

9. POSTER PRESENTATIONS

Poster Presentation No. 1

Evaluation of long-term storage effects on resin composites surface properties

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Purpose: To evaluate the effect of long-term storage in distilled water on surface hardness and roughness of different composites.

Materials and Methods: Ninety disc-shaped specimens (10×2 mm) of three different brands of resin composites shades A2 were prepared (Tetric N-Ceram, Filtek Z250, GC Gradia Direct Posterior) and randomly divided into 9 groups ($n = 10$) according to surface treatments [SIC 1000 papers, Enhance Finishing System (Dentsply) and Sof-Lex aluminium oxide discs (3M/ESPE)]. Average surface roughness (Ra) and micro-hardness were measured 24 hours after curing and after 36-months of storage in distilled water (370°C). Changes in percentage were taken and factorial ANOVA was employed for statistical analysis.

Results: Factorial ANOVA revealed that there was no statistically significant differences among materials, and surface treatments in term of changes in percentage of micro-hardness measurements of resin composites ($p > 0.05$). Nevertheless, in term of changes in percentage of surface roughness there were statistically significant differences among materials and surface treatments ($p < 0.01$). The highest result of change in percentage of surface roughness was in Enhance Finishing System groups ($253.35 \pm 23.54\%$ – group 2; $237.8 \pm 151.22\%$ – group 5; $99.56 \pm 17.36\%$ – group 8). CG Gradia with Soflex group obtained the highest change in percentage of micro-hardness ($-9.34 \pm 2.15\%$ – group 3), and the lowest result of micro-hardness was the Filtek Z250 with Soflex group ($0.58 \pm 6.12\%$ – group 6).

Conclusions: There was no correlation between micro-hardness and surface roughness. Polishing with Enhance Finishing System showed highest surface roughness after the storage in distilled water for 36 months.

Poster Presentation No. 2

The marginal adaptation of metal frameworks prepared by different methods

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Purpose: The purpose of this study was to compare the marginal fit of metal frameworks prepared by conventional casting, induction casting and milling.

Materials and Methods: Forty implant abutments were embedded in to acrylic blocks. Forty Co-Cr single crown metal frameworks were prepared on implant abutments while ten of them were prepared by conventionally casting (group C), 10 by induction casting (group IC), 10 by milling from half-sintered metal block (group MH) and 10 by milling from full-sintered metal block (group MF). Marginal gap of metal frameworks were measured on mesial, distal, buccal and lingual area by using stereomicroscope. Data were statistically analyzed by one-way ANOVA ($\alpha = 0.05$).

Results: A significant difference was found between the groups C, IC, MH and MF ($p > 0.05$). The milling groups showed better marginal adaptation than others.

Conclusions: All samples showed a clinically acceptable marginal adaptation, which is lower than $120\text{ }\mu\text{m}$. However, milling of full-sintered metal blocks showed better marginal fit, which may be a result of milling highly-resistant metal blocks without residual thermal stress.

Poster Presentation No. 3

Effect of metal primers on adhesion between composite and titanium

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Purpose: To evaluate the shear bond strength (SBS) of using four different metal primers between titanium alloy (Ti_6Al_4V) and indirect laboratory composite.

Materials and Methods: Four chemically different metal primers (GC Metal Primer II, Shofu ML Link, Ivoclar Vivadent SR Link, Bisco Z Prime) and one laboratory composite system (GC Gradia) were bonded on the 80 Ti_6Al_4V disks to test SBS. These 80 samples were divided into 2 main groups; first group (a) treated by thermal cycle and the other group (b) had no thermal cycle. These 2 groups were also divided into 4 subgroups according to used metal primers. After sand-blasting of machined Ti_6Al_4V disk samples, for all groups Ivoclar Vivadent SR Nexco Paste opaquer and GC Gradia indirect laboratory composite were used, however, for group 1a/b, group 2a/b, group 3a/b, group 4a/b; GC Metal Primer II, Shofu ML Link, Ivoclar Vivadent SR Link, Bisco Z prime metal primers were used respectively. All samples were tested by Instron for SBS. Finally, debonded surfaces were evaluated by Modified Adhesive Remnant Index (ARI).

Results: Before thermal cycle, group 1b; after thermal cycle application, group 3a showed the highest SBS value ($p < 0.01$). Some groups showed higher mean of SBS after thermal cycle application (group 2a/b, group 3a/b). In all debonded surfaces when detected by modified-ARI, incidence score 2 (43) was more frequent followed by score 1 (36), score 2 (1) and none of samples showed score 3.

Conclusions: Different but chemically appropriate metal primers can be used for preparing or repairing indirect laboratory composite as a superstructure for Ti_6Al_4V .

Poster Presentation No. 4

Effect of different surface treatments on bond strength of resin cement to a CAD/CAM restorative material

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Purpose: This study investigated the effects of different surface treatments on the shear bond strength of self-adhesive resin cement to a novel CAD/CAM hybrid ceramic material.

Materials and Methods: A novel CAD/CAM hybrid ceramic restorative material (Vita Enamic) was used in this study. Sixty resin blocks specimens were prepared and specimens were divided into six groups for each surface treatment method ($n = 10$); Group 1: control (no treatment), Group 2: sandblasted by silicate-coated alumina particles (CoJet Sandblasting), Group 3: 50 μm Al_2O_3 sandblasting, Group 4: 10% hydrofluoric acid, Group 5: no surface treatment + universal adhesive (3M Single Bond Universal), Group 6: 200 mJ, 10 Hz 2 W Er,Cr:YSGG laser treatment. A self-adhesive resin cement (3M U200) was built-up on each treated surface using a cylindrical mould (2×4 mm) and incrementally filled. The shear bond strength was measured with a universal test machine. Data were analyzed using a one-way ANOVA and a Duncan test ($p = 0.05$).

Results: Shear bond strength mean values ranged from 7.75 to 10.73 MPa. All surface treatment methods enhanced the bond strength values compared with the control group but there was a statistically significant difference between group 5 and the control group ($p < 0.05$). There were no significant differences between other treatment methods.

Conclusions: Surface treatments of hybrid ceramic resin blocks could enhance the bond strength

to resin cement. However, using of Single Bond Universal without surface treatment showed higher bond strength value.

Poster Presentation No. 5

Assessment of common finishing and polishing techniques on cast Co-Cr plates with various methods

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Purpose: It is essential to use highly polished surfaces in removable prosthodontics to avoid plaque formation. The aim of this study was to evaluate the surface characteristics of cast metal plates going through the common finishing methods, and its effect of bacterial adhesion.

Materials and Methods: Rectangular Co-Cr alloy samples (10 × 20 × 1 mm) were casted. The samples were treated as follows; method 1: sandblasting using 250 µm Al₂O₃ grit size, method 2: sandblasting and electro polishing for 7 min, method 3: sandblasting, electro polishing and polishing with rubber polishers, goat hair brush and polishing paste. The samples were examined with scanning electron microscope (SEM), and pictures were taken digitally. In addition, the surface of the samples was examined with an INCA x-stream and MICS (Microscope Image Capture System) analyzer for the percentile composition of metallic elements in the samples. Samples treated similarly were incubated with *Streptococcus mutans* on blood agar plate for 3 days and adhesion was checked with SEM.

Results: The optical evaluation showed that the plates with only sandblasting had the biggest roughness, and the smallest resistance to adhesion that went through all of the treatments, as it was expected. In the qualitative examination besides the casting alloy components other elements could be detected in small amount especially on the sandblasted (C, O, Na, Mg, Al, Si, P, S) surface. The attachment of the bacteria was the biggest to the sandblasted surface.

Conclusions: Among common laboratory circumstances the regular finishing and polishing of the casted metal plates reached high smoothness and shine showing the methods used were appropriate.

Poster Presentation No. 6

Residual bone height measured by panoramic radiography in edentulous Turkish patients

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Presentation was cancelled.

Poster Presentation No. 7

Surface treatment effect on roughness of ZrO₂ used in prosthodontics

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Purpose: The aim of this study is to evaluate the influence of mechanical and chemical treatment on ZrO₂ roughness.

Materials and Methods: Zirconia samples have been manufactured by CAD/CAM technology. By using SolidWorks software, an STL file with the requested dimensions has been generated and imported in the computer aided machine. The experimental samples were obtained with vhf CAM 4-K4 IMPRESSION milling machine. The samples have been sintered and then modified by mechanical (sand-blasting) and chemical (acid etching) treatments. The resulted samples had cylindrical shape with dimensions of 14 × 4 mm. In order to obtain a fitting core it must be considered that zirconia has 20% shrinkage.

Results: The influence of mechanical and chemical treatment on zirconia ceramic material is studied by means of chemical composition and microstructure (SEM-EDS), physic composition (XRD) and roughness (surface profilometry).

Conclusions: Practical conclusions regarding the ZrO₂ surface treatment are outlined, in order to obtain an enhanced roughness of zirconia bio-ceramic material.

Poster Presentation No. 8

The effect of ultraviolet treatment on the surface properties of YTZ-P: A pilot study

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Purpose: In order to increase adhesion capability, YTZ-P surfaces can be substantially modified by Al₂O₃ sandblasting. However, this technique has potential negative effects which lead to reduce fracture resistance, on the micro-structure of YTZ-P. The purpose of this study was to investigate the physical effects of ultraviolet (UV) light curing on YTZ-P surface, as an alternative technique.

Materials and Methods: Nine plates of machined YTZ-P discs (10 mm in diameter and 2.0 mm thick) were randomly divided into three investigation groups (n = 3) in which were subjected to UV for 15 minutes, 24 hours and not subjected (control). Each group was separately evaluated by scanning electron microscopy (SEM) and atomic force microscopy (AFM) by means of surface topography. Also the hydrophilic status was investigated by contact angle (CA) via a tensiometer.

Results: CA findings did not reveal any significant change about the wettability issues. On the other hand, minor topographical changes occurred on experimental samples according to control group, on SEM and AFM images. By the way as an unexpected finding for all treated YTZ-P samples, as application times increased the discoloration increased.

Conclusions: It was concluded that UV application is not an effective method for surface treatment of YTZ-P within stated time periods. Future researches may be based on to investigate the effect of longer treatment times and the colour changes of YTZ-P samples.

Poster Presentation No. 9

Shear Bond strength of resin cement to a CAD/CAM restorative material

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Purpose: This study aims to evaluate the effects of Er,Cr:YSGG laser irradiation under different

power settings on the shear bond strengths of a novel CAD/CAM hybrid ceramic resin restorative material (Vita Enamic) to a self-adhesive resin cement.

Materials and Methods: Sixty CAD/CAM restorative materials specimens were divided into six groups according to the surface treatment methods as follows: an untreated control group and five groups undergoing surface preparation with Er,Cr:YSGG laser under five different power settings (100, 200, 300, 400 and 500 mJ at 10 Hz for 60 s at 100 μ s pulse durations). After 24 hours of storage in water, self-adhesive resin cement (3M U200) was built-up on each treated specimens using a cylindrical mould (2 \times 4 mm) incrementally. After all of the specimens were set, shear bond strength tests were performed using a universal testing machine at a crosshead speed of 0.5 mm/min. The data were analyzed using one-way ANOVA and Duncan post-hoc test ($p < 0.05$).

Results: The highest shear bond strength value was observed in 2 W laser power setting and followed by 1 W power setting. There was a statistically significant difference between 2 W and control group ($p < 0.05$). The shear bond strength values ranged between 7.13 and 10.56 Mpa. The lowest values were observed in the groups without surface treatment.

Conclusions: Higher power settings of the Er,Cr:YSGG laser did not affect the bond strength. So, in lower power setting the Er,Cr:YSGG laser might be used for enhanced bond strength between a novel CAD/CAM restorative and resin cement.

Poster Presentation No. 10

The effect of IPN thermoplastic on mechanical properties of fibre-reinforced composite

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Purpose: To evaluate the effect of interpenetration polymer network (IPN) on mechanical properties of UDMA/MMA based fiber-reinforced composite. IPN-phase was formed either using PMMA or PMMA-co-polymer.

Materials and Methods: Materials used in this study were UDMA (90%, Esschem) –MMA (10%, Sigma) based resin. Used IPN-component was either PMMA (150 kD, Sigma-Aldrich) or PMMA-copolymer (150 kD, Sigma-Aldrich). 0.5% or 2% IPN-thermoplastic was added to UDMA-MMA resin having 0.7 wt% camphorquinone and DMAEMA 0.7 wt%. 0.5% PMMA was added to Group 1, 5 and 2% PMMA Group 2, 6. PMMA-co-polymer was added to 0.5% (Group 3, 7) and 2% (Group 4, 8) respectively. Total 80 ($n = 10$ /Group) specimens for flexural strength (3-point bending, FS) test were fabricated (2 \times 2 \times 25 mm). The resin was put in the mould and light cured for 25 min at oven. For fibre-reinforced specimens, one bundle of S-glass fibres (tex 2400, MCX21, Owens-Corning) were impregnated with each resin for 30 min and then placed in the mould. After placement, resin was put in and light cured for 25 min at oven. The half of specimens was without fibre-reinforcement (Group 1–4) and the rest was with fibre-reinforcement (Group 5–8). Specimens of FS test were fixed and load was applied at crosshead speed of 1.0 mm/min, loading span of 20 mm. The results were analyzed by two-way ANOVA.

