

by horizontal and axial sections. Cement thicknesses were measured using 3D micro-CT (Skyscan, 1172, Belgium) and analyzed using Statistics (Anova and Tukey's tests, $\alpha = 0.05$).

No internal debonding was found in the three groups. Cohesive and adhesive fractures marginally occurred in group A in several samples and voids or air bubbles were discovered among the composite layers. In group B and C no voids were present. Good quality margins on the floor and lateral walls was found. In group B the mean marginal and internal thickness was of 38 (+/- 3 micron). In group C, it was estimated of 40 (+/-4 micron). No statistics significance was reported.

Marginal and internal resin-based biomaterials adaptation appeared different in large class II MOD direct and indirect posterior restorations. The use of an indirect adhesive restorations made by block resin composite or lithium disilicate biomaterials could be preferred.

Biomaterials

Poster P.30

MERCURIAL INTOXICATION IN DENTAL CLINIC: MYTH OR REALITY IN COTE D'IVOIRE?

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Dental amalgam, the coronary restoration material used in restorative odontology, is the subject of controversy because of the mercury present in its composition. Despite this, in Côte d'Ivoire, it remains the most used restoration material according to several studies. According to the US Environmental Protection Agency (US- EPA) and World Health Organization (WHO), The minimum value of mercury vapor tolerated is 999 ng/m³ ; Beyond that, there are risks (Neurodegenerative diseases, foeto-toxic, infertility, ...) Incurred by the population. The objective of this study was to measure the level of mercurial vapors in the dental offices of Abidjan and to assess the risks faced by the practitioner, his staff and patients.

Using "Lumex", a spectrophotometer, we measured the levels of mercurial vapors in fifty dental offices in the city of Abidjan. The measurement was made as soon as the cabinet was opened before any care, then after the removal of an amalgam.

The results show variable rates ranging from 60 ng/m³ to 10060 ng/m³ according to the following information: the dental clinic is ventilated, not at all ventilated; and whether the amalgam is still used or not in the dental clinic.

It emerges from this study that the risks of mercury poisoning remain a reality in our country according to US-EPA and WHO standards.

Key words: Dental amalgam, mercurial vapors, intoxication, dental clinic

Biomaterials

Poster P.31

NANOINDENTATION VERSUS VICKER'S HARDNESS OF HYBRID CERAMICS

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Mechanical properties are an important part of the newly emerged hybrid ceramics as CAD/CAM blocks for indirect aesthetic restorations. The aim of this study was to evaluate hardness and elastic modulus of different

CAD/CAM blocks using two indentation techniques (nanoindentation and Vicker's hardness).

In this study, eight materials with different filler loading were tested: a non-filled polymer, polyetheretherketone (PEEK) and a low filled polymer, Dentokeep (20% ceramic by weight). Nano ceramic resin materials: LavaUltimate (80% ceramic nano particles by weight); Cerasmart (71% silica and barium glass nanoparticles by weight); Crios (70% of glass and amorphous silica by weight); Shofu (61% silica-powder, zirconium silicate, microfumed silica by weight). Polymer infiltrated ceramic network (PICN) material, VitaEnamic (86% feldspathic ceramic, by weight). VitablocMark II: a feldspathic ceramic. Specimens of 16.5x4x2mm (LxWxH) dimensions were cut using a Diamond saw machine. All specimens had standardized geometry, were highly polished and cleaned with water ultrasonic bath. Thirty indentations were undertaken for each material for each test. Vickers hardness was measured by a micro hardness tester (FM-700, Future Tech Corp., Japan). Nano-indentation measurements were undertaken (elastic modulus, hardness) using nano indenter (Nanovea) equipped with Berkovich three-sided pyramidal diamond tip. One-way analysis of variance (ANOVA) and post hoc Bonferroni test were used to analyse the results using SPSS 22.0 software with 95% confidence.

The mean values ranges were: microhardness 25.7 (0.05) to 502.4 (2.28) (Kg/mm²); nanohardness 0.317 (0.008) to 6.83 (0.379) (GPa) and elastic modulus 2.53 (0.15) to 47.7 (3.47) (GPa). VitablocMark II showed the highest values while PEEK showed the lowest.

Within the limitations of this study, PICN block had a comparable hardness and elastic modulus to ceramic (VitablocMark II). CAD/CAM composite blocks with disperse fillers showed high hardness and elastic modulus values. However, these values were very low compared to ceramic (VitablocMark II).

Biomaterials

Poster P.32

NANOLEAKAGE AND MARGIN QUALITY OF DIRECT COMPOSITE VENEERING SYSTEM FOR CERVICAL FILLINGS.

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Aim of this study was to evaluate the marginal adaptation and nanoleakage in class V bonded restorations before and after thermo-mechanical loading using Composeer Class V (CCV) compared to conventional composites. The null-hypothesis tested was that marginal adaptation and nanoleakage of CCV was not significantly different compared to conventional composites before and after thermo-mechanical loading. Standardized Class V cavities (width 2.0mm, length 3.0mm, depth 1.5mm) were created in 40 human premolars and molars at the cement-enamel junction. Cavity dimensions were standardized using a digital caliper. Teeth were divided in four groups (N=10): Group 1 One-coat-Bond-Self-etching bonding agent with Synergy-D6+CCV (Coltene); Group 2 One-coat-Bond-Self-etching bonding agent Synergy-D6-flow+CCV (Coltene), Group 3 Scotchbond Universal adhesive system with Filtek-Supreme-XTE (3M ESPE); (Group 4) Scotchbond Universal adhesive system with Filtek-Supreme-XTE-flow (3M ESPE). Restorations were placed according to manufacturers' instructions. Marginal quality was analyzed under a SEM using epoxy resin replicas before and after thermo-mechanical loading (240,000 mechanical cycles x 50N with a frequency of 1HZ and 7800 thermo-cycles between 5° and 55C° with chewing simulator CS4-Mechatronik). Data were statistically analyzed by two-way ANOVA and Tukey's post-hoc test ($\alpha=0.05$).

