comparison between sonic brush versus oscillating-rotating brush in relation to manual skills

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Aim: Scientific literature is not yet able to give a clear answer on the strengths and weaknesses between the roto-oscillating and sonic toothbrush when compared to each other. The aim of this study was to compare the effectiveness of the two toothbrushes in correlation to the level of manual dexterity of the patient and his grade of satisfaction through a survey.
Methods: The study, carried out in the Clinic of the University of Trieste, was designed as a split mouth test. The experimental protocol was approved by the Regional Ethics Committee (CEUR 16/2017). Each patient signed the informed consent before the participation. 30 patients, aged 18 to 58 years (21f; 9m), with FMPS between 20% and 70% were selected. Patients with disability, orthodontic therapy and removable prostheses were excluded. A study was conducted on knowledge and hygiene habits of the patients through pre-survey and post-survey. Each patient underwent a baseline examination (FMPS, clinical-periodontal chart and photographic examination). The experiment phase was based on the division of the mouth with a split-mouth method by randomly assigning one of the two brushes tested in the 1st+3rd quadrant and the other to the 2nd+4th quadrant. Before brushing, standardized instructions were given and each quadrant was cleaned for 45". At the end of the test, clinical, photographic and survey data was collected again. Finally the dexterity test (Purdue Pegboard Test) was performed.
Results: Survey - The most significant data of the survey reported that all the patients weren't aware of the existence of the sonic toothbrush (100% of the sample) and the correct way to use the roto-oscillating toothbrush (incorrect in 60% of cases).
Regarding subjective perception, 60% of patients, perceived a reduction of plaque and smoother surfaces after brushing. Both tools examined were rated better than the traditional toothbrush. The roto-oscillating toothbrush was perceived as more effective in 53% of patients compared to 27% who prefer the sonic, the remaining 20% had no preference between the two.Brushing test - Both toothbrushes clean well and without particular differences in results (pre-brushing: FMPS 65±15%; post-brushing: sonic FMPS 14±9,5% vs roto-oscillating FMPS 15±9,5%). From the comparison, the roto-oscillating appear more effective in the 1st quadrant (roto-oscillating post-brushing FMPS 12±6% vs sonic FMPS 20±11%) and the sonic in the 2nd quadrant (sonic post-brushing FMPS 11±7% vs roto-oscillating FMPS 18±10%). A significant decrease for FMPS interproximal in the 2nd quadrant was observed in the sonic toothbrush compared to the roto-oscillating toothbrush (sonic post-brushing FMPS 9±5% vs roto-oscillating FMPS 16±7%). No significant differences for FMPS interproximal was observed in the other quadrants. Manual test - The data relating to the degree of manual dexterity of the patients indicate that there is no correlation with the effectiveness of the toothbrushes examined.
Conclusion: No substantial negative differences are highlighted between the analyzed toothbrushes. Both toothbrush technologies are suitable for all types of patients. The choice of the correct toothbrush will be determined by the Dental Hygienist and the

patient together, being able to identify the preferred technology based on the patient.

One stage full-mouth disinfection combined with ND-Yag laser in peri-implantitis management: a microbiota associated-profile analysis with next generation sequencing and digital PCR sequencing

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Aim: Peri-implant diseases are prevalent, with numerous therapies studied in an attempt to combat this condition. The severity of human peri-implantitis lesions are correlates with the level of submucosal microbial dysbiosis. Peri-implantitis (PI) was defined, according to the 2018 Classification of Periodontal and Peri-Implant Diseases and Conditions (EuroPerio9 congress), workshop co-sponsored by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP), when a distance from the implant platform to bone contact ≥3 mm, and in conjunction with bleeding on probing was found. The purpose of this study was to identify the microbial communities that colonize PI pockets before and after One Stage Full-mouth disinfection protocol combined withNd-Yag Laser treatment using Next Generation Sequencing (NGS) and digital PCR (dPCR).
Methods: Clinical and radiographic examination assessed the peri-implant disease status. Subjects having at least one implant with PI, no diabetes, and not taking antibiotics in the previous 3 months were selected. Microbial samples were collected from PI pockets using paper points. After incubation and isolation, the colonies were analyzed by NGS and dPCR. Microbial signatures of 20 submucosal samples from untreated PI lesions before and after Nd-Yag treatment (total 40 samples) were assessed by 16S rRNA gene using QIACUBE HT ®, (Rotor- Gene Q and the Illumina MiSeq platform), targeting the V3-V4 region. Datasets were processed using the Quantitative Insights into Microbial Ecology, Greengenes and the Human Oral Microbiome Database (HOMD). Network analyses were performed to identify groups of taxa with mutual occurrence or exclusion. However, to be sure of their methodological effectiveness, the probes were tested in an external laboratory using the Sanger sequencing technique.
Results: Differences between groups were determined using principal coordinate analysis (PCoA), t tests and Wilcoxon rank sum test and FDR-adjusted. Although the compositions were highly variable, major habitants in different peri-implantitis sites could be identified. Network analysis identified two mutually exclusive complexes associated with "false negative" and "peri-implantitis", respectively. The peri-implant core microbiome was determined. The species Cardiobacterium hominis, Leptotrichia buccalis, Capnocytophaga sputigena, Rothia dentocariosa, were most closely associated with false negatives, whereas Synergistetes, Filifactor alocis, and Porphyromonas endodontalis were most discriminative for peri-implantitis. Moreover the bacterial load deeply decreased after the One Stage Full-mouth disinfection protocol combined with laser treatment.
Conclusion: The PI microbiome is a commensal-depleted and pathogen-enriched, harbouring traditional and new pathogens. The core peri-implant microbiome harbours taxa from genera is often associated with bone and related implant loss. Eradication of pathogenic bacteria and infected sulcular epithelium presents a significant challenge in the nonsurgical treatment of PI. This preliminary study provides comprehensive and reliable data for future study designs in PI involving NGS and dPCR in a more specific, easy, rapid and economical way. NGS and dPCR could be a new clinical method to evaluate and monitor oral microbiota associated with the disease during diagnosis, in the view of a personalized therapy (precision medicine) and related follow-up.

