[2]School of Dental Medicine, University of Pittsburgh, USA
[3]LaunchPad Medical Inc and Harvard School of Dental Medicine

Aim: Tetranite® (TN) is a new biocompatible, osteoconductive and resorbable bone alloplast, with the extraordinary ability to form high strength adhesive bonds with bone and metals, including titanium, even in a wet environment. Chemically, TN is composed of an active reaction mixture of tetracalcium phosphate and phosphoserine in water, which hardens to an amorphous solid. The adhesion of TN to bone and metals is due to calcium bridges that form between tetracalcium phosphate, phosphoserine, and hydroxyapatite in the bone, and between tetracalcium phosphate, phosphoserine, and titanium oxide on dental implants. Thanks to its biological, mechanical and adhesive properties, TN can be used as bone graft in dentistry, or as bone adhesive to treat and glue bone fractures. The aim of this *in vitro* study was to evaluate the potential of TN to induce vascular proliferation and osteo-differentiation of W-20-17 murine skeletal progenitor cells.
Methods: Quantitative Reverse Transcription-Polymerase Chain Reaction (qRT-PCR) was used to evaluate the expression of genes involved in osteogenesis (RUNX2, Osteocalcin) and angiogenesis (VEGF, ANGPT1) in W-20-17 cells grown in contact with TN. A comparative evaluation was performed with W-20-17 cells grown in contact with two bone graft materials currently used in clinical practice, which therefore served as positive controls: DFDBA (OraGRAFT®, LifeNet Health®) (OG) and bioactive calcium phosphosilicate glass (PerioGlas®, NovaBone®) (PG). Prior to cell seeding, TN (test), OG (first positive control), and PG (second positive control) were placed in three wells of a 6-well plate, whereas a fourth well was left empty (negative control). Since the three materials have different particle sizes, to equalize the surface of the materials available to cells, the same volume of each material was utilized (0,250 cc). Subsequently, 200.000 W-20-17 cells were seeded in each well with DMEM. After 48 hours of incubation (37°C, 5% CO2), RNA was extracted and quantitative expression of VEGF, ANGPT1 and RUNX2, Osteocalcin genes was performed. The experiment was repeated three times and data were expressed as means ± Standard Deviation of the measurements obtained in the experiments. Analysis was performed by Kruskal-Wallis and Dunn tests, $p<0.05$ was considered significant.
Results: Compared to OG and PG, TN induced equivalent gene expression of growth factors related to angiogenesis (VEGF, ANGPT1), and transcriptional factor (RUNX2) and osteoblastic differentiation marker (Osteocalcin) related to osteogenesis.
Conclusions: In this in *in vitro*, TN was able to induce osteogenic differentiation of W-20-17 stromal cells and expression of angiogenesis factors to levels comparable to those observed using OG and PG, thus confirming the great potential of this biomaterial to substitute OG and PG in current clinical practice. In conclusion, thanks to its unique adhesive qualities, in dentistry TN can be used both as bone graft without the need for a barrier membrane, or as bone adhesive to stabilize post-extraction implants with low primary stability. In orthopedics, TN can be used for bone fractures fixation, thanks to its ability to hold the two ends of fracture together and its high resistance to compressive and shear forces, thus avoiding the use of plates and screws and the surgical re-entry required for their removal. Therefore, TN can revolutionize dental and orthopedic clinical practice thanks to its adhesive properties and bioactive properties, which will have to be investigated with additional *in vivo* studies.

Pathological fracture of the mandible resulting from a metastatic osteolytic lesion from a primary pulmonary adenocarcinoma: a case report

Chirico Alberto, Costantinides Fulvia, Rizzo Roberto, Di Lenarda Roberto, Maglione Michele

Department of Medical, Surgical and Health Sciences, University of Trieste, Italy

Aim: Metastatic tumors to bone must be considered in all patients with unexplained bone pain, but in particular in patients who present with known cancer, localized pain at multiple sites, and findings suggestive of metastasis. The purpose of this report is to present a case of a pathological fracture of the mandible as a consequence of metastatic pulmonary adenocarcinoma.
Methods: In July 2018, a non-smoking 68-year-old male patient, came to our clinic, referred by the geriatric ward, for specialist evaluation. He complained of pain (VAS: 5) in the right temporomandibular region exacerbated, over the past few days, by chewing, and resulting in a reported functional limitation. The patient was hospitalized with a primary diagnosis of pulmonary adenocarcinoma (T2-T3 N2 Stage IIIA) diagnosed in December 2017 and treated with a completed course of radiation therapy and chemotherapy. Intense corticosteroid therapy for the adenocarcinoma led to heart and liver complications as well as vertebral collapse. Physical examination showed monolateral swelling of the right temporomandibular joint (TMJ) in the absence of joint clicks. A slight limitation of motion was observed with mouth opening. Intraorally, diffuse white lesions compatible with pseudomembranous candidiasis were