Results: The mean FS without fibre-reinforcement was from 115.6 MPa (Group 4) to 119.3 MPa (Group 1), and FS with fibre-reinforcement was from 458.4 MPa (Group 5) to 505.5 MPa (Group 8). ANOVA showed that there are significant differences between the groups with and without fibre-reinforcement. Addition of IPN-component did not change mechanical properties of FRC.

Conclusions: The results showed that the fibre-reinforcement is effective for increasing of flexural strength. Further studies will be needed to evaluate effect of thermoplastic IPN on acrylic resins.

Poster Presentation No. 11

Correlation between age and residual ridge resorption in edentulous Turkish patients

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Purpose: This study evaluated the relationship between the age and the residual ridge resorption (RRR) in edentulous Turkish patients who were referred to Akdeniz University Department of Prosthodontics.

Materials and Methods: Panoramic radiographs of 140 patients were reviewed. Panoramic radiographs of 79 among the 140 have met the criteria. Criteria consisted of no fracture history, clearly visible anatomic structures and absence of asymmetry. A researcher evaluated the panoramic radiographs using a standardised method. Relationship between residual ridge resorption and panoramic radiographs of 79 among the 140 patients met the criteria. Age was evaluated using t-test ($p = 0.05$).

Results: The results showed that there was no significant relationship between the residual ridge resorption and increasing age. ($p = 0.125$).

Conclusions: Despite the majority of the studies show otherwise, residual ridge resorption may not be affected by age.

Poster Presentation No. 12

Relationship between age and values of PMI and MCW in edentulous patients

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Purpose: The purpose of this study was to investigate the influence of age and gender on the mandibular cortical width and panoramic mandibular index, using panoramic radiographs of edentulous patients.

Materials and Methods: Panoramic radiographs that were taken for routine diagnosis of 79 edentulous patients (38 men and 41 women) were assessed. In addition to gender and age, mandibular cortical width at the mental foramen region was recorded. Panoramic mandibular index was calculated using the ratio of thickness of mandibular cortex to the distance between the mental foramen and the inferior mandibular cortex. Statistical comparisons were performed using t-test.

Results: There was a significant relation between the age of men and PMI values compared to women ($p = 0.014$). On the contrary, MCW values in men had more significant difference compared to women.

Conclusions: While mean mandibular cortical width values are stable in women over 60 years, mean mandibular cortical width values decrease significantly in men of the same age group.

Poster Presentation No. 13

Does the height of stabilization splints affect the treatment of temporomandibular disorders?

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Purpose: The aim of this study was to investigate if there are any differences between low height-

ened stabilization splints (2.0 mm) or high heightened stabilization splints (4.0 mm) for the treatment of temporomandibular disorders.

Materials and Methods: 72 female and 6 male patients attended to our study. Randomized numbers were used for dividing patients who would have 2 mm heightened-splints or 4 mm ones. After the stabilization splints were delivered, patients used them during 6 months only night time and they were recalled after 1st month, 2nd month, 3rd month and 6th month for controlling their symptoms. Patients were evaluated using RDC/TMD forms.

Results: Although there were statistical differences between low and high heightened-splints for relieving symptoms for myofascial pain related to temporomandibular disorders, they were not related to intracapsular temporomandibular disorders.

Conclusions: High heightened stabilization splints could be preferred for relieving symptoms of myofascial pain related to temporomandibular disorders but these results have to be confirmed by other studies.

Poster Presentation No. 14

The bone mineral density impact on residual ridge resorption in postmenopausal female

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Purpose: The aim was to evaluate the influence of general bone mineral density on the edentulous residual ridge resorption in postmenopausal female.

Materials and Methods: In the present study were 53 postmenopausal women aged 54–86 years (average age $72,0 \pm 8,7$ years). For all patients were made: dual energy x-ray absorptiometry (DXA) cone beam computer tomography (CBCT). Bone mineral density measurements (BMD) of lumbar spine and both hips by dual energy x-ray absorptiometry (DXA) (Lunar DEXA DPX-NT, GE Medical Systems) were made. From DXA analysis the T-score reading was used. To detect edentulous jaw bone quantity cone beam computer tomography (CBCT) (Next generation i-CAT, KaVo eXam vision) were made. CBCT images were analyzed with KaVo eXam vision software. The level of residual ridge resorption for each patient was determined performing 7 height and 49 width measurements in mandible and 10 height and 30 width measurements in maxilla on CBCT. Edentulous jaw bone resorption of the maxilla and mandible were calculated with KaVo eXam vision software. Statistical analysis data were separately analyzed for each edentulous site, calculated by Pearson Correlation.

Results: There was negative statistically significant correlation between BMD and width of the mandibular residual ridge. There was no correlation between BMD and maxillary measurements, except in some width measurements in frontal region.

Conclusions: There is weak relationship with BMD and edentulous residual ridge resorption in postmenopausal female.

Poster Presentation No. 15

Conversion degree analysis of resin cements beneath different ceramic materials

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Purpose: Degree of conversion (DC) is one of the important factors that affect clinical performance of resin-based cements. The aim of this study is to evaluate the DC of two dual-cured resin cements

beneath the different ceramic cores.

Materials and Methods: The dual-cured resin cements (Pv; Panavia F 2.0, and Per; Permacerem) were photo-activated for 40 s through different ceramic disks 2 mm thick (F; Ceramco 3, E2; IPS Empress II and, Ic; In-Ceram Alumina). The control groups were obtained with dual-cured resin cement specimens without ceramic specimen. Film thickness (0.8 mm) of resin cement specimens were checked using a digital calliper before testing. After 24 h of dry storage at 37 °C, the DC was measured by Fourier Transformed Infrared Spectroscopy (FTIR) at 24 °C and dry storage. Data were submitted to one-way ANOVA and post-hoc Tukey's test, with a pre-set alpha of 0.05.

Results: In Panavia groups, highest values of the %DC were obtained in group Ic-Pv and lowest values of the %DC were obtained in group F-Pv. In Permacerem groups, highest values of the %DC were obtained in group Ic-Per, and lowest values of the %DC were obtained in E2-Per. The factors "ceramic type" and "resin cement" were significant, as was their interaction ($p < 0.001$). For all ceramic type, Permacerem showed significantly lower DC than all other groups ($p < 0.001$).

Conclusions: The DC of resin cements may be affected by the type of the ceramic material and chemical composition of the resin cement.

Poster Presentation No. 16

Effects of laser treatments on surface roughness of zirconiumoxide ceramics

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Purpose: The purpose of study was to investigate the effect of different laser treatments (CO₂, Er:YAG) on the surface roughness of yttrium stabilized tetragonal polycrystalline zirconia (Y-TZP) ceramics.

Material and Methods: 5 × 5 × 2 mm rectangular prism of forty eight Y-TZP (Zirkonzahn specimens) were prepared. For surface standardization, specimens were gradually ground wet with 600-, 1200-grid silicon carbide papers for 10 seconds each on 300 rpm grinding machine. Specimens of each ceramic were randomly divided into eight groups (n = 6) for control (Group-C), sandblasting with Al₂O₃ powder at 2.8 bar for 15 seconds through a nozzle distance of 10 mm (Group-S), two different CO₂ laser (Smart US-20D) treatments (Group-3W: 3W, 382 w/cal, Group-4W: 4W, 509 w/cal) and four different Er:YAG laser (Fotona AT) treatments (Group-150SP: 150 mJ, 10-Hz with 100 µs; Group-150SSP: 150 mJ, 10-Hz with 300 µs; Group-300SP: 300 mJ, 10-Hz with 100 µs; Group-300SSP: 300 mJ, 10-Hz with 300 µs) treatments. Surface roughness measurements (Ra) were performed using a profilometer. Surface morphologies of the specimens were evaluated under SEM after laser treatment.

Results: The data were analyzed with a one-way ANOVA, and mean values were compared by the Tukey HSD test ($\alpha = .05$). According to the one-way ANOVA results, the highest Ra value was observed in Group-S and the lowest Ra value was observed in Group-150SP. Group-4W showed highest Ra value after sandblasting. There were no statistically significant differences among Group-C, Group-150SSP, Group-300SP, Group-300SSP and Group-3W.

Conclusions: Under the limitations of this study, surface treatment with CO₂ laser increased the surface roughness of zirconium oxide ceramics.

Poster Presentation No. 17

Evaluation of the vertical-bone-height of dentulous and edentulous patients

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Purpose: The aim of this study was to analyze difference between the amount of vertical bone height in the dentulous and edentulous mandibles by using the mental foramen as a references.

Materials and Methods: A total of 160 panoramic radiographs of 80 dentulous (males MD and females FD) and 80 edentulous (males ME and female FE) were selected. Among the dentulous and edentulous subjects, in both genders, the ratio between the height of the mandible and the distance from the mental foramen and the lower border of the mandible (A/B) were calculated by using Adobe Photoshop CS4 computer programme. The amount of vertical bone height was then calculated. **Results:** Measurements were performed in patients over 40 years old. In the dentulous patients; the A/B ratio for males in right side of mandible was 2.49 and in left side of mandible was 2.41. Dentulous females, in right side of mandible the ratio was 2.43 and in left side of mandible was 2.41. The A/B ratio for the edentulous males in right side was 2.08 and in left side 2.01. In the edentulous females A/B ratio was in right side 1.98 and in left side 2.01. A significant difference was not found among the right and left side of the mandible. Significant differences were found between dentulous and edentulous patients. The comparison of the ratios was non-significant between males and females.

Conclusions: The mean bone height in dentulous patients was found to be greater than the mean bone height in edentulous patients on comparison.

Poster Presentation No. 18

Radiotherapy effect on the bond strength of resin luting cement

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Purpose: The purpose of this study was to evaluate the effects of pre- and post-irradiation application on the shear bond strength of self adhesive luting cements to dentin and enamel.

Materials and Methods: 32 extracted human maxillary (n = 12) incisors were used in this study. According to preparation depth (0.5 mm and 1 mm) and treatment protocol which includes; irradiation surface (teeth or resin cement) and time of preparation (after or before irradiation) 8 study groups were determined. Specimens were placed in a universal testing machine, metal ring was connected with the cross-head and load was applied to each specimen until the bond between the exposed surface of teeth and resin cement failed. The maximum tensile bond strength was recorded from a personal computer. The shear bond strength results were analyzed using 2-way ANOVA to evaluate the effects of depth of preparation, treatment protocol and their interactions. The mean shear-bond strength values were then compared using the Tamhane's test. Significance was evaluated at $p < 0.05$ for all tests.

Results: According to the two-way ANOVA results, depth of preparation and treatment protocol and their interactions were significant on shear bond strength on resin cement. For the both 0.5 mm depth and 1mm depth of preparation the mean shear bond strengths for the groups, were significantly ($p < 0.05$) lower than in control group.

Conclusions: Irradiation may have an adverse effect on the bond strength of adhesive luting cement depending on the application sequence.

Poster Presentation No. 19

Retention force of SynCone pairs made of gold

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Purpose: Aim of this study was to determine the retention force, depending of a method of fabrication, of double conical crown whit 5°, in the Ankylos SynCone concept, at the beginning of the use, during and after 10,000 cycles.

Materials and Methods: In this study we have used a SynCone conical abutment made of titan whit 5° angle and 1.5 mm gingival height, inserted on the implant, as the inner part of the conical pair. For the outer part (SynCone Cap) of the conical pair we have used a: 1. Prefabricate SynCone cap made of gold, that corresponds to the inner part of the conical pair; 2. Casted cap made of gold, which was manually made in a dental laboratory. For this study we have used Kausimulator CS-4.8 (SD MECHATRONIC; Germany) for cycles. The conical pairs have been submitted to 10,000 separation cycles. We have measured the force on the cycles No 1, No 120 and No 10000.

Results: In group 1 we had increase of retention force from F1 to F120 and then a constant force until F10000. In group 2 we had a constant increase of retention force from F1 until F10000. We have found that there is a difference in the first group between F1 and F10000 ($p < 0.05$) and between F120 and F10000 ($p < 0.05$). In the second group we have found no statistically relevant difference.

Conclusions: It was shown that the SynCone conical crown system could potentially provide adequate and constant retentive force to retain implant-supported overdentures.

Poster Presentation No. 20

Physicochemical and antibacterial properties of a Bis-GMA-free dental resin

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Purpose: The objective of this study was to evaluate the antibacterial activity, physicochemical properties of the quaternary ammonium dimethacrylate monomer IMQ-16 containing UDMA/SR833s resin system relative to Bis-GMA/TEGDMA resin system. It was hypothesized that the physical and chemical properties of the experimental polymers would be comparable with Bis-GMA/TEGDMA polymer and that IMQ-16 monomer could endow the UDMA/SR833s resin with antibacterial activity. **Materials and Methods:** Double bond conversion (DC) was measured using Fourier transform infrared spectroscopy (FTIR). Mechanical properties including flexural strength (FS) and flexural modulus (FM) were measured by three-point bending test with bars of 2 mm × 2 mm × 25 mm. Water sorption (WS) and solubility (WSL) were also investigated. Antibacterial activity of obtained polymers against *Streptococcus mutans* Ingblitt (*S. mutans*) was tested through direct contact test (DCT). The presence of antibacterial activity due to soluble components was also investigated by agar diffusion test (ADT).