In vitro comparison of two types of toothbrush bristles in penetration capacity into the peri-implant sulcus

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Aim: The aim of this preclinical study was to compare the ability of the conical and cylindrical bristles to penetrate the peri-implant sulcus.
Methods: A mandibular dentition was reproduced using a plaster model. The gingival component was recreated in silicone and a glass cylinder simulating a 4mm diameter implant was positioned by replacing element # 3.6. Using an 1mm diameter optical fiber placed from the lingual side inside the cylinder, the penetration of the bristles was recorded during the brushing. The Bass Technique was performed in a humid environment from the vestibular side. This brushing motion is described as a vibratory movement

of the bristles arranged at 45° respect to the long axis of the tooth into the sulcus. The protocol included 5 toothbrushes per group and 10 tests per toothbrush for a total of 50 assessments per group. Each test lasted 1 minute with controlled pressure of approximately 500gr and a stroke length of 15 mm. From the video clips acquired, 4 degrees of penetration were identified: grade 0 (<2mm), grade 1 (2-3mm), grade 2 (3-4mm), grade 3 (4-5mm) and grade 4 (5-8mm). The highest value was collected for each test. At an αlevel of 0.05 for a one-tailed test with a power of 80% and a margin of superiority of 40%, a sample of 10 toothbrushes was needed. Intraoperative variability was assessed with the Cohen's kappa coefficient. A generalized mixed-effect linear model (multilevel analysis) was used considering the level of bristle penetration as the primary outcome and the type of bristle as fixed effects. The level of significance αwas a priori set at 0.05. The null hypothesis affirms that no difference of efficacy (level of penetration) exists between the two types of bristles.

Results: Excellent agreement was obtained between the measurement performed by the examiner (K-statistics =1). The conical bristles showed 8 times greater efficacy (p = 0.001) than the cylindrical bristles; moreover, with respect to the latter, the degree of penetration of the conical bristles proved to be 2 times (p = 0.015), 20 times (p = 0.001) and 76 times (p = 0.001) higher than degrees 1, 2 and 3 respectively. The null hypothesis was therefore rejected.

Conclusion: This preclinical study shows a clear and superior penetration capacity of the conical bristles compared to traditional cylindrical ones. This result suggests a greater hygienic efficacy at the peri-implant level for the newly designed bristles.

Evaluation of patients' compliance in different age groups: preventive methodology

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Aim: The aim of this work is to evaluate the effectiveness of the SSRD Department of University of Milan Prevention Program between subjects of different sex and ages.

Methods: Methods prevention program is divided into six stages, in which specific and standardized procedures are effected on patient. Level 1: collect information about the patient through a full medical history and clinical examinations and fill out the medical record, in particular plaque (Silness index) and bleeding (Loe index) scores. Level 2: educate children on oral hygiene prevention through a lecture, which also involves kid's parents. Level 3: record a new plaque and bleeding scores and compare them with the precedent values. Level 4: applicate topical fluoride after cleansing of surfaces with cups and prophylaxis paste. Level 5: sealing of deep pits and fissures of deciduous and permanent teeth, after the usual record of plaque and bleeding index scores. Level 6: record plaque and bleeding index scores after 3 months. For this study 120 patients were involved, then they were followed those who exceeded the level 4. It deals with 90 patients (48 female and 42 male), divided into age groups: 6-9 years, 10-12 years and over 12 years. The variations of some of the main parameters were analyzed over time: plaque index recorded at level 1, 3, 4 and 6; bleeding index recorded at level 1, 3 and 4; number of controls before final checks up; quantitative and qualitative variations of bacterial plaque.

Results: Remarkable results were obtained regarding both the effective reduction of bacterial oral flora and patient's compliance and learning, especially in the group of patients older than 10 years. The new values of parameters recorded at the end of the study showed that all the subjects included in the sample had an improvement of compliance in oral hygiene, in particular: P.I. level 3, 10-12 age, sex female; B.I. level 4, males over 10, female 6-9 age; quantitative and qualitative variations of bacterial plaque, level 4, all groups.

Conclusion: The results obtained in this study suggest that with this preventive program, it's possible to instruct to the oral hygiene with good results the young patients, particularly those above the 10 years of age, motivating and instructing them to the use of proper techniques and habits. The study also highlights how a personalized preventive strategy, which takes into consideration the individual problems, is effective at maintaining a constant high standard of oral hygiene and thus successful results. A greater parental involvement is considered necessary to get effective results. A preventive program is an effective technique for all the patients, not only for patients at the first appointment and ones undergoing orthodontic treatment, but also before complex orthodontic-surgical and implant prosthetic therapies.

Evaluation of salivary matrix metalloproteinases (MMP-8) in periodontal patients undergoing non-surgical periodontal therapy and mouthwash based on ozonated extra virgin olive oil: a randomized clinical trial

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Aim: To compare the clinical periodontal outcomes and the levels of salivary matrix metalloproteinases MMP-8 after non-surgical periodontal therapy alone or coadjuvated by the use of a mouthwash based on ozonated extra virgin olive oil in patients with periodontitis.
Method: A randomized double-blind case-control study was conducted. The analysis will include data from all patients with different stages of periodontitis. The level of salivary MMP-8 metalloproteases will also be detected. After enrollment, the patients were divided into two groups, according to randomization: experimental and control. Ninety-six subjects of both sexes, aged between 30 and 60 years, were selected at a private dental practice in Cecina, Italy. The enrolled subjects were subsequently divided into two groups: control group (n = 48), scaling and root planning procedures; experimental group (n = 48), scaling and root planning procedures + mouthwash based on ozonated extra virgin olive oil. All the participants signed an informed consent. The study population was analyzed by Intention To Treat (ITT), then all randomized patient data were analyzed. Frequencies, means, medians and standard deviation were calculated for the descriptive analysis. Group differences were assessed using the Chi-square test for categorical variables and the T-Student test for independent samples for continuous variables. The multivariate logistic regression model was used to examine the effect of the ozonated extra virgin olive oil mouthwash supplement compared to the SRP causal therapy alone.
Results: After treatment, improvement in the periodontal indices examined, PI, BoP, PDD and salivary MMP-8 levels was observed in both groups. However, the differences in values between baseline and post-treatment were statistically significant only in the study group ($p<0,01$).
Conclusion: The Scaling and Root Planing procedure has a beneficial effect on the inflammatory status in patients with periodontitis. The SRP coadjuvated by the use of ozonated oil contributes to a further improvement of the clinical periodontal parameters. The traditional SRP treatment causes a decrease in the MMP-8 levels in the saliva of the treated subjects, but the SRP followed by ozone therapy can certainly speed up and improve the result. SRP in combination with ozonated oil leads to a significant and faster reduction in saliva MMP-8 concentrations in patients with periodontitis.