Specimens were then processed to investigate nanoleakage expression under SEM.

The null hypothesis was partially accepted since no significant statistical differences were found in marginal adaptation with CCV compared to margins obtained with conventional composite both before and after thermo-mechanical cycling ($p>0.05$). Conversely the nanoleakage analysis showed only significant differences between group 1 and group 4 ($p<0.05$).

The marginal quality of class V cavities restored with CCV was similar to conventional composite restorations, both before and after thermo-mechanical cycling. Nanoleakage expression was dependent on the restorative material type. Further clinical research is essential to confirm that composite shells for direct veneering can be a valid restorative procedure.

Biomaterials

Poster P.33

NEW DEVELOPMENTS IN THE STUDY BY FIB OF ACIDIC ETCHED HUMAN ENAMEL

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Many methodologies have been reported to study acidic etched enamel such as microhardness, SEM, confocal microscopy, AFM. Focus Ion Beam (FIB) tomography has been used to investigate the subsurface of enamel after a wear process in acidic environment (Zhang 2015, Wu 2015) However, FIB methodologies are also able to provide quantitative data regarding porosities, anisotropic coefficient determination and finally 3D volume analysis. The aim of our study was to compare sound and phosphoric acid etched enamel to demonstrate the potential of such device in the study of enamel erosion.

After polishing to remove aprismatic layer, Human enamel samples were etched with phosphoric acid on one side and preserved without any treatment on the other side (sound enamel) Silver nitrate penetration was realized to penetrate porosities. After dehydration, samples were observed in a FIB microscope and a 3 D analysis was conducted.

For healthy tooth enamel, silver nitrate doesn't penetrate the subsurface. Low mineralized structure (LMS) is distributed in two populations, the main one localized in the interprismatic area. The other population (38% of the LMS) is randomly distributed. Both populations of LMS represented 0.5% of the whole volume.

For acid etch enamel, porosities are infiltrated by silver nitrate and pore volume vary from 16% at the surface to 0.5 at a depth of 10 μ m. Silver nitrate infiltrated only interprismatic area. The other population is reduced to 17%. The determination of the anisotropic coefficient demonstrated an increase from sound enamel to etched enamel for interprismatic area (0,56 to 0,81) FIB technique using 3D quantitative analysis enables to characterize different LMS in the structure of dental enamel. Percentage of porous volume, depth of penetration of silver nitrate, distribution of pore volumes, anisotropic coefficient determination are quantitative data to characterize the acid exposure effect.

Biomaterials

Poster P.34

NEW PROCEDURES FOR PROXIMAL BOX ELEVATION

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The deep margin elevation, also known as proximal box elevation (PBE) is a technique used for the treatment of deep cavities with sub-gingival limits. This technique consists to insert a flowable composite to relocate the margin to a supra-gingival location, facilitating the next steps of direct or indirect restorations. The aim of this study was to suggest new procedures, involving various combinations of filling materials and adhesive systems as an alternative of flowable composite under conventional direct composite to perform PBE.

Three filling materials were compared to flowable composite (Tetric Evo Flow, Ivoclar Vivadent): two high-viscous glass ionomer cements (HV-GIC) (EQUA Forte and Fuji IX GP Fast, GC) and one bulk composite (SDR, Dentsply). For each HV-GIC, various adhesive systems were tested to bond to the overlying conventional composite: an etch-and-rinse system (Scotchbond 1XT, 3M ESPE), a universal adhesive system (Scotchbond Universal, 3M), a self-etching system (Optibond All-in-one, Kerr) and a coat (Equia Coat, GC). Shear bond strength between the filling materials and the conventional composite was performed and type of failure (adhesive, cohesive or mixed) was noted.

Shear bond strength of the combinations HV-GIC+adhesive system/conventional composite were significantly lower than that of the combinations bulk composite/conventional composite and flowable composite/conventional composite. However they can be considered as sufficient, because of a very high percentage of cohesive fracture in HV-GIC. Besides, shear bond strength was not significantly different when a universal adhesive system was used compared to the others adhesive systems.

Bulk composite (rapid to implement) or HV-GIC (easy to use, moisture tolerant and with intrinsic adhesion to dental tissues, implying no need for rubber dam or conditioner and low microleakage) could be an eligible technique to substitute flowable composite in proximal box elevation technique. However clinical studies are necessary to confirm their usability in these situations.

Biomaterials

Poster P.35

NEW ZINC-CONTAINING DESENSITIZERS IMPROVE NANOMECHANICAL PROPERTIES OF DENTIN

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Biomaterials for treating dentin hypersensitivity and tooth tissue wear are evaluated, not only to efficiently occlude the dentinal tubules but also to increase dentin resistance to abrasion.

Dentin surfaces were treated with 0.5M EDTA to expose dentinal tubules. Surfaces were brushed with five experimental pastes containing different bioactive particles for 2 min, a control group was brushed with distilled water. Dentin surfaces were then immersed in artificial saliva for 24 h, and submitted to an acid challenge (citric acid during 1 min). Nanomechanical properties were assessed on dentin surfaces after both saliva immersion and citric acid application using a Hysitron Ti Premier nanoindenter and a commercial nano-DMA package. Modulus mapping of samples was conducted by imposing a quasistatic force setpoint, $F_q=2 \mu$ N, to which we superimposed a sinusoidal force of amplitude $F_A=0.10 \mu$ N and frequency $f=100$ Hz. Data from regions approximately $15 \times 15 \mu$ m in size were