Results: All of the IMQ-16 incorporated polymers exhibited improvements in WS and WSL, while maintaining equivalent DC and FS relative to the Bis-GMA/TEGDMA control system. Incorporation of 17% and 20% IMQ-16 into UDMA/SR833s resin reduced the viable counts of *S. mutans* after incubation on the surface of the materials and produced no inhibition zones around the cured discs in ADT.

Conclusions: UDMA/SR833s polymer is a promising resin system to formulate an antibacterial

resin with equivalent or even higher physical and chemical properties relative to Bis-GMA/TEGDMA formulation. IMQ-16 monomer is capable to endow UDMA/SR833s resin system with significant antibacterial activity.

Poster Presentation No. 21

Conventional vs. computerized determination of the level and inclination of the artificial occlusal plane

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Purpose: This study evaluated the reliability of the Camper's plane as a guide to determine the artificial occlusal plane in edentulous subjects and utility of cephalometric parameters for this purpose. **Materials and Methods:** A total of 60 lateral cephalometric radiographs of subjects with natural dentition and class I skeletal jaw relationship of Serbian nationality from the region of Vojvodina were included in the investigation. Thirty subjects were males, and thirty females, their age range was 20 to 29 years. The obtained values after cephalometric analysis were used as objective parameters in prosthodontic treatment for exact control of the determined artificial occlusal plane in edentulous patients. Cephalometric radiographs of 60 edentulous patients and class I skeletal jaw relationship of Serbian nationality from the region of Vojvodina have been done with models and definitely pre-cised, and marked with lead foils, the level and inclination of artificial occlusal plane according to Camper's plane. The present study included twenty-five men and thirty-five women, aged between 45 and 78 years. Cephalometric analysis was performed by using "Dr. Ceph" computer software (FYI Technologies, GA, USA). The examined angular cephalometric parameters were: angle between palatal plane and mandibular plane (PP/MP), angle between occlusal plane and palatal plane (OccP/PP); angle between occlusal plane and mandibular plane (Occl/MP).

Results: Statistical analysis of data obtained from this study showed statistically significant differences between the values of the inclination of artificial occlusal plane in edentulous patients and the inclination of natural occlusal plane in subjects with natural dentition: PP/MP ($p < 0.05$), OccP/PP ($p < 0.05$), OccP/MP ($p < 0.05$).

Conclusions: Because of his effect on aesthetics, function and denture stability, artificial occlusal plane should be reconstructed as identical as possible to the occlusal plane of missing natural teeth.

Poster Presentation No. 22

Self-perceived chewing function in locator retained mandibular implant overdentures

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Purpose: To compare self reported outcomes of a chewing function in two- or four-implant mandibular overdentures (IOD) retained by locators, as well as to assess influence of patients' age. In spite of abundant literature on oral health related quality of life (OHRQoL) outcomes in different prosthodontic treatment options and various cohorts, the outcomes of a chewing function has not been studied as a single concept.

Materials and Methods: Altogether 52 patients with mandibular IODs participated (mean age 66.54 ± 8.6 years). Patients were divided into 2 groups depending on the number of implants (locators) (30 patients with 4 and 22 two implants), age (31 patients older than 60 years; 21 patients younger or equal 60 years), and gender (25 females and 27 males). The one-dimensional Chewing function questionnaire (CFQ) was used to measure patient's self-perceived chewing function. Summary

scores of 10 questions were calculated. Statistical analysis comprised descriptive statistics, independent sample t-test and 3 factor ANOVA.

Results: Although slightly lower CFQ summary scores (better self assessed chewing function) were registered in the 2 implant IOD group, in females and in patients of higher age no statistically significant differences were found for single factor assessments ($p > 0.05$). However, the 3 factor ANOVA revealed only one significant effect for the combination of two factors: number of implants and age group ($p = 0.028$).

Conclusions: Older people were more satisfied with 2 locator retained IODs. It seems to be acceptable treatment for completely edentulous elders considering chewing function.

Poster Presentation No. 23

Fatigue resistance of pure titanium wire fabricated by multi-directional forging

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Purpose: Fatigue failure of denture clasps decreases the retention of removable partial dentures (RPDs). It is commonly known that the fracture frequency of a titanium wire clasp is higher than that of a cobalt-chromium wire clasp. Application of Multi-directional forging (MDF), which is one of severe plastic deformation methods, to metals and alloys can drastically modify the properties. Especially, MDFing of pure titanium has shown an ease of use and abrasion resistance comparable to that of a titanium alloy. This study evaluated the fatigue resistance of a MDF pure titanium wire and a commercial titanium alloy wire.

Materials and Methods: A round (0.9 mm in diameter) wire made with a titanium alloy and an MDF pure titanium wire were used in this study. The clasp specimens (15-mm cantilever) were loaded at the free end by a 20 Hz fatigue-testing apparatus using an electromagnetic force with a constant deflection of 4.0 mm. Fatigue tests were continued until each specimen fractured. The data ($n = 5$) was analyzed by t-test ($\alpha = 0.05$).

Results: The MDF pure titanium wire showed about 1.4 times greater fatigue resistance as compared to that of the titanium alloy wires; the difference observed between them was significant ($p < 0.05$).

Conclusions: The fatigue resistance of MDF titanium is clearly superior to that of a titanium alloy. MDF of titanium wire clasps would contribute to the long-term use of RPDs.

Poster Presentation No. 24

The accuracy difference between surgical microscope and CBCT to find MB2 canal in mesiobuccal root of maxillary permanent first molar in Malay population

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Purpose: To investigate the accuracy difference between the surgical microscope and CBCT to find of extra canal MB2 in maxillary first molar among the Malay population.

Materials and Methods: This was an in-vitro cross-sectional study on total of 83 extracted maxillary

first permanent molars of Malay patients who attended the Polyclinic, Kulliyyah of Dentistry, IIUM. All teeth were cleaned, mounted in a wax box and were sent for a PA radiograph and cone beam computed tomography imaging. Cavity access was performed on all teeth followed by coronal patency under surgical microscope.

Results: Out of 83 teeth, 68% were found with MB2 canal. However, prevalence of MB2 canal found in both clinical and radiographic examinations was 68%. Kappa statistic between clinical and radiographic examination was 0.94 ($p < 0.001$).

Conclusions: This study showed that agreement between clinical and radiographic assessments was almost perfect (94%), the treatment can be proceed without expose the patient to extra radiation and it was found the high prevalence of MB2 canal among a sample of Malay population.

Poster Presentation No. 25

Could orthopantomograms be used to determine condylar guidance angles

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Purpose: Different clinical procedures are used to obtain numerical data on the condylar guidance angle. A method using orthopantomogram radiographic images (OPG) has been described in the literature. The aim of the present study was to verify the recommendation of this method in clinical use.

Materials and Methods: One panoramic radiographic image was randomly chosen from a group of 191 images from individuals who were free of the signs and symptoms of temporomandibular disorders and possessed intact dentition. The digital image was converted to analogue and printed. The study involved 21 dentists, who were asked to position four dots on both sides of the image (the orbitale and porion, and the most superior and the most inferior points of the jaw's articular surface). The marked images were then scanned. Using computer software, the points were connected with lines A and B on both sides. To evaluate the accuracy of the lines, the equation of the straight line was calculated and their slopes compared. The condylar guidance angle between lines A and B was calculated.

Results: The spread of the results for the condylar guidance angle on the right side was 30 degrees; on the left side, it was more than 40 degrees. The SD for the slope of line A was 0.01 on both sides. The slope value of line B varied from 0.25 to 0.34.

Conclusions: The use of OPG to obtain the condylar guidance angle is not recommended in clinical use.

Poster Presentation No. 26

The effect of implant diameter and length on stress distribution for single implant treatment using 3D FEM analysis

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Purpose: The aim of this simulation was to evaluate the effects of implant diameter and length on the stress exerted on peri-implant bone, to investigate the usefulness of virtual implant.

Materials and Methods: Three-dimensional (3D) finite element model of the mandibular bone was created from 3D x-ray CT scan images of healthy adult male. Simulating the clinical scenario of implant therapy at the mandibular first molar region, virtual extraction of this tooth was performed on the model and 12 different diameters and lengths experimental designed implants were virtually

placed in order to carry out an equivalent stress.

Results: High stress distribution was found on the surfaces of the buccal and lingual implant bone adjacent to the sides of the neck in all the implants. The highest stress value was approximately 6.0 MPa with implant diameter of 3.8 mm, approx. 4.5 MPa with implant diameter of 4.3 mm, and approx. 3.2 MPa with implant diameter of 6.0 mm.

Conclusions: The stress on the implant bone was found to decrease with increasing mainly diameter of the implant.

Poster Presentation No. 27

Relationship between muscle and oral function in Japanese community-dwelling elderly

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Purpose: The aim of the present study was to survey skeletal muscle status, oral function, and the relationship between the two in community-dwelling elderly people.

Materials and Methods: Twenty-four community-dwelling elderly were assessed using following parameters: Skeletal muscle index (SMI), grasping power, walking speed, jaw-opening force, occlusal force, the gum-chewing test, maximum voluntary tongue pressure, RSST, MWST and diadochokinesis. Correlations between parameters were analyzed using Spearman's correlation coefficient.

The subjects were divided into two groups according to standards for grasping force: healthy and muscle weakness. Additionally, subjects were divided into two groups based on Eichner's classification. Parameters were statistically compared between the two groups using the Mann-Whitney U test.

Results: There were statistical relationships between SMI and grasping force ($r = 0.455$, $p < 0.05$), SMI and jaw-opening force ($r = 0.578$, $p < 0.01$), and grasping force and jaw-opening force ($r = 0.640$, $p < 0.01$). In the weak muscle group, jaw-opening force and the number of diadochokinesis were larger than the corresponding values in the healthy group ($p < 0.01$ for both comparisons). For patients wearing a prosthesis in the non-occlusal support group, RSST and MWST results were better than the corresponding values for patients in the occlusal support group ($p < 0.05$ for both comparisons). It is reasonable that an overall decrease in muscle mass would evoke decreases in muscle strength in both the extremities and the jaw-opening muscles.

Conclusions: We confirmed significant relationships between skeletal muscle mass, skeletal muscle strength, and oral function in Japanese community-dwelling elderly.

Poster Presentation No. 28

Analysis of mandibular movements in patients with temporomandibular disorder

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Purpose: The aim of this study was to analyse a restricted movements of mandible and the mandibular pathway association with temporomandibular joint (TMJ) bone structural changes in temporomandibular disorder (TMD) patients with clicking sounds of temporomandibular joint.

Materials and Methods: The study involved 30 TMD patients (mean age 31.06 years, 86 % women) with clicking sounds of the TMJ. The TMJ border movements and the mandibular pathway during maximal opening was measured and recorded with an ultrasonic instrument Arcus Digma (KaVo). The TMJ morphology was evaluated with cone beam computed tomography (iCAT New Generation, Imaging Sciences International, Inc. Hatfield, PA, USA). Presence of structural changes in bone structures of the joint were assessed in coronary and sagital plane, based on the system

worked out by Dworkin (1992) for assessment of changes in temporomandibular joint (RDC/TMD). Data were analysed using descriptive and analytical statistical methods. Statistical significance was tested using Fisher test. P value less than 0.05 was chosen as a significance level.

Results: Limited mouth opening showed 36.7% of cases, restricted movement to the right was in 6.7% of cases, restricted movement to the left was in 16.7% of cases. TMJ bone changes were observed in 28.5% of cases. 27.2% of this subgroup showed limited mouth opening while 26.3% – unlimited mouth opening. 50% of all cases showed only deviation during mouth opening movement without restriction.

Conclusions: At the current stage of this study based on collected data, it can be concluded that there is no statistically significant relationship between the maximum border movement limits and the TMJ bone structural changes. Most common feature is the mandibular deviation during mouth opening.

Poster Presentation No. 29

Comparing different kinds of edentulous patients' static and dynamic muscle activation (M. Masseter, M. Temporalis anterior) before and after prosthetic rehabilitation with electromyography

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Purpose: This study is performed in order to evaluate the changes in masseter and anterior temporalis muscles activity after using dentures at patients with partial dentures and patients with complete dentures.

Materials and Methods: For this purpose after making partial removable dentures for single sided and double sided edentulous patients and complete prosthesis for the patients with old complete prosthesis applied for a period of 1 month on 36 individuals whose mean age was 56.8 ± 8.5 years, at patients with partial dentures, 54.1 ± 5.7 years, at patients with complete dentures, 37.1 ± 5.7 years at subjects with natural dentitions and electromyographic (EMG) records were taken both before using removable partial dentures and at patients with old complete dentures, first day, first week, first month of the application from each individual. Muscle activation values of single sided and double sided prosthesis and complete prosthesis at the first month were compared with natural dentition during four jaw movements (chewing, maximal clench, swallowing, and rest). Muscle activation changes of M. Massetericus and M. Temporalis anterior of patients with single sided and double sided prosthesis and complete prosthesis were evaluated during 1 month period. One-way ANOVA, Paired simple t-test, Kruskal-Wallis H test and Mann-Whitney U test used for the evaluation of the measurements.