In vitro activity of ozonated olive oil-based products against carious pathogen streptococcus mutans

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Aim: The Gram-positive bacterium Streptococcus mutans is mainly known to be a causative agent of dental caries as well as some genotypes are also involved in severe systemic affections. In this context is strictly crucial the control of S. mutans amount inside the oral microbiome, in fact hight levels of this bacterium in the oral tissues are related to severe clinical events: caries, tonsillitis, transitory bacteraemia's are the most common. In other hands, the current agents used against the S. mutans have low substantiveness and present side effects as skin irritation, teeth discoloration, and allergic reactions. In this in vitro study we investigated the antibacterial activity of two commercial ozonated olive oil-based products against a pathogenic strain of Streptococcus mutans.
Methods: Two different commercial mouthwashes were obtained from Gemavip, (Cagliari Italy): (i) Ialozon Blu, IB within ozonated olive oil and (ii) Ialozon Rosa IR, with ozonated olive oil, hyaluronic acid and E vitamin. All formulates were analyzed in a dilution range from 2 to 256 folds in saline solution. A strain of S. mutans, CIP103220 (Collection Institut Pasteur) was used for the antimicrobial susceptibility test. The Minimum Inhibitory (MIC) and Minimum Bactericidal Concentration (MBC), were performed by the micro-dilution method following the Clinical & Laboratory Standards Institute (CLSI), while (MBIC) was evaluated following the modified protocol described by Montana University Canter for Biofilm Engineering.
Results: Both formulates showed the same antimicrobial activity and this suggest the main role of ozonated -oil in antibacterial antibiofilm process. MIC, MBC, MBIC were observed for dilutions factors of 1/32, 1/8 and 1/8 respectively. These results suggest that these formulates are able to inactivate the sessile and planktonic form of S. mutans avoiding the dilution effect by saliva in the oral cavity.
Conclusion: Dental caries is a microbe-mediated

oral disease with a four-factor aetiology: oral microorganisms and environment, host and time. In this case scenario dental biofilm plays a central role and evidence exists that controlling dental biofilm is effective on tooth decay prevention. When compared with chlorhexidine, olive oil showed lower antimicrobial activity, but lower cytotoxicity, resulting in a safer product for a long-term use. In addition, topical ozone is effective through damage to the microbial cytoplasmic membrane, but it is very safe on human cells. Recent studies suggested the use of ozonated olive oil in periodontology, with antibacterial efficacy comparable to chlorhexidine. The current study showed that ozonized olive oil, with and without hyaluronic acid and other fillers, could be useful to reduce bacteria load of S. mutans, and to prevent, safety, dental caries. For these reasons ozonated oil could be a new frontier for the non-invasive treatment of dental caries.

Prosthesis

Functional, radiographic and prosthetic outcomes in patients with single implant-retained mandibular overdentures: a six-year prospective study

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Aim: The aim of this prospective pilot study was to investigate evolution in chewing efficiency, thickness discrimination, implant survival, peri-implant bone loss and prosthodontic maintenance interventions after prosthetic connection of single implant-retained mandibular overdentures over an observation period of 6 years.

Methods: 15 totally edentulous subjects, mean age 67 years, were selected consecutevely from those attending Oral and Maxillofacial Rehabilitation and Dental Implants Department of Dental School at the University of Turin, Italy, between January and December 2010. All patients needed new complete dentures and complained difficulty in coping with the mandibular denture. Chewing efficiency was tested using gummy jelly; the method measures the glucose extraction from chewed gummy jelly, the smaller the pieces, the more the area of the chewed jelly and the glucose released. Shimstock Metal Foil, 8 mm thick and 8 mm wide, interposed between the premolars has been used for detecting the thickness discrimination ability of patients. After adding further layers the patient is asked to tell when he is feeling the thickness between the teeth. Implant periapical radiographs have been taken using a modified Rinn radiograph holder; a Locator matrix has been fixed in the bite to be blocked in a reproducible position on the implant abutment. Marginal bone loss was assessed using a measuring software (ImageJ, Wayne Rasband, National Institutes of Health, USA). Peri-implant bone loss was defined as the difference among prosthetic connection and follow-up measurements. During follow-up visits denture stability, retention, and fit were also checked, and all the prosthodontic maintenance interventions were recorded as they occured. Adjustments and repairs were performed when required.

Results: 2 patients died during the follow-up period. No implant was lost during the observation period representing 100% implant survival. Masticatory efficiency increased from the complete denture fitting up to 3 months after prosthetic connection and then still increased significantly until the 1 year after the connection. After the first year patients still maintained this efficiency having a very slow increase until the sixth year. Patients were able to discriminate significantly lower thicknesses up to the third month after connection. They maintained this ability up to the sixth year having still some decrease in the thicknesses discriminated. Mean peri-implant bone loss at 1-year postloading was 0,59 mm. After the first year we recorded 0,14 mm and 0,11 mm bone loss at 2-year and 6-year postloading. All values respect the criteria for implant success by Albrektsson. Peri-implant bone loss at the sixth year was 0.85 mm, in line with results presented in the literature for implant retaining overdentures. The main events of maintenance recorded were: 5 relining, 6 fractures, 3 new dentures, 26 replacement of matrices, for a mean value of 1,85 change per patient in 6 years. The 6 fractures happened to 3 patients for whom we made the 3 new dentures. After they received the new dentures (without metal framework) patients did not have fractures.

Conclusion: Within the limitations of this study, it was concluded that single implant-retained mandibular

overdentures improve masticatory efficiency and thickness discrimination, results are maintained over time. Thickness discrimination is a new data never evaluated in single implant overdentures. Clinical parameters are comparable to other studies in the literature. MSIR-OVD may be considered a promising and safe alternative treatment for completely edentulous patients, especially for the elders: dependent, home bound or institutionalized, with cognitive impairments and reduced manual dexterity.

Removable partial dentures retained by short implants : functional assessment before and after implant anchorage