detected. A Panoramic radiograph demonstrated a right intracapsular condylar compound fracture associated with an osteolytic lesion at the condyle base with jagged margins. A CT scan with contrast of the facial solid mass and fine-needle aspiration of the lesion were performed.
Results: CT confirmed the presence of a right mandibular condyle fracture associated with a large osteolytic lesion, located at the neck of the condyle. The size was approximately 9 mm antero-posteriorly, 6 mm medial lateral, and 17 mm cranial caudal. 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 size adenocarcinoma cells with a large cytoplasm, sometimes apocrine in appearance with focal secreting aspects, mostly central nuclei with severe anisonucleosis and gross eosinophilic nucleoli. 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: Lung cancer frequently produces lytic-type metastases. In patients with a known diagnosis of pulmonary malignancy, panoramic radiographs are recommended to search for early areas of bone radiolucency in the symptomatic jaw.

Interdisciplinary approach within surgical extraction of a supernumerary tooth in patient with reduced periodontium in aesthetic zone: case report

D'Urso Umberto, Psaila Alessandro

DDS - University of Catania, CLMOPD, Dental Discipline III, Teaching Special Oral Pathology, adjunct Prof. Giovanni Barbagallo, Italy

Aim: Nowadays when talking about oral surgery, we should always also consider its biological cost. The ultra-specialization of the different dental disciplines, when combined with an interdisciplinary approach, allows to achieve different goals, such as saving severely compromised teeth. The case report here presented, involves the surgical removal of a supernumerary tooth which caused the slow but progressive periodontal bone resorption and the mobility of a tooth whose root was contiguous to it. In order to maintain the contiguous tooth and thus to minimize the biological cost, the surgery was performed with the more typical approach within the different regenerative periodontal surgery techniques.
Methods: The 51-year-old male patient, previously treated with causal therapy because of generalized chronic periodontitis, and since ten years under periodontal support therapy, came to our observation with a III degree mobility on tooth 4.2, with reduced periodontium though with full-mouth plaque score (FMPS) and full-mouth bleeding score (FMBS) <20%. After radiographical evaluation using intraoral X-ray, a supernumerary tooth between teeth 4.2 and 4.3 was detected, that caused the periodontal deficit and which prevented a possible non-surgical treatment on that site. Therefore, the surgical removal of the supernumerary tooth and the periodontal regeneration of the deficit using GTR were planned. The correct position of the tooth was detected thanks to a previous CBCT taken several years before. for planning an implant restorative procedure in the posterior area of the mandible. The design of the flap, on the buccal side, was realized according to the modified papilla preservation technique (MPPT). The supernumerary tooth was removed using a minimally invasive approach, while the remaining periodontal defect, similar to an horizontal defect, was treated with GTR using a combined regenerative procedure with deproteinized bone graft mixed with enamel matrix derivates, all covered by a resorbable membrane.
Result: Seven months after the surgery, the mobility of tooth 4.2 passed from grade III to grade I also showed a marked improvement in the level of clinical periodontal attachment. As recognized in literature, the benefits for the supplementary intrabony defect, reached using GTR procedures are more effective than the ones obtained by only using the flap surgery.
Conclusion: Thanks to the design of the flap, that allowed an excellent stability of the clot, reabsorbable membranes that avoided a second intervention for removal were used. Since this is an interdisciplinary treatment on reduced periodontium in an area with a high aesthetic value, such approach has allowed to avoid a further loss of clinical attachment. It was possible to reach best results thanks to the different biological principals of the combined periodontal therapy. When the correct flap design avoids the membrane exposition and guarantees the stability of the clot, it is possible to obtain a more predictable treatment, on both the clinical and esthetical side.

Peri-implant and periodontal diseases: plaque-induced pathologies or simple disbiosis? *In vivo* experimental study with an original protocol design

D'Urso Umberto, Psaila Alessandro

DDS - University of Catania, CLMOPD, Dental Discipline III, Teaching Special Oral Pathology, adjunct Prof. Giovanni Barbagallo, Italy

Aim: A real challenge for the clinician is nowadays