Results: The muscle activity recordings taken at first month from M. Massetericus and M. Temporalis anterior from patients with partial dentures and patients with complete dentures were significantly lower from patients with natural dentition. As a response to prosthetic rehabilitation, at chewing and maximal clench, at the first day of the denture use, the rise of muscle activation from the first day abate to the first month were viewed. But this didn't get to the values which were taken before the denture use.

Conclusions: As it is known, muscles amplitude variability is related with muscles neural control. At first day the amplitudes are high, as during chewing and maximum clench has more motor unit activity. That is why at first day of the prosthetics, patients managed to use new prosthesis. This can be taught patients managed to adaptation to new prosthesis and muscle activity gets higher. From first day to the first month muscle activity gets lower this maybe because of adaptation to the new prosthesis. First month values are higher than before the prosthetic rehabilitation and the reason can be adaptation to the normal functions.

Poster Presentation No. 30

Effect of laser treatment on bond strength of bleached enamel

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Purpose: The aim of this study was to evaluate the effect of surface treatment with Er:YAG and Diode lasers on resin cement bond strength to recently bleached enamel.

Materials and Methods: 72 human central incisors were divided into two groups: group O: bleached with Opalescence Endo and group W: bleached with Whiteness HP. Each group was divided into three subgroups: subgroup C: without laser treatment (OC, WC); subgroup Er: irradiation with Er:YAG laser (OE, WE); subgroup D: irradiation with Diode laser (OD, WD). After bleaching treatments atomic force microscopy was carried out and then resin cement Panavia cylinders of 3 mm × 3 mm (Panavia F 2.0, Kuraray Co. Ltd., Japan) were bonded to the enamel surfaces. All specimens were subjected to shear bond strength test after 24 h of storage in water. The shear bond strength was measured using a Universal testing machine (TSTM 02500, Elista Ltd. Şti., Turkey) at a 0.5 mm/min crosshead speed. The data were analyzed statistically with ANOVA followed by Tukey's test ($p < 0.05$).

Results: Two way ANOVA test analysis showed there was significant differences between laser groups but no significant differences between the bleaching agents and bleaching agents and lasers. There were no significant differences between the WC (28.29 MPa) and OC groups (26.70 MPa). OD group was showed the lowest shear bond strength (17.99 MPa) with statistical difference of WE (23.20 MPa), WC (28.29 MPa), and OC (26.70 MPa). Significant morphological alterations were observed in all groups.

Conclusions: The results suggested that following the bleaching treatments, the use of Er:YAG laser may provide higher bond strengths than Diode laser.

Poster Presentation No. 31

Correlation between the nose width, mouth width and the widths of maxillary anterior teeth

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Purpose: It is difficult to determine the width of the maxillary anterior teeth for an edentulous patient when pre-extraction records are not available. The purpose of this study was to evaluate the relationship between nose width (NW), mouth width (MW) and two other measurements of the maxillary anterior teeth (intercanine cusp tip distance – ICTD and width of maxillary anterior teeth – WMAT). **Materials and Methods:** One hundred and sixty Kosovo Albanian dental students at the University of Prishtina, Dental School were evaluated. The sample comprised 80 males and 80 females ranging in age from 19 to 25 years. The anthropometric measurements of the nose width and mouth width were recorded directly on the subjects while intercanine cusp tip distance and width of maxillary anterior teeth were measured on the dental casts using an electronic digital calliper with accuracy of 0.01 mm (Digital calliper Boss Hamburg – Germany). Basic statistical parameters and Pearson correlation coefficient were calculated.

Results: There was no significant correlation between nose width, mouth width and two other measurements of maxillary anterior teeth (ICTD and WMAT) in male subjects. Significant correlation ($r = 0.32$; $p < 0.01$) was found in female subjects between mouth width and width of maxillary anterior teeth.

Conclusions: Nose width and mouth width would not be reliable guides for determine the width of artificial anterior teeth for complete dentures.

Poster Presentation No.32

Marginal and internal fit of CAD/CAM ceramic crowns fabricated from different ceramic blocks

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Purpose: The purpose of this study was to evaluate marginal and internal adaptation of CAD/CAM crowns made from 7 different materials.

Materials and Methods: Crown restorations (n = 10) were fabricated from seven CAD/CAM blocks (IPS e.max, Lava Ultimate, inCoris TZI, inCoris ZI, Vita Suprinity, Vita Enamic, GC Cera Smart). In order to document the marginal and the internal discrepancies, silicone replicas were fabricated. The crowns were filled with a light body silicone and placed on the abutment teeth. The thin silicone layer represented the gap width between the inner surface of the crown and the surface of the abutment tooth. After setting of the light body silicone, the crown was removed from the abutment. The thin green-coloured silicone film in the abutment crowns was stabilized by injecting a heavy purple-coloured body silicone. The replicas were removed and segmented with a blade. The green-coloured silicone layer, which represented the discrepancy between the die and the inner surface of the restoration, was examined at 50x magnification using a light microscope with digital camera. At each cross-section, four landmarks were measured. A one-way analysis of variance (ANOVA) was used to compare data (p = 0.05).

Results: One-way ANOVA showed significant differences between materials for marginal fit (p < 0.05) and internal fit (p < 0.05). However, the measured values of discrepancies were low.

Conclusions: All materials showed low marginal and internal discrepancies and were therefore considered clinically acceptable. The CAD/CAM crown restorations fabricated from different blocks are precisely adapted on the abutment teeth.

Poster Presentation No. 33

Effect of different veneering techniques on the fracture strength of ceramics

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Purpose: To determine whether the fracture strengths and failure types differed between metal and zirconia frameworks veneered with pressable or layering ceramics.

Materials and Methods: A phantom molar tooth was prepared and duplicated in 40 cobalt-chromium abutments. Twenty metal (IPS d.SIGN 15, Ivoclar Vivadent, Schaan, Liechtenstein) and 20 zirconia (IPS e.max ZirCAD, Ivoclar) frameworks were fabricated on the abutments. Each framework group was randomly divided into 2 subgroups according to the veneering material: pressable and layering ceramics (n = 10). Forty molar crowns were fabricated, cemented onto the corresponding abutments and then thermocycled (5–55 °C, 10,000 cycles). A load was applied in a universal testing machine until a fracture occurred on the crowns. In addition, failure types were examined using a stereomicroscope. Fracture load data were analyzed using one-way ANOVA and Tukey HSD post-hoc tests at a significance level of 0.05.

Results: The highest strength value was seen in metal-pressable (MP) group, whereas zirconia-pressable (ZP) group exhibited the lowest one. Moreover, group MP showed significantly higher fracture loads than group ZP (p = 0.015) and zirconia-layering (ZL) (p = 0.038) group. No significant difference in fracture strength was detected between groups MP and ML, and groups ZP and ZL (p > 0.05). Predominant fracture types were cohesive for metal groups and adhesive for zirconia groups.

Conclusions: Fracture strength of a restoration with a metal or a zirconia framework was independ-

ent of the veneering techniques. However, the pressing technique over metal frameworks resisted significantly higher fracture loads than zirconia frameworks.

Poster Presentation No. 34

Inaccuracies generated during digital impression making in implant prosthodontics

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Purpose: The aim of this poster presentation is to demonstrate the problems occurring during digital impression making procedures in implant prosthodontics generating prosthetic appliances of questionable accuracy. Inaccurate prosthesis may lead to biological complications (mucositis, peri-implantitis) and to mechanical complications (screw loosening, fracture of the prosthesis or of an implant component).

Materials and Methods: There are two alternatives for digital impression making; A. The direct (intraoral) data capturing technique. An intraoral scanner is used to collect optical data directly from the patient's mouth. These data are then used to create a 3D model through software compatible with the scanner. B. The indirect (extraoral) data technique using a scanner that captures the optical data from an existing master cast, which are then used to create a 3D model. Most of the oral scanners have problems in scanning a reflective, shiny surface. This is the reason why some manufacturers provide a specific powder to apply on the area to be scanned. In various situations specific scanbodies are also required.

Results: The problems that might occur during digital impression making in implant cases could be due to: Inexperience; Failure to create a final scan of the scanbodies; Misalignment of the photos during the stitching phase; Deformation of the scanbodies; Positioning of the scanbodies.

Conclusions: The evolution of the digital dental technology has been impressive in the last decade. The latest studies underline the improvements needed to be made so that the conventional impression making can be replaced in daily clinical practice.

Poster Presentation No. 35

Bone augmentation and implant prosthetic rehabilitation versus partial removable dentures

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Purpose: Evaluation of the methods of patients' rehabilitation that have insufficient bone support by comparative analysis of conventional and implant prosthetic methods with preliminary bone augmentation.

Materials and Methods: In the study were included 24 patients with alveolar bone defects of different aetiology who needed prosthetic rehabilitation. Patients were divided in two groups: The first group consisted of 9 patients (mean age 38 ± 2.77 years) who were rehabilitated with fixed implant supported metal-ceramic prostheses after bone augmentation. The second group consisted of 15 patients (mean age 54.8 ± 2.3 years) who were rehabilitated with partial removable prosthesis. In the second group, 10 patients were rehabilitated on both arches and 5 patients on one arch. Patients were given a questionnaire of satisfaction consisted of 20 questions.

Results: In the first group, after augmentation procedures, it was possible to insert implants of standard size and manufacture fixed metal-ceramic prostheses type FP1, FP2 and FP3 (according to Carl E. Misch classification). After 12 months there was 0.5 ± 0.08 mm bone resorption mesially and 0.41 ± 0.06 mm distally. There have not been noticed any pathological signs in peri-implant soft tissues. In 30% of cases was noted the loss of prosthetic stability after 12 months.

Conclusions: Despite of long rehabilitation period, multiple surgical procedures and higher price needed for implant prosthetic rehabilitation with preliminary bone augmentation, this method is often required by patients due to its advantages over the rehabilitation with removable prosthesis.

Poster Presentation No. 36

The efficiency of different polishing systems on the surface roughness of full-contour CAD/CAM ceramics

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Purpose: To evaluate the efficiency of different chair-side polishing systems on the surface roughness of full-contour CAD/CAM ceramics after clinically simulated adjustment.

Materials and Methods: Seventy-five square-shaped specimens (sides 10 mm) of different CAD/CAM ceramics were fabricated: Kerox (n = 20), Doceram (n = 15), Metoxit (n = 20), VITA SUPRINITY (n = 10) and VITA ENAMIC (n = 10) (5 groups). The specimens were sintered, polished with technical polishers in dental laboratory. Simulated clinical grinding was performed under water coolant for 15 s and 2 N pressure. NTI diamonds burs (red and yellow) were used sequentially. The surfaces were polished under water coolant for 20 s and 2 N pressure with different chair-side polishing systems: CeraMaster (SHOFU), CeraGloss (EDENTA), Set 4622 (KOMET), VITA SUPRINITY Polishing Set (clinical), VITA ENAMICs Polishing Set (clinical), DirectDia (SHOFU) and DiaPolisher (GC) polishing pastes. To remove residues from the surfaces, the test specimens were placed in Ultra-sound appliance with distilled water at 35 °C for 10 min. Before and after clinically simulated adjustment and polishing, the surface roughness (Ra average) (µm) of each ceramic was measured with a 3-dimensional (3D) optical profilometer (3 times per specimen) and scanning electron microscope (SEM) (magnification 500, 1000x). The data obtained were statistically analyzed by SPSS (version 20.0): T-test, one-way ANOVA, correlations.

Results: The surface roughness of Metoxit (Ra average = 3.062 ± 0.638) zirconia after clinical adjustment and polishing was significantly higher than that of Doceram (Ra average = 2.509 ± 0.577) or Kerox (Ra average = 2.40 ± 0.527) ($p = 0.002$). All zirconia ceramics demonstrated similar surface roughness after polishing in dental laboratory. There was no statistical significance among the groups after polishing in dental laboratory or chair-side polishing. The use of different clinical polishing systems exhibited no significance on surface roughness within ceramics or polishing systems groups.

Conclusions: The surface roughness before and after clinical adjustment and polishing with different chair-side polishing systems is comparable. The best results in chair-side polishing are achieved by using Kerox and Doceram zirconia.

Poster Presentation No. 37

The effect of prosthodontic treatment on mastication predominance

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Purpose: The aim of the present study was to investigate the effect of prosthodontic treatment on mastication predominance in patients with unilateral posterior missing teeth using the objective assessment of masseter muscle electromyographic (EMG) activity.

Materials and Methods: The sample consisted of 56 patients with unilateral posterior missing teeth who received prosthodontic treatments: removable partial denture (RPD group) or fixed implant prosthesis (Implant group). EMG activities were recorded from the bilateral masseter muscles while

subjects were asked to chew chewing gum freely for 40 seconds. The assessment of mastication predominance was conducted before and after prosthodontic treatments. The chewing side (right or left) was judged by the level of root mean square EMG amplitude. The mastication predominance was then objectively assessed by mastication predominant index (MPI): the proportion in the number of the difference between the right and left side strokes against the number of total strokes. The MPI was analyzed in terms of period (before and after prosthodontic treatments) and treatment option (RPD group and Implant group).

Results: There was a significant difference in the MPI before and after prosthodontic treatments ($p < 0.05$). Regarding the treatment option, the amount of change in MPI between RPD group and Implant group was significantly different ($p < 0.05$).