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Aim: To evaluate the functional outcomes of removable partial denture (RPD) retained by short implants in Kennedy Class I and II edentulism, before and after implant anchorage.
Methods: 13 patients (Kennedy Class I and II) rehabilitated with RPD underwent the surgical insertion of one short implant in the distal edentulous ridge to be connected to the RPD with an attachment after healing. Overall, 21 implants were inserted. The following tests were carried out before the implant insertion and after the prosthetic connection: - preliminary psychological evaluationsby means of the Beck Depression Inventory test and the Rosemberg self-esteem scale. The Beck depression inventory test is a self-evaluation test with 21 multiple choice questions based on the most frequent attitudes and symptoms detected in depressed patients. A value inferior to ten indicates non-depressed patients, while higher values/scores identify a depressive state. The Rosemberg self-esteem scale consists of 10 questions to which the patient has to answer using a scale from 1 to 4. The patient's score is in the range between 10 and 40. The higher the score, the higher the self-esteem of the patient; - prosthetic satisfaction questionnaire: the form consisted of seven questions, regarding the level of prosthetic comfort, that patients answered using a visual analogue scale (VAS), from 0 to 10; - kinesiographic recordings: Patient's masticatory cycles pattern on the sagittal and frontal plane was evaluated using a kinesiograph and specific cube-shaped jellies. During each trial, patients performed ten masticatory cycles chewing two jellies, and the test was repeated twice. The values of maximum opening (Max Op), maximum protrusion (Max Pr), and maximum opening passing through centric occlusion (Max Co) were recorded; -masticatory efficiency test: a masticatory test based on the ability to break up a test food was performed. Patients were invited to chew 17 cubes made of an ordinary impression silicone, making 60 chewing cycles, in order to reduce the test food homogeneously. The masticated food collected from the patient's oral cavity was sieved under a stream of water by means of 4 sieves, whose pore diameter was progressively smaller; afterwards, the sieved food was collected, dried and weighted.
Results: No signs of depression and a medium-high level of self-esteem were detected by the psychological tests. After prosthetic connection,masticatory cycles patterns became more uniform and with a decreased variability, due to the improved stability of the prosthesis; patients showed a statistically significant improvement in masticatory efficiencyand prosthetic satisfaction increased in every aspect.
Conclusion: Given these preliminary data, short implants retained RPD can be considered a viable treatment option for the rehabilitation of the partially edentulous patient, improving psychological comfort and the prosthesis retention and function.

Oral rehabilitation of a patient with bruxism and decreased vertical dimension. A clinical case

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Aim: The aim of this case is to present a possible way to treat dental wear in an old patient who already had prosthetic restorations. The patient is an old man who referred bruxism and has a decreased vertical dimension of occlusion but any kind of problems about masticatory muscles and temporomandibular articulation. He is a man scared because of previous dental treatments and our first approach was to evaluate to treat his worn teeth with adhesive techniques using a combination of composite restorations and porcelain veneers to recreate the VDO and aesthetic harmony. His only requests were "not to feel pain" during our treatment and "not to leave our dental department without teeth".
Methods: A 62 years-old man came to our department presenting a significantly worn dentition requiring a functional aesthetic improvement. His medical history was non-contributory. After a complete examination including periodontal, functional, biomechanical and aesthetic evaluation, we have established that the

aetiology of this worn dentition was the severe bruxism of the patient, never treated by his previous dentists. The treatment plan began with the increasing of the vertical dimension and the leveling of the posterior occlusal planes to obtain an equal bilateral intensity of the posterior occlusion. To achieve this result a full-mouth wax up was created. A provisional mock up was performed. The full Treatment plan was:
16–> root canal retreatment + dental finer post + Zr Crown.
15–> Zr Crown.
14–> Ceramic onlay.
26–> amalgam replaced with Zr Crown.
25–> amalgam replaced with Zr Crown.
24–> amalgam replaced with Zr Crown.
46 –> worn tooth but there was some enamel to preserve so we decide to make a Zr Crown with adhesive procedure.
45–> Litium Disilicate veneerlay.
44–> Litium Disilicate veneerlay.
34 –> MetalCeramic Crown.
35–> Direct composite Filling (Posterior Gc Dental) with Trasparent guide to obtain the same occlusal vertical height of mock up project.
36–> Direct composite Filling (Posterior Gc Dental) with Trasparent guide to obtain the same occlusal vertical height of mock up project.
13<–>23 lithium disilicate veneers applied on teeth with adhesive procedure (hydrofluoric acid 9%,silane , bonding, composite).
43<–>33 lithium disilicate veneers applied on teeth with adhesive procedure (hydrofluoric acid 9%, silane, bonding, composite).
Protective Bite in the lower arch to preserve the prosthetic rehabilitation.
Results: Function and aesthetics were re-established due to increasing of VDO. The first step of VDO increase was a full mouth wax up, followed by temporary mock up and temporary anterior restoration. After establishing a new dental support in the posterior area, we obtained the anterior prosthetic space to adhesive ceramic veneers . On the request of our patient, the colour of ceramic veneers was light (A2) and the patient looked younger. We achieved function and aesthetics with collaboration of our patient.
Conclusion: It is possible, to restore aesthetics and to create occlusal harmony in a worn dentition, by increasing the VDO: we reached our goals with a full adhesive approach using a combination of ceramic onlays or replacement of existing crowns (for the posterior teeth) and porcelain veneers.

Rehabilitation of cancer patients undergoing maxillectomy: palatal obturators

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Aim: The purpose of the present report is to analyze the prosthetic rehabilitation of oncological patients who underwent maxillectomy, focusing on the clinical application of palatal obturators. The prosthetic rehabilitation of these patients is a major challenge, due to the consequences of maxillectomy, like Oro-Antral or Oro-Nasal communications, teeth loss and facial deformation, with both functional, aesthetic and social limitations. The aim of the prosthetic rehabilitation is to restore oral functions, like chewing, swallowing and phonation. To do this, we must choose the more appropriate and predictable rehabilitation, relating to the patient's surgical outcome According to the guidelines in the choice of therapy, to rehabilitate a patient with no surgical reconstruction, we will prefer to realize a removable prosthesis On the other hand, if the patient has been reconstructed, the selected therapy will change basing oh the used reconstruction With soft-tissue free flap reconstructions, we will realize a removable prosthesis With osteocutaneous free flap reconstruction, we will choose, if possible, an implant-supported prosthesis rehabilitation, with better retention and prosthesis Obviously, in every patient with residual communication, we will realize a palatal obturator to close the palatal defect The size and location of the bone defect influences the degree of impairment and difficulty in prosthetic rehabilitation. Lack of support, retention, and stability are common prosthodontic treatment problems for patients who have had a maxillectomy.
Methods: 95 oncological patients, who underwent maxillectomy, with or without surgical reconstruction, and who showed a residual communication, were rehabilitated by using a palatal obturator To realize obturators, our clinical protocol provides different steps. The first is taking the preliminary impression, followed by the functional impression, the prosthesis' delivery and the follow up. Depending on the patients' local condition, like the residual dentition and the tissues health, we realized a tissue-borne obturator, a dental retention obturator, or an implant-supported obturator, to close the palatal defect. Where needed, we included teeth in the prosthesis design, to restore patient's occlusion.
Results: The use of a palatal obturator in oncological patients who underwent maxillectomy allows us to close the patient residual communication. Doing this, we are able to solve the nasal leakage during swallowing and to reduce rhinolalia. Moreover, with an obturator prosthesis we can restore patient's occlusion. In this way, we restore all oral functions, allowing the

patient to carry out a normal social and working life.
Conclusion: The obturator prosthesis is used to restore masticatory function and improve speech, deglutition and aesthetic in oncological patients with residual communication after maxillectomy It is easy to realize, and allows a quick resolution of the patient's problems, thus increasing the quality of the patient's life.