Conclusions: The obtained results suggested that prosthodontic treatment could have an influence on the improvement of masticatory predominance. It was also suggested that the implant prosthodontic treatment might be more effective than the removable partial denture treatment in terms of mastication predominance.

Poster Presentation No. 38

The effect of different shades of resin cements and composite thickness on the final colour of veneers

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Purpose: The aim of the study was to evaluate the effect of different shades of resin cements on the final colour of 2 different thicknesses of 2 different composite resins.

Materials and Methods: A total of 112 discs were fabricated from A2 colour of each resin composite (Clearfil Majesty Esthetic, Kuraray; AELITE Aesthetic Enamel, Bisco) with 2 different thicknesses (0.5 mm and 1 mm). Baseline CIE L* a* b* colour coordinates were measured with spectrophotometer (VITA Easyshade Compact), and then composite discs were divided into 4 groups according to the shades (A1, A3, transparent and opaque) of resin cements (Variolink II, Ivoclar Vivadent) ($n = 7$). After luting the resin cements to the composite discs, colour measurements were repeated and colour differences (ΔE) were calculated. Data were statistically analyzed with one-way ANOVA and Tukey HSD test.

Results: The results of the study showed that the opaque shade had significantly increased ΔE values when compared with the other shades (A1, A3, transparent) ($p < 0.05$) whereas no significant difference was found among A1, A3 and transparent shades for all groups ($p > 0.05$). For A1 and transparent shades in 0.5 mm thickness, ΔE values of AELITE were higher compared to Clearfil Majesty Esthetic. There is no significant difference between 2 thicknesses for both composite resins in terms of ΔE values.

Conclusions: The shade of the resin cement influenced the resulting colour of composite laminate restorations, whereas the thickness of the composite resin had no effect on the final colour of veneers.

Poster Presentation No. 39

Development of a continuous cingulum rest using an adhesive composite resin

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Purpose: The continuous clasp in a removable partial denture (RPD) has been constructed before more than 100 years. It was placed just incisally of the lingual eminence of the tooth and has the

combined advantages of providing bracing and assisting good gingival hygiene. For more tooth support from incisors, continuous cingulum rest seats have been developed that use adhesive composite resin.

Materials and Methods: Cingulum rest seats have been affixed using an adhesive composite resin as the floor of the rest seat on the lingual surface of a mandibular incisor or canine. After a definitive impression was made, the following laboratory procedures are conventionally carried out: 1) A refractory cast is made from the original master cast after relief and blockout; 2) The pattern of the RPD framework is waxed freehand, especially, a continuous cingulum rest using ready-made pattern forms; 3) After the sprued pattern is invested, the RPD framework is conventionally cast and polished. The cast framework is evaluated intraorally, and a sufficiently accurate adaptation and design identical to the continuous cingulum rest are revealed.

Results: Advantages include: 1) Maximum support and bracing can be provided from the incisors; 2) More rigidity can be obtained with a lingual bur; 3) Tooth and soft tissue surfaces covered can be smaller than the lingual plate; 4) Adding an artificial tooth to the framework is easy.

Conclusions: By improving the adhesion of composite resin, a continuous cingulum rest can be provided for obtaining greater support from incisors than with a Kennedy bar.

Poster Presentation No. 40

Association between asymmetry index and distribution of occlusal contacts in young adults

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Purpose: The aim of the study was to determine the association between the asymmetry of the masticatory muscles (LTA, RTA, LMM, and RMM), sex, and occlusal classes and occlusal contacts in asymptomatic young adults.

Materials and Methods: One hundred and forty-four Caucasian volunteers (96 females, 48 males) aged eighteen years participated. The exclusion criteria included transversal malocclusion, any periodontal disease, caries, bruxism, neuropathic conditions, maxillofacial disease, and psychological disorders. A surface electromyography (sEMG) recording with an 8-channel BioEMG III BioPAK Measurement System Electromyograph (BioResearch, Inc., Milwaukee, WI, USA) was used to quantify the degree of asymmetry in the activity of the masticatory muscles, as well as to determine the balance between masseter and temporary anterior muscles. In order to determine the degree of symmetry of the maximal occlusion contact, occlusal contact points were analyzed using a T-scan III evolution 7.01 device (Tekscan, Inc., South Boston, MA, USA). Occlusal classes were graded by means of an approach based on plaster study models.

Results: Our findings show that the asymmetry index shows the predominance of the right-side muscles across sex and occlusal class and distribution of occlusal contacts on left side.

Conclusions: Presented results are concerning asymptomatic young adults.

Poster Presentation No. 41

Evaluation of CAD/CAM denture, “Whole You” milled denture

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Purpose: Recently, computer-aided designed (CAD), computer-aided manufacturing (CAM) den-

ture was developed by Whole You, Inc., Mitsui Chemicals Group. They use the DENTCA tray system for impression taking, which made the denture design by CAD. Then from the CAD denture, data denture, milled denture will be produced by CAM. The performance of this CAD/CAM denture was evaluated.

Materials and Methods: Using DENTCA trays and hard and medium flow silicone impression materials, definitive impressions of maxillary and mandibular edentulous jaws are made with a double impression technique. Both impressions are cut and separated; maxillomandibular registration and Gothic arch tracing are performed using the anterior portions of impressions. They are scanned, and the complete dentures are designed and milled from an acrylic resin block (developed by Mitsui Chemicals Group). The dentures are thinly coated (approximately 10 µm) with hydrophilic coating material (developed by Mitsui Chemicals Group), and the complete dentures are delivered during a second visit.

Results: Because the denture base is milled from the acrylic block by precise CAD/CAM technology, the palatal plate thickness of the CAD/CAM dentures can be controlled to be thinner than the conventional dentures. The thickness is approximately 1 mm. And the coating material makes easier to remove the stain on both polished and impression surfaces.

Conclusions: Complete denture fabrication in two visits can be confirmed by using the DENTCA tray system and milling denture production process. The coating material is also effective for the stains to be removed easily.

Poster Presentation No. 42

Identifying colour changes of denture base acrylics on scanned images

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Presentation was cancelled.

Poster Presentation No. 43

Hard and soft tissue reactions to different attachment systems in implant retained overdentures

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Purpose: Although implants have offered a great service to partially edentulous patients, the most dramatic changes have been achieved in bone and soft tissues of atrophic mandibles and/or maxillae. The purpose of this article is to discuss the potential effect of the different attachments used routinely in implant-retained overdentures on soft and hard tissue.

Materials and Methods: Relevant articles were screened and selected based on a MEDLINE search limited to English-language articles published from 1995 to the present with regard to retention of different attachment systems available in the dental market. Selection criteria were done based on previously published articles in the literature.

Results: 80 relevant articles were found after an initial search from databases mentioned before. Following the title, abstract and full text level eliminations, total of seventeen papers was selected for critical analysis and appraisal.

Conclusions: The results of this review indicate that the marginal bone loss cannot be related to the use of different attachment systems and peri-implant soft tissue health is not affected by either

ball or bar attachments. It is believed that the direction of occlusal forces is more important than the connection of the implants. A mean marginal bone loss of 0.3 mm within the first year at implants with bars and clips or Ceka attachments was recorded. In the maxillae when O-rings were used as an attachment, rapid bone loss around fixtures has been documented too.

Poster Presentation No. 44

Attachment systems and retention of implant supported overdentures

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Purpose: Large number of manufacturers around the world provided much different design of attachments. The purpose of this review is to evaluate and compare the retention of implant-retained overdentures with different routinely used attachment systems.

Materials and Methods: Relevant articles were screened and selected based on a MEDLINE search limited to English-language articles published from 1995 to the present with regard to retention of different attachment systems available in the dental market. Selection criteria were done based on previously published articles in the literature.

Results: 80 relevant articles were found after an initial search from databases mentioned before. Following the title, abstract and full text level eliminations, total of eight papers was selected for critical analysis and appraisal.

Conclusions: The results of this review suggest that the retention appear to have an effect on long-term success and patient satisfaction and seems to decrease over time especially for the most retentive designs. Bars and clips seem to be more retentive. They can be selected when a high degree of retention is required such as extremely resorbed ridges without tissue undercuts. The retentive forces of most attachment systems are in the range of about 20 N. The least retentive attachments are the magnets. Some investigators suggest that these should be used in cases of bruxism. The complex movements in function can clinically lead to plastic deformation of the matrix portion, resulting in a reduction of retention or fractures of the clip.

Poster Presentation No. 45

Evaluating the short term colour stability of resin cements

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Purpose: Colour changes of the luting material can become clinically visible affecting the aesthetic appearance of translucent all-ceramic restorations. The aim of this in vitro study was to evaluate the early period of colour stability of light and dual-cured resin cements and its effect on the final shade of the all-ceramics.

Materials and Methods: Three different resin cements in both light and dual-cure forms were included in the study (Rely X/3M, NX3/ Kerr, Variolink/Ivoclar Vivadent). All resin cement prepared 1 mm diameter and 0.5 thicknesses with using acetaldpolyoxymethylene (Derlin) mould. Curing was performed according to ISO standards with a calibrated LED curing light. After curing 0.7 mm thickness feldspathic porcelain placed on the resin cement and colour measurements were determined using spectrophotometer. Samples were stored 24 h in 37 °C distilled water at dark and then colour measurements determined again. Changes in colour (ΔE) were obtained using the CIE L* a* b* system. The results were submitted to one-way ANOVA, Tukey HSD test ($\alpha = 5\%$).

Results: The ΔE values were listed under clinically acceptable limit of 3.3, except one dual-cure

resin cement group. Although the light-cure resin cement test specimens showed less than 1.0 ΔE values, dual cure resin cement test specimens showed ΔE values between 1.11 and 5.54.

Conclusions: The aesthetic performance of all ceramic restorations can be affected by the colour of the resin cement. Dual-cured resin cements presented significantly more colour changes in short term period, however, light cure resin cements showed clinically acceptable ΔE values.

Poster Presentation No. 46

Examination of the antifungal activity of nystatin mixed into a soft relining

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Purpose: The aim of the study was to examine the dissolution and the antifungal activity of medication incorporated into soft relining material applying conditions similar to the oral cavity.

Materials and Methods: Sample discs were prepared using denture base material with a diameter of 10 mm and a thickness of 1.5 mm. After mixing 10% Nystatin (group 1, N = 6) and 10% Nystatin and Eudragit® NE30D (Evonik Industries AG, Germany) (group 2, N = 6) to a soft relining material (UfiGel® VOCO GmbH, Germany), it was applied to one side of the acrylic discs in a thickness of 1.5 mm. Control discs were prepared without any agents (n = 3). The discs were immersed in 150 ml of artificial saliva, separated, kept at room temperature and the dissolution of the antifungal agent was measured for three months with spectrophotometer. Microbiological examination and agar diffusion tests were carried out immediately after the sample preparation and after three months, while the bioautography was completed after three months of immersion.

Results: The dissolution rate of Nystatin was higher in group 2 in the first month; later in group 1 and group 2 followed a similar pattern according to the spectrophotometric examination. Agar diffusion test, carried out with the discs after three months immersed in the saliva did not reveal antifungal effect. The bioautographic analysis confirmed the results of the spectrophotometric examination.

Conclusions: The results provided evidence for the dissolution of Nystatin that was effective at start, however after three months there was no effective antifungal agent left in the soft relining material.

Poster Presentation No. 47

Micro-shear bond strength of resin cements to Er,Cr:YSGG laser and acid etched enamel

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Purpose: The aim of this study was to evaluate the micro-shear bond strength (MSBS) of 2 different resin cements to enamel etched with phosphoric acid, Er,Cr:YSGG laser irradiation, or Er,Cr:YSGG laser irradiation followed by acid etching.

Materials and Methods: 24 caries-free molars were sectioned vertically and the flat buccal surfaces were used. 12 enamel discs for each of the resin cements (Panavia F 2.0 and Variolink N) were randomly divided to 3 subgroups according to the surface pre-treatment methods: 1) 37% phosphoric acid application for 20 seconds; 2) Er,Cr:YSGG laser (Waterlase MD, Biolase) irradiation at an energy level of 2 W, a repetition rate of 20 Hz with 55% water and 65% air irradiation for 10 seconds; 3) Er,Cr:YSGG laser irradiation for 10 seconds followed by 20 seconds of 37% phosphoric acid etching. 3 cylinders of resin cements were bonded to each enamel surface and MSBS was determined in a universal testing device at a crosshead speed of 1 mm/min. One-way analysis of variance and Tukey post-hoc tests were used to analyze the MSBS values.

Results: Panavia showed significantly higher MSBS values than Variolink ($p < 0.05$) for all the tested surface pre-treatment methods. Panavia showed the highest MSBS when the enamel was

treated by laser irradiation and acid etching.

Conclusions: The combination of laser irradiation and acid etching exhibited higher MSBS values to enamel than the use of acid or laser irradiation alone in the bonding of resin cements, holding the potential to become a suitable method for conditioning enamel surface.