Nose wing collapse collaboration between surgeon and dentist: clinical case

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Aim: La labio-palatoschisi è una malformazione ad eziologia sconosciuta che si presenta con un'interruzione del labbro superiore, della gengiva e del palato. Le cause sono sconosciute e molteplici e cosi le variabili genetiche (1,2,3). Esistono protocolli che prevedono interventi chirurgici a età diverse (4,5). L'obiettivo del seguente lavoro è mantenere l'apertura della narice nasale destra cercando di non fare collassare l'ala del naso durante l'inspirazione dopo l'intervento di chirurgia plastica nasale.
Methods: La costruzione del dispositivo nasale prevede in primis la spiegazione alla paziente delle fasi lavorative e i materiali da usare. Per costruire il dispositivo sono stati utilizzati materiali: Soluzione fisiologica per pulire la narice; Vasellina per lubrificare la narice; Una cannuccia di plastica; Silicone per addizione; Resina acrilica a freddo trasparente; Una matita per disegnare i contorni del dispositivo; Frese e gommini per rifinizione. Eseguita la pulizia della cavità nasale mediante garza sterile e soluzione fisiologica si procede a inserire con un cotton fioc un po' di vasellina per lubrificare le pareti ed evitare che il silicone indurisca sui peli interni della cavità nasale durante la solidificazione del silicone. Preparata la cavità nasale si inserisce la cannuccia per una profondità di circa 2,5 cm i si inserisce il silicone nella cavità nasale mediante beccuccio cercando di coprire per tutta la lunghezza la cannuccia. Il silicone deve essere applicato fino a farlo uscire dalla narice in modo da formare una base. Ottenuta l'impronta si procede con lo stampo in gesso su cui verrà inserita la resina acrilica. Ultimata la polimerizzazione e rimosso il dispositivo dal gesso si procede a disegnare, rifinire e lucidare i punti e i confini del dispositivo eliminare tutte le asperità che potrebbero dare fastidio alla paziente durante la prova estetica.
Results: Il dispositivo mobile in resina trasparente è stato realizzato in una sola seduta e introdotto attraverso la narice ha impedito all'ala del naso di collassare durante l'inspirazione facilitando il normale reflusso dell'area. Inoltre è risultato estetico e non invasivo.
Conclusion: Oggi l'utilizzo delle resine acriliche a freddo e la loro versatilità ha permesso la collaborazione tra le diverse specialistiche nella fattispecie tra Chirurgo maxillo-facciale e Odontoiatra. Il dispositivo nonostante sia un corpo rigido risulta ben accettato dalla giovane paziente in quanto in posizione statica o durante le manovre di inserimento o rimozione non crea fastidi o dolori, inoltre essendo in resina trasparente risulta molto estetico.

The Virtual prosthetic project: an experimental study on the accuracy of different 2D and 3D digital systems

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Aims: The introduction of new restorative materials in dentistry, the current knowledge on the enamel-dentin adhesion method, and the use of the computer as an aid for the aesthetic analysis of the smile are the basis of a change in the dental daily practice. The new clinical approach is not very invasive and is therefore able to replace the "real" patient with a "virtual" one. The digital revolution opens the way to the virtual patient representing all the patient's tissues (bone, teeth, gums, face) in a single 3D model. The study aims to assess the accuracy of digital planning in dentistry, evaluating the characteristics of different intraoral 3D scanners and comparing it with traditional imaging 2D recording methods. Specifically, using computer aided design (CAD) software and measuring inside CAD software, authors want to verify the reliability of different models obtained with different techniques and machines.
Methods: 12 patients that needed aesthetic restorative treatment were enrolled in the study. All the patients underwent recording data of the height and width dental elements 1.1, 1.2, and 1.3 size using different technologies and comparing 2D with 3D methods. A T test was then applied in order to verify whether there was a statistically significant difference between the measurements obtained, comparing the different tools data (Emerald, TRIOS, Photogrammetry and DSS (Digital Smile System)) with the reference values.
Results: No significant differences emerged in the

measurements made with the different scanners (Trios 3Shape ®, Planmeca Emerald ®) and photogrammetry. Therefore, what should be underlined regarding the 2D measurements is the speed and simplicity compared to all 3D techniques, so this work can help to better define the field of application and the limits connected to 2D techniques, giving a good window of the technique.
Conclusions: The low number of patients is not sufficient to provide statistically significant results, but the digital planning future prospects seem to be promising. This study results highlighted how a photogrammetric scanner for dental arches would only have a much smaller shooting field size and greater accuracy. Despite these considerations, the photogrammetric facial scanner provided excellent results for the measurement of individual teeth, showing a great versatility of use.

Fiber-reinforced composites for full-arch prostheses supported by implants

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Aim: In full-arch rehabilitations on implants it is often recommended the application of a rigid framework to splint the implants together and distribute the loads homogeneously. In recent years, fiber-reinforced composites (FRC) have been proposed as an alternative to traditional metal alloys. The aim of this study was to evaluate the mechanical characteristics of seven prostheses, endowed with frameworks made of different materials, through compression tests to evaluate their deformation.
Methods: The samples were upper full-arch fixed prostheses, screw-retained and supported by 4 implants in correspondence of the two lateral incisors and the two first molars. All the prostheses had the same shape and size and were realized using the same master cast. The materials used were: gold alloy + resin (Au + R), titanium + resin (Ti + R), FRC with multi-directional carbon fibers + resin (ICFRC + R), FRC with unidirectional carbon fibers + composite (UCFRC + C), FRC with glass fibers + resin (GFRC + R), FRC with glass fibers + composite (GFRC + C), resin (R, full-acrylic prosthesis). The prostheses were subjected to compression tests using Zwick / Roell Z 0.5 machine with loads increased up to 100 N, 200 N and 300 N at the level of the first premolars, up to 100 N, 200 N and 260 N at the level of the central incisors. The deformation of the lower surface of the prosthesis was measured by the machine in order to obtain load / deformation graphs.
Results: Comparable data and graphs were obtained by compression tests at the level of the first right and left premolar. Greater rigidity and less deformation were recorded for UCFRC + C, GFRC + C, followed by Ti + R, R and Au + R. The greatest deformations were observed for ICFRC + R and GFRC + R. The results in the incisal region were slightly different probably because the framework was thinner than in the premolar region. There was less deformation in GFRC + C and UCFRC + C followed by Au + R and Ti + R. The greatest deformations were recorded for R, ICFRC + R and GFRC + R.
Conclusion: When used to realize full-arch frameworks, Au and Ti allow a predictable mechanical behavior with gradual deformations with increasing load, while FRC present some advantages such as lower cost and lower weight. UCFRC demonstrated good outcomes and allowed a better distribution of load than ICFRCs. The full-arch framework in GFRC may be an alternative, however further studies are needed in order to investigate its mechanical characteristics, also in relation to the aesthetic coating used. The acrylic resin alone, using the thickness simulated in this research, does not allow to obtain a sufficiently rigid structure to guarantee loads control in full-arch rehabilitations.

Fourteen-year evaluation of posterior three-unit zirconia-based fixed dental prostheses: a prospective clinical study

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Aim: The primary purpose of the present prospective clinical trial was to evaluate the clinical performance of posterior 3-unit zirconia-based fixed dental prostheses (FDPs) after 14 years of clinical function. The secondary aim was to evaluate both biological and technical complications throughout the whole period of observation.
Methods: Thirty-seven patients needing to replace either premolars or molars were involved and 48 3-unit zirconia-based FDPs were fabricated. Patients with a minimum age of 21 and a maximum of 68 years met specific inclusion criteria and clinical procedures were standardized. Frameworks with a 9 mm2 cross section of the connectors and 0.6 mm minimum thickness of the retainers were made by means of Computer Aided Design/Computer

Assisted Manufacturing. A resin cement was used to lute the restorations. Two external, calibrated and experienced clinicians blind to the prosthodontics procedures performed the baseline evaluation, recorded 7 days after the cementation of FDPs. The patients were recalled after 6 and 12 months and then yearly up to a total follow-up of 14 years. The United States Public Health Service criteria were used in order to examine technical and esthetic outcomes. Survival rates of the zirconia FDPs were calculated. The biological examination was performed analyzing both abutments and contralateral teeth.
Results: Descriptive statistics resulted in 91% and 99% cumulative survival rates for patients wearing 1 and 2 FDPs, respectively. Five minor fractures of the veneering ceramics and 1 fracture of a connector were recorded. According to USPHS, 42 restorations were rated Alpha. There were no significant differences in periodontal parameters between control and test teeth. Both function and esthetic results were successful for 3-unit zirconia-based FDPs over a 14-year follow-up period.
Conclusion: The results of this prospective clinical study confirmed the effectiveness of zirconia as a viable alternative to metal frameworks to fabricate short-span posterior FDPs. Zirconia FDPs showed very good marginal integrity and mechanical resistance to fracture and the optimal biocompatibility of zirconia was proven by the excellent response of soft tissues. Patients' satisfaction regarding both functional and esthetic outcomes was fully satisfactory in the long-term. The strict and careful management of all these steps together with a comprehensive and motivated compliance of patients contributed to the optimal biological, technical and esthetic outcomes recorded in the present prospective clinical study.

Digital versus conventional impressions in implant-supported prosthesis: a review

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Aim: To compare the accuracy of implant impressions using the conventional technique and the digital technique in implant prosthetic rehabilitations both single and full-arch, and to prove the precision of conventional and digital impression-making procedures.
Methods: The selection of articles involved searching in scientific website like PubMed and MEDLINE using the keywords "digital workflow", "full-arch" and "tilted implant". The inclusion criteria that have been applied are: Presence of the aim of the study; Correct IMRAD structure; Inherent of the article to the assigned topic; Range of five years from the year of the article's publication; Clear Materials and Methods; Sample of patients; Follow-up. Seventeen articles have been selected, but fourteen of those have been rejected for: Uncorrect IMRAD structure; Limited sample of patients; Not clear Materials and Methods; Small follow-up; Absence of the aim of the study; Poor credibility of the posters.
Results: After careful reading of seventeen articles, three articles were suitable to the inclusion criteria: Gintaute et al., "Trueness and precision of 5 intraoral scanners in the impressions of single and multiple implants: a comparative in vitro study", The International Journal of Esthetic Dentistry, 2018; Mangano et al., "Accuracy of computerization and conventional impression-making procedures for multiple straight and tilted dental implants", BMC Oral Health, 2019; Amin et al., "Digital vs. conventional full-arch implant impressions: a comparative study", Clinical oral implant research, 2016. In the article by Gintaute et al. it is highlighted that both conventional and digital techniques are clinically precise. It is stated that, both the IOS and the conventional method (polyether and polyvinylsiloxane), are accurate in taking impression of straight and inclined implants in the case of full-arch rehabilitations and single implants, considering the inter-implant distance and the angulation of the implants. In the article by Amin et al. two digital technique Cerec-Omnicam and True Definition are compared with Splinted Open-Tray, conventional technique. It is claimed that full-arch digital impression technique has a greater accuracy than the traditional method. It also shows that the True Definition intraoral scanner is more accurate (in terms of 3D deviations) than the CEREC-Omnicam scanner. In the article by Mangano et al., five different intra-oral scanner models are analyzed: CS3600, DWIO, Omnicam, Emerald, Trios3. The best is the CS3600, despite not having a high acquisition resolution, followed by Trios3. In the conclusion, it is stated that the intra-oral scanner has a better precision in the impression taking in the case of single implants and that it loses effectiveness with the increase of the scanning area.
Conclusion: In this review it is observed that some authors prefer the digital technique because it allows to eliminate many problems such as tray selection and dispensing and polymerization of impression materials. However, other writers claim that they prefer the conventional technique given that it is easier regardless of the operator's experience and the patient's movement. Despite this, because of the presence of only in vitro studies, it would take more studies, especially in vivo and clinical trials, to arrive at a definitive conclusion. For this reason, it is necessary to implement the literature.