Poster Presentation No. 48

Efficacy of various pre-treatments on the bond strength of denture teeth to denture base resins

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Purpose: To evaluate the effect of different pre-treatments such as sandblasting, grounding with a carbide bur and Er,Cr:YSGG laser irradiation of different intensities (1 to 4 W) in the ridge lap area of acrylic resin denture teeth on the shear bond strength (SBS) to heat-polymerized polymethyl-methacrylate (PMMA) denture base resin.

Materials and Methods: A total of 70 central incisor denture teeth were used in this study and were divided into 7 groups as; control group (no surface treatment), grounded with a tungsten carbide bur, sandblasted with 120 μm Al_2O_3 particles and Er,Cr:YSGG laser irradiated with different intensities (1 to 4 W). All specimens then were subjected to SBS test at a crosshead speed of 1 mm/min until fracture. Data were analyzed with one-way ANOVA and post hoc Tukey-Kramer multiple comparisons tests ($p = 0.05$).

Results: Similar SBS values were obtained after air abrasion, grounding with a carbide bur and irradiation by an Er,Cr:YSGG laser at 1 to 4 W and no significant differences among surface treatments and control group ($p < 0.05$).

Conclusions: Bond strength of acrylic denture teeth to (PMMA) denture base material is independent of the surface pre-treatments with both Er,Cr:YSGG laser, sandblasting and grounding with a carbide bur. In addition, all surface treatments provided similar bond between the acrylic denture base and teeth.

Poster Presentation No. 49

Evaluation of precision of digital impression technique in vivo

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Purpose: The aim of this study was to evaluate inter-operator reproducibility of digital impression technique in contrast with conventional silicone impression technique in vivo.

Materials and Methods: Twelve subjects who have no missing teeth (6 males, 6 females; mean age 26.6 ± 2.0 years) were included in this study. Impressions of mandibular molars of these subjects were made by 2 impression techniques, which used intra-oral scanner (Lava COS, 3M ESPE) and silicone impression material (Imprint 3, 3M ESPE). Both impressions were made by 2 operators with different clinical experience (3 or 15 year clinical experience). The Standard Tessellation Language (STL) data was directly exported from the COS system, while that of gypsum model made from silicone impression was obtained by 3D lab scanner (D810, 3shape). The STL datasets recorded by the 2 different operators were loaded into 3D evaluation software and superimposed using the best-fit-algorithm method (least squares method, PolyWorks, InnovMetric Software) for each impression method. Inter-operator reproducibility as evaluated by averaged discrepancies of corresponding 3D data was compared between 2 methods (paired t-test, $p < 0.05$).

Results: The visual inspection of superimposed inter-operator datasets revealed smaller discrep-

ancy for the intra oral scanner, which was confirmed by the statistical analysis that revealed significantly smaller averaged discrepancy for digital impression method ($19.9 \pm 4.3 \mu\text{m}$) than that for silicone impression ($34.1 \pm 6.6 \mu\text{m}$, $p < 0.05$).

Conclusions: This in vivo study demonstrated that digital impression method has superior precision in comparison with conventional silicone impression method, which is independent upon the clinical experience of the operator.

Poster Presentation No. 50

Comparison of occlusal contact during low-level clenching intensity

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Purpose: This study investigated the difference of occlusal contact area in each tooth between low level tooth clenching conditions in normal subjects.

Materials and Methods: Twelve healthy men (24.8 ± 2.5 years) and 12 healthy women (24.3 ± 2.0 years) with no more than one missing tooth per quadrant participated. Surface EMG was recorded from the masseter muscle. As baseline measurement, intercuspal position was maintained with minimal force and occlusal contact was recorded with blue silicone material. Occlusal contact was also recorded at 20% Maximum Voluntary Contraction (MVC) of masseter muscle and 40% MVC using visual feedback. The occlusal contact area was analyzed using five levels of light transmittance through the silicone material: Level 1 (0–149 μm); Level 2 (0–89 μm); Level 3 (0–49 μm); Level 4 (0–29 μm); and Level 5 (0–4 μm). Each of teeth was analyzed separately.

Results: At level 2 and 3, the occlusal contact area significantly increased from baseline to 20% MVC and to 40% MVC in the pre-molar area ($p < 0.05$), and it significantly increased from baseline to 20% MVC and to 40% MVC in pre-molar and molar area at level 4 and level 5 ($p < 0.05$). In the anterior part, there is no significant increment at all levels.

Conclusions: This study showed that the occlusal contact area increased from baseline to 20% MVC or 40% MVC. It suggested that occlusal contacts may be different at low clenching intensity with potential effects on the each teeth or periodontal tissues.

Poster Presentation No. 51

The influence of impression material on the accuracy of the master cast in implant restorations

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Purpose: The purpose of this study was to examine the effect of two different impression materials on the accuracy of the master cast with parallel and inclined implants. The impression materials that were used are medium body polyether and medium body silicone using a closed tray.

Materials and Methods: Master cast was fabricated in epoxy resin with three dental implants embedded. Five impressions were prepared with medium-viscosity polyether and five other with medium-viscosity silicone. The technique that was tested was that of closed tray. Two light-cured custom acrylic trays were fabricated for each impression material and transfer copings were fixed on the implants. Subsequently, the ten impressions were poured in type IV die stone. The first two implants were parallel to each other (Implants A, B) and perpendicular to the horizontal level and the third implant (Implant C) had a 25° inclination to the other two. The metal framework that was constructed in the master cast was fixed to the new specimens and the micro-gap between this

prosthesis and the implant analogues was evaluated. The specimens were observed using optical microscope from which photos were taken and analyzed in computer software.

Results: The obtained data of the micro-gap values were statistically evaluated using ANOVA and Categorical Regression analysis: 1) The marginal gaps were greater when medium-viscosity poly-ether was used as an impression material, than of those gaps when medium-viscosity addition silicone was used. 2) Concerning the angulated implants, the master casts that were poured from the medium-viscosity addition silicone impressions were more accurate, especially when short transfer copings were used. 3) Concerning the parallel implants, their master casts were more accurate, when short transfer copings were used. 4) Medium-viscosity addition silicone used as the impression material combined with short transfer copings produced more accurate master casts.

Conclusions: Within the limitations of this study, it can be concluded that the marginal gap between the implant surface and the prosthesis is affected mainly by the impression material, the implant angulations or their interaction.

Poster Presentation No. 52

Inlay-retained monolithic zirconia fixed dental prosthesis: A case report

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Purpose: Many treatment options are available to replace a missing tooth such as conventional metal-ceramic or all ceramic fixed dental prosthesis (FDPs) or implants in the posterior region. Inlay-retained FDPs can be considered more conservative treatment option compared with full coverage FDPs, especially when adjacent teeth have pre-existing restoration. The use of all-ceramic materials for fixed restorations has become popular due to its excellent optical properties and many of these restorations can be fabricated by CAD/CAM method chairside. Furthermore the indications of all-ceramic restoration are increased by introducing zirconia to dentistry. Depending on its high mechanical properties, monolithic zirconia could be material of choice for inlay-retained FDPs.

Materials and Methods: Case report: a 33-year-old man with missing maxilla right first premolar was referred to the Izmir Katip Celebi University, Department of Prosthodontics clinic. After radiographic and clinical examination; good oral hygiene, low susceptibility to caries, adjacent teeth of edentulous gap previously restored with composite filling were observed. Inlay-retained FDP was decided with monolithic zirconia using CAD/CAM technology. Filling materials were removed and deep chamber finish lines were prepared. Digital impression was taken (inLab Software, Sirona), restoration was designed and fabricated (inCoris TZI C, A3). Restoration was adhesively cemented (Panavia F 2.0) after sandblasting the internal surfaces of the restoration.

Results: The technique described in this case report allows a minimally invasive approach for single-tooth substitution, as an alternative to a full-coverage FDP or an implant-supported crown.

Conclusions: The demand for aesthetics and biocompatibility led to the use of monolithic zirconia CAD/CAM materials in fixed prosthodontics.

Poster Presentation No. 53

Evaluation of acid etching to shear bond strength of current CAD/CAM blocks

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Purpose: The purpose of this study was to evaluate the effect of two different etching agents on the shear bond strength between two lithium disilicate glass ceramic blocks and a composite resin by

using two resin cements.

Material and Methods: Pre-sinterized blocks of zirconia reinforced lithium silicate (ZLS); (Vita Suprinity) and lithium disilicate blocks (IPS e.max CAD) were sectioned (2 mm), to have 80 specimens by using a precision cutting machine. The prepared specimens received crystallization heat treatment as suggested by manufacturers. Two different acids were applied on groups: hydrofluoric acid etching (HF) and acidulated phosphate fluoride etching (APF). The disks were coated with silane primer and bonded to 4 mm diameter resin composite disks using two different resin adhesives and then stored in 37 °C for 24 hours. Shear bond tests were performed in a universal testing machine with a crosshead speed of 1 mm/min. The mean bond strength of the specimens was statistically analyzed using parametric test methods (Mann-Whitney U and Student T-tests).

Results: Based on the data of shear bond strength, statistically no significant differences were found between ceramic blocks ($p > 0.001$) with Student T-test. As surface treatment with HF acid method showed significant difference comparing to APF method.

Conclusions: New generation lithium disilicate (ZLS) and lithium disilicate glass ceramics did not show any statistically differences on shear bond strength among them.

Poster Presentation No. 54

Incidence of combination syndrome over a five-year period at the University of Pécs, Department of Prosthodontics

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Purpose: The treatment of patients having a completely edentulous maxillary arch and lower anterior teeth present is frequent in the dental practice. In these cases some specific changes can be detected in the oral cavity and on x-rays. These signs were summarized and described first by Kelly (1972).

Materials and Methods: Aim of the study was to examine the presence of the specific signs of the combination syndrome among the patients between 2009 and 2014. With the help of the electronic patient registry system used by the University of Pécs, 319 patients were filtered who were diagnosed with anodontia code (K0000 International Classification of Diseases [ICD]) in the examined period.

Results: 220 patients' orthopantomographs were evaluated searching for specific symptoms of the combination syndrome. 34 patients had complete edentulous maxilla and anterior teeth in the mandible. 4 patients (11.7%) showed the main sign of the combination syndrome, i. e. the maxillary anterior bone loss. Hypertrophy of maxillary tuberosity (9 cases, 26.4%), extrusion of the lower anterior teeth (6 cases, 17.6%) and great resorption of the distal mandibular ridge (16 cases, 47%) was diagnosed on the x-rays. The clinical examination of three patients supported the radiological findings.

Conclusions: Different signs of the combination syndrome were detectable, but the incidence rate was lower in this population in comparison with the results available in dental scientific publications.

Poster Presentation No. 55

The evaluation of development process of OHIP questionnaire

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Purpose: The oral health impact profile (OHIP) is one of the most important measurement instru-

ments of human perception of the social impact of oral disorders on their daily life. The OHIP questionnaire has 49 questions in original but it can be time consuming, so only 14 items were extracted from 49 items and provided good statistical properties. The aim of this study was to evaluate the content of OHIP articles towards years and cultures.

Materials and Methods: We searched the literature from 1995 and 2015 about OHRQoL measured by OHIP who had prosthodontic treatment.

Results: The short form of OHIP is generalized from past to today and this form generally applied in elderly for every country.

Conclusions: Both the short and the long form of OHIP are quite adequate method to assess OHRQoL.

Poster Presentation No. 56

Influence of increment thickness on the shear-bond-strength and light-irradiance of composite-based materials

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Purpose: Bulk-fill composites (BFC) are gaining popularity in restorative dentistry due to the significant reduced chair-time. The aims of this study were to determine and compare the influence of increment thickness on dentin bond strength and amount of light-irradiance of different BFC's.

Materials and Methods: One hundred and eighty extracted and sound human molars were prepared for Shear Bond Strength (SBS) testing. The teeth were then divided into four groups (n = 45) according to the filling material used; (1) G-ænial Anterior, (2) Tetric EvoCeram Bulk Fill, (3) SDR, (4) EverX Posterior. Each group was subdivided according to increment thickness: (2, 4 and 6 mm). In parallel, the amount of light irradiance for all groups and subgroups were quantified using (MARC® Resin Calibrator; BlueLight Analytics Inc.), measured at the bottom layer. Data were analyzed using two-way ANOVA followed by Tukey's post-hoc test.

Results: SBS and light irradiance decreased as the height of increments increases ($p < .05$), regardless of the type of BFC. SBS and irradiance mean values arranged in descending order was as follows ($p < .05$): EverX Posterior, SDR, Tetric EvoCeram Bulk Fill and G-ænial Anterior.

Conclusions: Besides being a reinforcing base with crack propagation inhibition and reduced polymerization shrinkage, EverX Posterior could potentially be used clinically as BFC.

Poster Presentation No. 57

Effect of gastric acidic challenge on surface topography of monolithic zirconia

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Purpose: To evaluate the surface topography of monolithic zirconia after immersion in simulated gastric acid.

Materials and Methods: Four partially stabilized (PSZ) and one fully stabilized (FSZ) zirconia materials were evaluated in this study: Prettau (PRT) from Zirkonzahn, Zenostar (ZEN) from Ivoclar, Bruxzir (BRX) from Glidewell, Katana (KAT) from Noritake and Prettau Anterior (PRTA) from Zirkonzahn, respectively. IPS e.max from Ivoclar was used as a control. The specimens ($10 \times 10 \times 1.2$ mm, n = 5 per material) were cut, sintered, polished and cleaned before immersed in 5 ml of simulated gastric acid solution (hydrochloric acid, 0.06 M, 0.113% solution in deionised distilled water, pH 1.2 for 96 hours in a 37 °C incubator. Specimens were weighed and examined for mor-

phological changes under scanning electron microscope (SEM) coupled with energy dispersive x-ray spectroscopy (EDX). Surface roughness was evaluated by a confocal microscope. The data were analyzed by one-way ANOVA followed by Tukey's HSD post hoc test ($p < 0.05$).

Results: PRTA displayed the highest weight loss (1.40%) among the zirconia specimens. IPS e.max showed about three times higher weight loss (3.05%) than zirconia specimens as an average. SEM examination indicated areas of degradation, bead-like shapes and smoothening of the polishing scratches after acid immersion. EDX displayed ion interactions and possible ion leaching from all specimens. Sa and Sq values for PRTA, ZEN and IPS e.max were significantly lower ($p < 0.05$) after acid immersion.

Conclusions: Monolithic zirconia showed potential resistance to acidic challenge in vitro. Whether a smoother surface is in fact a sign of true corrosion resistance or is purely the result of an evenly progressive corrosive process is yet to be determined.

Poster Presentation No. 58

Effect of shoulder lithium-disilicate on marginal leakage of CAD-on crowns

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Purpose: To evaluate the influence of shoulder lithium-disilicate ceramic on marginal leakage of CAD/CAM split-file zirconia based crowns.

Materials and Methods: Ten freshly extracted human molars were collected and distal half of each tooth was prepared with chamfer type margin, while mesial half was finished with mini-chamfer. Following digital impressions, zirconia frameworks were designed (Cerec 4.3, Sirona, Bensheim, Germany). Restoration margins on the mesial halves were designed as zirconia and on the distal halves zirconia margins were veneered with lithium-disilicate glass ceramic. Zirconia frameworks were milled and sintered. Lithium-disilicate veneering parts were milled, luted on zirconia frameworks, crystallized and glazed. Finished crowns were cemented on teeth (Multilink N) and 5,000 cycles of thermocycling (5–55 °C) were performed. Specimens were immersed in basic fuchsin solution for 24 hours. Four cross-sections were received from each crown and inspected for micro-leakage under a stereomicroscope (Leica, 20x). Micro-leakage scorings were calculated millimetrically and data were statistically analyzed (Mann-Whitney U Test, $\alpha = 0.05$).

Results: Statistical tests showed significant difference between two groups ($p < 0.05$). Mean micro-leakage scores for each group were recorded and the highest micro-leakage was noted with lithium disilicate margin design (1.17 ± 0.69). Zirconia margin group showed lower micro-leakage scores (1.03 ± 0.74).

Conclusions: Lithium disilicate added margin designs for zirconia crowns were not effective in reducing marginal micro-leakage, conversely restoration margins which are designed as zirconia only yielded better micro-leakage results.

Poster Presentation No. 59

Guidelines for acceptable scientific poster: A literature review

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Purpose: In most congress or scientific meeting usually there are some posters with very useful and practical scientific contents but unfortunately they have many problems in them so they could not attract the attendee's attention. Therefore this study was accomplished with the purpose of preparing basic rules for a useful poster.

Materials and Methods: In literatures review the keywords “guidelines – scientific – posters” were searched in: www.pubmed.org and www.google.com and among 103 subjects, 43 efficient literatures were evaluated. Then the common rules, guidelines and recommendations were summarized in this poster.

Results: Almost all literatures pointed out to many problems in creating a poster. The most common faults were in poster size, colour, font size and thrusting many words in a limited area. Although some literatures had been emphasized on attractive style and design but many posters had not contained.

Conclusions: With limitations of this research, for preparing a poster the mentioned basic rules must be accomplished, otherwise it could be frustrated and/or not attractive for readers.

Poster Presentation No. 60

Investigation of styloid process length in a Greek adults' population

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Purpose: The styloid process is a slender cylindrical bony projection of the temporal bone with two ligaments and three muscles attached to it. The symptomatic elongation of the styloid process is also referred to, as Eagle Syndrome. There is no unique statement however on what seems to be the normal length of the process. The aim of the present study is to investigate the distribution of length of the styloid process in a Greek young adults' population.

Materials and Methods: The sample comprised of student pilots and engineers entering the Hellenic Air Force Academy, from 2008 and onwards. 567 Digital Panoramic Radiographs and the corresponding software were utilized for the length measurements. Defined landmarks used were the end tip of the process and the lower margin of the tympanic plate. Inter and intra examiner variability was also tested.

Results: The mean length of the complex was 27.4 mm for the right side and 27.7 mm for the left side. 22.6% of the processes measured exceeded 30 mm which is most commonly used as a cut off value for elongation.

Conclusions: Styloid process is normally both detectable and measurable in OPGs. Even if the measurement may lack the absolute preciseness an elongated process is usually clearly depicted and must be kept in mind. Since symptoms of elongation may overlap with symptoms of TMD and since OPGs are routinely used, the dental professionals must be familiar with this clinical and radiological entity.

Poster Presentation No. 61

Implant-supported prosthetic rehabilitation with anterior iliac grafting in an adult cleft patient

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Purpose: The aim of this case report was to fabricate a fixed prosthesis in an adult cleft lip palate patient who had a congenital defect in anterior maxillae complaining of mastication, speaking and aesthetic problems.

Materials and Methods: The patient was operated under general anaesthesia with nasotracheal intubation. The repair of the alveolar defect began with infiltration anaesthesia in the vestibular and palatal areas. Vestibular incision was made and mucoperiosteal flap was released on the vestibular side. Another incision was performed to separate the gingival mucosa from the nasal mucosa.

Then, the nasal mucosa was separated from the oral mucosa in order to lift it towards the floor of the nose. Following this procedure, harvested anterior iliac bone was grafted into the cleft side with two mini titanium screws. Finally, the flap was closed with 4.0 mm polyglactin suture. After 4 months, gingival formers were placed. After 3 weeks, impression was taken with polyvinylsiloxane (PVS) impression material. Titanium custom abutments were fabricated for correction of implant angulation. Zirconia-supported fixed prostheses were inserted.

Results: The patient had a great satisfaction with the appearance and function. The patient was followed for 6 months and was instructed to comply with an oral hygiene programme on a one month recall schedule.

Conclusions: Implant-supported fixed prostheses in adult cleft lip palate patients have excellent aesthetic appearance and function.

Poster Presentation No. 62

Efficacy of water cooling in different implant systems – thermographic analysis

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Purpose: The aim of the study was the evaluation of efficacy of water cooling in different systems during implant placement procedure.

Materials and Methods: The study was performed on raw swine rib bone model. Four implant systems (Bergo®, 3I®, Sybron®, NeoBiotech®) were evaluated. The material was divided into five groups, including one without irrigation. During drilling, the potential overheating level of the bone tissue was recorded with thermo vision infrared camera (ThermoVision A20 M). The experiment took place in a room with a temperature of 24–26 degrees Celsius with humidity of 50–70%, without dust, vapours, and minimum air movement in the room. After drill-hole preparation, the neighbouring tissue was taken for histological and ultra-structural investigations. Achieved results were statistically analyzed. Difference significance was verified by Friedman ANOVA and Kruskal-Wallis ANOVA at the level $p < 0.05$.

Results: The lack of significant differences in drilling temperature between investigated devices was proved. In the case of drilling without any irrigation, the bone tissue destruction as well as exceeding of critical temperature disruptive osseointegration process was shown. All investigated irrigation systems effectively prevent bone overheating. The histological and ultra-structural investigations showed the changes typical for mechanical and thermal injuries and destruction of bone tissue.

Conclusions: Effective cooling system use plays the crucial role in implantation procedures, especially in mechanic drilling. The analyzed irrigation systems were comparable in bone overheating prevention. It may be concluded that infrared thermography can be used as an objective, non-invasive, and quantitative tool in temperature estimation during implant placement procedure.

Poster Presentation No. 63

Framework fit of removable partial dentures fabricated with different manufacturing techniques

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Purpose: The aim of the present in vitro-study was to compare the framework fit of removable partial dentures (RPD) fabricated with the conventional lost-wax technique (LWT) and 4 different computer assisted technologies.

Materials and Methods: An upper model with both molars and canines as residual teeth served as the master pattern for the fabrication of a total of 15 RDP's with equal construction. Beside LWT the following techniques were used to produce 3 RDP's, respectively: indirect CAM milling technology (ICT), direct CAM milling technology (DCT), rapid prototyping technology (RP) with direct inject printing (RPC) and RP with selective laser sintering (RPM). In all computer assisted technologies the same framework's design and dataset was used. Measurements of frameworks' fit were taken on the master pattern at the clamps' arms in horizontal and vertical direction using a light microscope. Statistical analysis was performed using SPSS 20.0 (Mann-Whitney U-test, $p < 0.05$).

Results: The conventional method (LWT) showed marginal discrepancies of $106 \pm 60 \mu\text{m}$. Highest fitting accuracy was found in RDP's fabricated with CAM milling technology with an average gap size of $41 \pm 25 \mu\text{m}$ (DCT) and $84 \pm 51 \mu\text{m}$ (ICT). Lowest fitting accuracy was found in RDP's fabricated with RP technology with an average gap size of $227 \pm 180 \mu\text{m}$ (RPC) and $359 \pm 184 \mu\text{m}$ (RPM). All techniques differed in a significant way ($p < 0.001$).

Conclusions: In contrast to RP, the use of CAM-technology seems to improve the fitting accuracy of RDP's in comparison to the conventional LWT.

Poster Presentation No. 64

Laser treatments effects on bond strength of differently sintered zirconia

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Purpose: This study investigated the effects of surface treatments by laser irradiations on the bond strength of differently sintered zirconium-oxide ceramics to resin cement.

Materials and Methods: 80 zirconia specimens were prepared, sintered in two different periods (short = Ss, long = Ls) and divided into four treatment groups of 10 as follows: a) No surface treatment applied; b) Er:YAG laser irradiated with 2 W power for 10 sec; c) CO₂ laser with 2 W power for 10 sec; d) CO₂ laser with 4 W power for 10 sec. 80 composite resin discs were fabricated and cemented with an adhesive resin cement to ceramic specimens. The shear bond strength test was performed after specimens were stored in water for 24 hours by a universal testing machine at cross shed speed of 1 mm/min. Data were statistically analyzed with two-way analysis of variance (ANOVA) and Tukey HSD test ($\alpha = 0,05$).

Results: According to the ANOVA, the sintering time, surface treatments and their interaction were statistically significant ($p < .05$). While each laser irradiating groups were significantly higher than the control groups, there was no statistically significant difference among them ($p > .05$).

Conclusions: Sintering time may be effective on the bond strength values and both Er:YAG and CO₂ laser irradiation would increase the bond strength between resin cement and differently sintered zirconium-oxide ceramics.

Poster Presentation No. 65

Cement and core materials effects on the colour of ceramics

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Purpose: The aim of this study was to evaluate the effects of luting cement and composite core materials on the final colour of lithium disilicate ceramic systems.

Materials and Methods: Twenty A2 shade ceramic discs (11 × 1.5 mm) were fabricated from IPS e.max medium-opacity (mo) (n = 10) and high-translucency (ht) (n = 10) frameworks. Additionally, five composite resin background discs (11 × 3 mm) were prepared from different shades (A1, A2, A3, B2, C2) and 30 luting cement discs (11 × 0.2 mm) from the shades of translucent, universal (A2) and white-opaque resin luting cement. The colour measurements of each ceramics were performed on each background and cement samples with a digital spectrophotometer and data recorded as CIE L* a* b* coordinates. The colour coordinates of ceramics on A2 shade composite and universal shade cement samples served as the control. Colour differences (ΔE_{00}) between control and other groups were calculated. Data were analyzed by three-way variance analysis (ANOVA) and Tukey HSD test ($\alpha = .05$).

Results: The ΔE_{00} values were affected by luting cement, composite core materials and their interactions ($p < .05$). The use A1, A3 and B2 shades of composites with WO-shade cement caused an unacceptable colour differences ($\Delta E_{00} > 2.25$) for both lithium disilicate ceramic systems.

Conclusions: The optical properties of composite core and cement layers would be effective on the final colour of lithium disilicate ceramics. Clinicians must be aware of this interaction, especially while using white-opaque cements.

Poster Presentation No. 66

Evaluation of marginal/internal fit of Co-Cr crowns: Direct-laser-metal-sintering versus CAD/CAM

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Purpose: The purpose of the study was to evaluate the internal and marginal fit of Co-Cr crowns fabricated with laser sintering, CAD/CAM and conventional methods.

Materials and Methods: Polyamide master and working models were designed and fabricated. The models were initially designed with a software application for 3D computer-aided design (Maya, Autodesk Inc.). All models were produced by a 3D printer (EOSINT P380 SLS, EOS). 128 one-unit Co-Cr fixed dental prostheses (FDPs) were fabricated with four different techniques: Conventional lost wax method (CLW), milled wax with lost-wax method (MCLW), direct laser metal sintering (DLMS) and milled Co-Cr (MCo-Cr). The cement film thicknesses of the marginal and internal gaps were measured by an observer using a stereomicroscope after taking digital photos in x24 magnification. **Results:** Best fit rates according to mean and standard deviations of all measurements were in DLMS both in premolar (65.84) and molar (58.38) models in μm . Significant difference was found in DLMS and the rest of fabrication techniques ($p < 0.05$). No significant difference was found between MCo-CR and MWLW in all fabrication techniques both in premolar and molar models ($p > 0.05$).