Palatal implant-prosthetic rehabilitation in a patient of fifty-six years of age, with cocaine-induced destructive midline lesions (CIMDL)

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Aim: Currently available literature concerning the prosthetic rehabilitation of palatal perforation in the context of cocaine-induced destructive midline lesions (CIMDL) is still very scarce and the number of reported cases is limited. Therefore, it is very difficult to identify an overall analysis of its effectiveness and the most appropriate approach. The aim of this case-report is the detailed description of our experience in the use of a fixed palatal prosthesis on implants, in a patient of fifty-six years with palatal perforation, which admitted a past use of cocaine.
Methods: The patient's clinical evaluation was performed by a multidisciplinary team (otolaryngologists, oral surgeons and prosthetists) at the San Raffaele hospital, Vita-Salute San Raffaele University, Milan. At the first visit, anamnestic data including personal medical history and previous treatment for CIMDL were collected. An Orthopantomography (OPT) and a cone beam computed tomography (CBCT) were requested to evaluate the amount of maxillary e mandibular bone available and to display the structures involved by CIMDL. Furthermore, endonasal structures were evaluated by the otolaryngologist through a nasal endoscopy. On clinical examination the patient presented total edentulism of the upper and lower arches and a very extensive perforation of the hard palate. In addiction the patient had an incongruous removable palatal prosthesis. The most frequent symptoms reported by patient were: oro-nasal reflux, hypernasal speech, halitosis and difficulty in the interpersonal relationships. Initially, was created a palatal removable prosthesis and then trough a carefully follow-up, was evaluated the stability of lesion. After an intra- and extra-oral clinical examination and a careful radiographic examination, we proceeded with the implant-prosthetic treatment: four implants were positioned according to the All-on-four method, on which the palatal prosthesis was fixed. A 36-month follow-up included an evaluation every 7 days for a month and then once a month after surgery. Furthermore, every six months, the obturator prosthesis was disassembled for the execution of professional oral hygiene and for a more careful evaluation of the palatal lesion.
Results: The palatal prosthesis has been successful to soothe of most symptoms reported by patient. In fact, she reported greater self-confidence due to the reduction of difficulties in nutrition and phonation. Decubitus occasionally detected around palatal lesion: they have been resolved with the removal of part of the resin material for a better adaptation of the obturator prosthesis to the palatal lesion. The patient underwent a strict follow-up: checks were performed every 30 days in the absence of symptoms associated with palatal perforation (e.g. rhinolalia, dysphagia and oro-nasal reflux) and every 7 days in case of instability of the lesion(inflammation, superinfection and decubitus). Every 3 months was necessary to perform the reline of the obturator due to the loss of the hermetic seal at the perforation level, mainly due to instability of the lesion. After each relining, a restitutio ad integrum of the phonation and swallowing was obtained.
Conclusion: The clinical evaluation of patient with palatal perforation in the context of CIMDL and the development of a correct treatment plan are based on a close collaboration between otolaryngologists, oral surgeons and prosthetists. Palatal implant-prosthetic rehabilitation has proven to be an efficient option to alleviate the disabling symptomatology in a patient with palate perforation in the context of CIMDL.

Use of the facial scanner in dentistry: superimposition, of files with the digitalbite device

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Aim: A method is presented by this article for superimpose files of different types, PLY / STL, DCM, with the OBJ data files of a facial scanner. The merging could be possible with the help of a geometric device, called Digitalbite. The computer guided surgery softwares and the CAD-CAM softwares can use the data matching. The matching procedure is presented in this article.
Methods: The aim of this article is to present a procedure of superimposition between digital dental files. Our personal purpose is to merge an OBJ file of a facial scanner, with an (STL or PLY file), of an intraoral scanner file, and a DCM file, (Dicom 3). A patient with no facial deformities was chosen to record the (OBJ, PLY /STL),files to be then merged on a CAD software, (Geomagic). In this patient the OBJ, PLY / STL and DCM files were combined into an implant planning software, DDSPro, MAC OS version, 2.0 2018. A geometric bite prototype device, called Digitalbite , was used to match all the files. The Digitalbite device (DGB) consists of 2 elements: DGB1 and DGB2. DGB1, is a bite with an occlusal base, in which 2

types of landmarks are inserted. The first landmark is constituted by radiopaque spheres, located in strategic areas in the arch of the DGB1, to be recognized during the radiographic acquisition of the patient. The DGB1 material is a printing resin for 3D models. The second landmark of the DGB1 is constituted by a base inspired by a lego brick with identifiable shape and landmarks during digital scans with the different instruments. The DGB1 was stabilized to the patient's upper arch by polyether. Once stabilized in the mouth, the DGB1 is used to superimpose all the files, OBJ, STL/PLY, DCM. The second element of the DGB called DGB2, consists of a device of the same material of DGB1, in the shape of a straight parallelepiped, with identifiable points of landmarks, which is equipped with a double-sided adhesive to be fitted the same at the forehead of the patient.
Results: the patient's 3D face can be insert into a CAI planning software and into a CAD-CAM design software, thanks to the creation of the OBJ file, giving more data for diagnosis and treatment of our patients.
Conclusion: Different mimics can be upload thanks to the OBJ files to estimate the virtual wax-up at rest vertical dimension, (RVD), in the slight and maximum smile (E phoneme), and some more reference skin point.

A muldisciplinary approach to treat a facial trauma with high aesthetics demand

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Aim: Traumas in the facial area represent a common issue in dentistry; when they occur a multidisciplinary approach is needed to re-establish both function and aesthetics in order to allow the patient to recover in the shortest possible period. This poster display aims to present a multidisciplinary approach to a trauma-case in the aesthetic area.
Methods: A 32 years old patient was referred to our department (Centro Odontoiatria Infortunistica e Riabilitativa -COIR-, IRRCS Istituto Ortopedico Galeazzi) following a motorcycle-related accident that caused him various medical issues such as: nasal fracture, upper lip laceration, complete fracture of the right maxillary central incisor (1.1) and traumatic extrusion of the left maxillary central incisor (2.1).
After radiographic and clinical examination it was possible to assess a negative response to thermical test and pain after percussion to all the teeth in the frontal area (from 1.3 to 2.3). Since the x-ray showed a vertical root fracture of element 1.1 and 2.1 which also presented grade 3 mobility, these elements were considered irrecoverable. The patient presented poor oral hygiene, generalised mild periodontal disease and tobacco use (20 cigarettes a day), therefore implant therapy was not recommended; Instead, tooth-supported rehabilitation was chosen in order to obtain more predictable outcomes. During the first appointment, dental records were taken and sent to the laboratory to fabricate a provisional bridge from element 1.3 to 2.3, with the request to create an ovatic pontic at 1.1 and 2.1. At the second appointment elements 1.1 and 2.1 were extracted and elements 1.3, 1.2, 2.2 and 2.3 were prepared according to the BOPT technique, to obtain a better therapeutic result. Therefore the provisional crowns were simultaneously placed. Since the patient's vertical dimension of occlusion was reduced and he didn't want to increase it, the teeth preparation required endodontic treatment and reconstructions of the teeth using a fibre-reinforced post. After further analysis a soft tissue defect was observed in the area of 1.1, a sub-epithelial connective tissue graft was executed to obtain a better tissue conditioning and to avoid any possible aesthetic problems in future. The connective tissue graft was taken from the palate and placed in the 1.1 area to increase soft tissue volume transversely. To shape the soft tissue, 30 days after the surgery the ovatic volume (1.2 and 2.1) was increased to obtain a pleasant aesthetic result. After two months from the provisional crowns delivery, the patient broke the restoration due to new trauma. A new provisional bridge was placed to allow further soft tissue conditioning.
Results: After 8 months of tissue conditioning, it was possible to deliver the final restoration. Tissue quality was satisfactory and both function and aesthetics were re-established. The final crowns were realized in zirconia-based ceramic.
Conclusion: When patients are not ideal candidates for implant therapy it is possible to obtain successful outcomes both from an aesthetic and functional points of view using tooth-supported rehabilitations. This trauma-case was treated with a multidisciplinary approach which can possibly lead to a more predictable outcome than implant therapy.

Clinical performance of cemented implant-supported monolithic zirconia single crowns in the posterior area: a prospective clinical study with a 36-month follow up

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Aim: The primary aim of this clinical study was to evaluate the clinical performance of the computer-aided design/computer-assisted manufacturing (CAD/CAM) implant-supported monolithic zirconia single crowns (ZrSCs) cemented onto titanium implant abutments with dual-curing resin cement. The secondary aim was to assess possible biological and technical complications over time during function.
Methods: Fifty patients in need of at least one single crown in posterior regions of both maxilla and mandible were enrolled as participants in this prospective clinical study. The patients' age ranged between 21 and 70 years, with a mean age of 45.5 years. Specific inclusion and exclusion criteria were used, accordingly to the international guidelines for clinical investigations. A 2-stage surgical technique with 1 endosseous dental implant and no additional soft/hard tissue grafts were planned for all the patients. No provisional restoration was inserted and the final impression was taken with an open tray using polyether material (Impregum, 3M ESPE, Landsberg, Germany). A total of 50 crowns were fabricated using a CAD software. CAM milling was used to fabricate monolithic zirconia single crowns, without any veneering ceramic. As implant abutments were selected titanium abutments. CAD-CAM designed titanium abutments were screwed onto osseointegrated implants after a healing period of 3 months, using a torque-controlled device at 35 Ncm according to manufacturer's recommendations. Monolithic ZrSCs were cemented onto the abutments with a dual-curing resin cement that contains MDP monomer (10-Methacryloyloxydecyl dihydrogen phosphate). A postoperative radiograph was performed to clinical observation for possibly remaining excess cement. All patients were enrolled in a supportive periodontal care program, with 4- to 6-month recalls. The following parameters were gathered: the modified plaque and gingiva index (mPI) by Silness and Löe and modified sulcus bleeding index (mSBI) described by Mühlemann et al. Also, the restorations were evaluated for technical failures like fracture behaviour and decementation using the United States Public Health Service (USPHS) criteria.
Results: After 3 years of clinical service, the restorations were available for the follow-up examinations. This study showed that titanium abutments demonstrated a good level of retention over time during function and no decementation was reported. Dual- adhesive cement evidenced a good clinical performance. MDP monomer increased the tensile bond strength between zirconia and resin-based luting agent. No technical failure like fracture behavior of monolithic ZrSCs was reported. The modified plaque and gingiva index defined by score 0 was reported with a percentage of 64.0. Score 1 mPI by 32.0 and score 2 with 4.0 percentage. No score 3 mPI was reported. The Mühlemann modified sulcus bleeding index defined by score 0 was reported by 62.0 percentage, score 1 mSBI by 34.0. Score 3 mSBI by 4.0 percentage. Score 4 and score 2 weren't reported. The technical evaluation by means of the USPHS criteria revealed acceptable clinical performances of the zirconia crowns cemented on titanium abutment. To validate the long-term serviceability, the biological and aesthetical outcome of the present restorative system, more RCTs with longer observational periods will be essentials.
Conclusion: The restorative system (titanium abutments + monolithic ZrSCs) and the dual-curing resin cement tested in the present prospective clinical study showed good clinical performances over the entire observation period and proved to be a viable clinical option to restore posterior regions.

Worn dentition: how to restore aesthetics and function. A clinical case

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Aim: The aim of this report is to present a full-mouth rehabilitation of a dental wear case. The patient is an old woman who referred bruxism and has a decreased vertical dimension of occlusion and related issues, as tension in the masticatory muscles and clicking from temporomandibular joint during mandibular movements. The worn dentition was treated with adhesive techniques using a combination of composite restorations and porcelain veneers to recreate the VDO and aesthetic harmony.
Methods: A 76 years old woman came to our department presenting a worn dentition and requiring an aesthetic improvement. She especially disliked her aged appearing anterior teeth that had old composite restorations.The patient presented loss of enamel on the occlusal surfaces of molars and premolars and on vestibular surfaces of anterior teeth.Wear facets at the canines were also present. A complete examination including periodontal, functional, biomechanical and aesthetic evaluation was performed to determine the etiology of worn dentition.The patient denied any excessive consumption of acidic beverages or food and gastric reflux, but she reported bruxism and didn't use any occlusal splint. In the first appointment the dental records were taken and sent to the laboratory with the request of a full-mouth waxup with increased VDO. In the second appointment we realized a complete removable mock up using flowable composite to

anticipate the final shape of the teeth in the mouth.The patient stayed with the adhesive mock up for 3 weeks and the new occlusion was controlled once a week to intercept occlusal interferences. No TMJ disorders nor pain were reported.The final rehabilitation started with the replacement of the posterior mockup.Upper molars received composite onlays while lower molars received ceramic onlays, premolars received porcelain veneers(except element 24 that already had a crown that was replaced with a new one).To complete the treatment, elements from 1.3 to 2.3 and from 4.3 to 3.3 received disilicate veneers. According to the patient request,the inter-proximal spaces between 1.1 and 2.1 and between 4.1 and 3.1 were closed and veneers were whiter and longer than natural teeth. An occlusal splint was fabricated for the lower arch to be worn overnight in order to prevent bruxism damages. The occlusal splint was controlled every 2 weeks for 2 months.

Results: The increasing of the VDO reached with a full-mouth waxup and mockup allowed a final rehabilitation that reestablished function and aesthetics.The new VDO gave us the space to restore the occlusal surfaces of posterior teeth and to fabricate longer anterior veneers. A greater labial support was also obtained and the patient looked younger. Reduced clicking from TMJ and no more tension in the masticatory musclues were detected. Patient's aesthetic requirements were achieved.

Conclusion: This full-mouth adhesive rehabilitation was able to recover the VDO, to allow the correct masticatory function,to eliminate muscle pain and tension,to reduce click from TMJ and to increase the labial support, therefore it improved aesthetics.

Dental wear is becoming an increasingly important factor when considering the long term health of the dentition. It is important prevention and early diagnosis to avoid more invasive treatment