Conclusions: DLMS was best fitting fabrication technique for single crown based on the results. All groups were within the clinically acceptable misfit range.

Poster Presentation No. 67

Interarch relationship measured in transversal view using digital 3D models

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Purpose: To evaluate the method for measuring interarch relationship in transversal view using 3D models.

Materials and Methods: The sample comprised of 30 sets of study models randomly selected from Northern Finland 1966 Birth Cohort (Sipilä et al., 2001). Dental casts were placed in intercuspal position and scanned by 3Shape® 3D Scanner. Measurements were done on 3D digital models using 3Shape Ortho Analyzer software. Measurements were performed in transversal view and marked points in both dental arches were projected to the buccal sagittal plane. The measurements included bilateral first-molar relationship, bilateral canine relationship, transversal inter-molar asymmetry and midline asymmetry. All measurements were repeated in two weeks.

Results: Mean errors between repeated measurements were: for right first-molar relationship 0.12 mm (range 0.00–0.39 mm) and for left one 0.10 mm (range 0.00–0.20 mm), for right transversal intermolar asymmetry 0.15 mm (range 0.01–0.42 mm) and for left one 0.11 mm (range 0.00–0.30 mm), for right canine-relationship 0.12 mm (range 0.01–0.88 mm) and for left one 0.09 (range 0.01–0.26 mm). Mean error for midline asymmetry was 0.07 mm (range 0.00–0.24 mm).

Conclusions: The study shows that using 3D models and 3Shape Ortho Analyzer software is a valid and repeatable method in interarch relationship measurements.

Poster Presentation No. 68

Manual and digital measurement of occlusal characteristics in sagittal view

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Purpose: To evaluate the reliability and accuracy of measurements comparing manual measurements made on dental casts with measurements on digital 3D models in sagittal view.

Materials and Methods: The study sample comprised of 30 models of subjects randomly selected from Northern Finland 1966 Birth Cohort (Sipilä et al., 2001). Dental casts were placed in intercuspal position and scanned with 3Shape® 3D Scanner. Measurements were done on dental casts using digital calliper and on 3D digital models using 3Shape® Ortho Analyzer software in sagittal view. Marked points in both dental arches were projected to the occlusal plane. The measurements included bilateral first-molar relationship, bilateral canine relationship in the sagittal view and midline asymmetry in the frontal view. All measurements were repeated after two weeks.

Results: Mean errors in digital measurements were: for right first-molar relationship 0.07 mm (range 0.00–0.23 mm) and for left one 0.11 mm (range 0.00–0.39 mm), for right canine relationship 0.10 mm (range 0.00–0.34 mm) and for left one 0.14 mm (range 0.00–0.43 mm) and for midline asymmetry 0.11 mm (range 0.00–0.48 mm). Mean errors in manual measurements were: for right first-molar relationship 0.22 mm (range 0.00–0.83 mm) and for left one 0.17 mm (0.00–0.55 mm), for right canine relationship 0.21 mm (range 0.00–0.57 mm) and for left one 0.20 mm (range 0.03–0.66 mm) and for midline asymmetry 0.21 mm (range 0.00–0.63 mm).

Conclusions: The study shows that measurements of inter-arch occlusal relationship using digital 3D models have better accuracy and repeatability than manual measurements using dental casts.

Poster Presentation No. 69

Measurement of overbite and overjet using digital 3D

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Purpose: To evaluate accuracy of measurements of overbite and overjet made on digital 3D models with measurements made on conventional dental casts.

Materials and Methods: The sample comprised of 30 sets of study models of subjects randomly selected from Northern Finland 1966 Birth Cohort (Sipilä et al., 2006). Dental casts placed in intercuspal position were scanned by 3Shape® 3D Scanner®. Measurements of overbite and overjet were done on conventional dental casts using digital calliper and on 3D digital models using 3Shape® Ortho Analyser software®. Measurements were performed in frontal and sagittal view. All the measurements were repeated in two weeks.

Results: Mean error between repeated measurements on digital models was 0.13 mm (range 0.00–0.45 mm) for overbite and 0.15 mm (range 0.00–0.86 mm) for overjet. Mean error in manual measurements was 0.21 mm (range 0.00–0.58 mm) for overbite and 0.27 mm (range 0.02–0.82 mm) for overjet.

Conclusions: It can be concluded that measurements performed on digital 3D models show better accuracy and repeatability compared to manual measurements of overbite and overjet.

Poster Presentation No. 70

Comparison of three sintering methods

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Purpose: To compare the sintering shrinkage of zirconia frameworks sintered with three different methods.

Materials and Methods: A CAI/CAD/CAM system (Cerec 3) was employed to produce 72 identical zirconia single crown frameworks on a cast metal mandibular molar abutment. All frameworks were milled by the same milling device (inLab MCXL) based on one digital design file. Occlusal and buccal dimensional measurements based on marked reference points were done with a Toolmaker's microscope. Four reference points were marked on each surface of the projection area and perimeter between four points were calculated. Frameworks were randomly assigned to three groups to be sintered with three determined programs with durations of 8 hours, 2 hours and 10 minutes. All dimensional measurements were repeated after sintering.

Results: Projection area and perimeter changes after sintering were calculated and the sintering shrinkage of zirconia frameworks for three sintering groups were compared. The occlusal surface shrinkage values of 8 hour, 2 hour and 10 minute sintering groups were -20.283%, -20.435%, -20.341% for perimeter and -36.437%, -36.693%, -40.217% for area respectively. Buccal surface shrinkage values of 8 hour, 2 hour and 10 minute sintering groups were -20.052%, -20.107% and -20.087% for perimeter and -36.064%, -36.075% and -36.065% for area respectively. Statistical analysis shows there is no significant difference between three groups ($p > 0.05$).

Conclusions: The sintering shrinkage of zirconia single crown frameworks with 8 hour, 2 hour and 10 minute sintering programs were comparable.

Poster Presentation No. 71

The investigation of the marginal micro-leakage of ceramic veneer crowns with different finish lines

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Purpose: All-ceramic crowns offer good biocompatibility and aesthetic appearance and have been used successfully to restore anterior and posterior teeth. Micro-leakage is an important factor that affects the longevity of all-ceramic crowns. The purpose of this study was to evaluate the micro-leakage of heat pressed all-ceramic crowns made from IPS Empress eMax which were cemented with two different resin cements on the prepared teeth with two different finish lines, chamfer and rounded shoulder.

Materials and Methods: Forty extracted premolars were prepared for complete crowns with 2 different marginal finish lines (chamfer and rounded shoulder) (n = 20); IPS Empress eMax restorations were cemented using different 2 resin cements (RelyX U200 and Multilink N) (n = 10). Samples were thermocycled (5000), stained with 0.5% basic fuchsin, sectioned and examined under stereomicroscope. The extent of micro-leakage on gingival margins of the restorations was scored and recorded.

Results: Statistically no significant difference was observed between shoulder and chamfer groups (p > 0.05). However significant difference was found in RelyX compared with Multilink N (p < 0.05).

Conclusions: Multilink N resin cement showed significantly higher values for micro-leakage while marginal finish line design had no effect on micro-leakage for IPS Empress eMax crowns.

Poster Presentation No. 72

The effect of flow rate during laser irradiation on the bond strength of zirconia

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Purpose: The aim of this study was to determine the effect of different flow rates during Er,Cr:YSGG laser irradiation on the shear bond strength (SBS) of zirconia cores to a resin cement.

Materials and Methods: Fifty fully sintered zirconia specimens were divided into 5 groups according to the surface treatment applied (n = 10); control group (no surface treatment) (n = 10): airborne-particle abraded with Al₂O₃ particles and Er,Cr:YSGG laser irradiation with different flow rates (1%, 50% and 100%). After surface treatments, resin cements were applied on zirconia core specimens with the use of a cylindrical mould. SBS test was performed on all bonded specimens at a cross-head speed of 1 mm/min until fracture. In order to compare results of the bond strength, one-way ANOVA and post hoc Tukey-Kramer multiple comparisons tests ($\alpha = 0.05$) were used.

Results: Control group of specimens were exhibited the highest SBS values. All surface treatment methods did not improve the bond strength of the specimens (p > 0.05).

Conclusions: Bond strength of zirconia to resin cement is independent of the surface pre-treatments with both Er,Cr:YSGG laser and sandblasting.

Poster Presentation No. 73

Clinical follow-up of zirconia partial fixed dental prostheses

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Purpose: This retrospective clinical follow-up study purposed to evaluate the outcome of zirconia partial fixed dental prostheses made by dental students after 3 to 7 years of clinical service.

Materials and Methods: Altogether 102 patients had received 120 zirconia partial fixed dental prosthesis (range 3 to 12 units, mean 4.5 units) made by predoctoral dental students between 2007 and 2010. An invitation letter to clinical examination was sent and 76 patients (80%) attended the clinical follow-up (48 women and 28 men; mean age of 61 years, range 29–81 years). Patients received 88 zirconia partial fixed dental prostheses that consisted of 387 units, of which 250 were abutments and 137 pontics.

Results: The majority of restorations consisted of 3 or 4 units and the mean follow-up period was 4.9 years (range from 3 years to 7 years). The most common complication was chipping of veneering porcelain (13/387 units, 3.4%). The survival rate of the zirconia partial fixed dental prostheses after 3 to 7 years was 100%.

Conclusions: Results of this retrospective clinical follow-up study show that zirconia is a suitable material for short and long span fixed dental prosthesis both in anterior and posterior region.

Poster Presentation No. 74

Effect of sleep and physical activity on chronic myalgia

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Purpose: The objective of this study is to clarify how sleep and physical activities affect chronic myalgia in TMD patients.

Materials and Methods: Female TMD patients (n = 7) and female non-TMD patients (n = 9) were recruited. Sleep condition and physical activities were recorded with Actigraph for 14 consecutive days. Subjects were requested to answer following questionnaire everyday: 1) subjective jaw pain intensity at every three hours after awakening; and 2) subjective assessment of the quality of sleep. These parameters were statistically analyzed using a mixed effect model in which patient's age and the presence of menstruation were compensated. This study was approved by the Ethics Committee of the Osaka University, Graduates School of Dentistry and was supported by Japan Society for the Promotion of Science (JSPS), Grant-in-Aid for Scientific Research (B) #25293392. The authors have no conflict of interest.

Results: The higher the previous day's physical activity (OR = 0.992, p = .000, 95% CI: -0.0110~ -0.0040) and the quality of last-night sleep (OR = 0.997, p = .038, 95% CI: -0.0050~-0.0001), the lower the jaw pain in the first period became. The higher the previous day's physical activity (OR = 0.997, p = .033, 95% CI: -0.0053~-0.0002) and the quality of last-night sleep (OR = 0.993, p = .001, 95% CI: -0.0099~-0.0026), the lower the jaw pain in the second period became. The higher the jaw pain of the previous day, the lower the sleep quality became (Odds ratio = .993, p = .049, 95% CI: .987~.999).

Conclusions: These results suggest that sleep quality and physical activities affect chronic myalgia and that the chronic myalgia and sleep status could form the vicious cycle.

Poster Presentation No. 75

Bennett angle at different Angle's classes of occlusion

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Purpose: The Bennett angle is an important parameter during prosthodontic rehabilitation. Existing data about impact of different occlusion types on the values of the Bennett angle are scarce. The

purpose of this study was to investigate effect of different occlusion types on the Bennett angle values.

Materials and Methods: Study included 98 participants (26.0 ± 5.2 years) divided into four study groups: Angle's class I, Angle's class II, subdivision 1, Angle's class II, subdivision 2 and Angle's class III. All recordings were obtained using ultrasound jaw tracking device with six degrees of freedom. After paraocclusal tray was fixed on the lower jaw, every subject had to make three protrusive, three left and right laterotrusive movements. From the laterotrusive movements, device's software automatically calculated Bennett angle values for left and right joints, and data were statistically analyzed.

Results: One-way ANOVA did not show differences between different Angle's classes of occlusion for the Bennett angle values. Average Bennett angle value for all participants was 7.7° .

Conclusions: Our results suggest that different Angle's classes of occlusion do not have impact on the Bennett angle values. Average value of the Bennett angle is 8° , and should be used for average articulator settings.

Poster Presentation No. 76

Effect of daytime biofeedback training on sleep electroencephalograms

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Purpose: Sleep bruxism (SB) is one of well-known sleep disorders. In a previous study, daytime electromyogram (EMG) biofeedback (BF) training aimed at regulating awake bruxism was also found to be effective in reducing SB. Therefore, this study aimed to investigate the effect of daytime EMG-BF training on sleep electroencephalograms (EEG) in subjects with SB.

Materials and Methods: Five male subjects diagnosed as having SB (age: 23.2 ± 0.8 years) were recruited for this study. The diagnosis of SB was also verified by polysomnogram (PSG) sleep recordings for one night. The subjects were randomly divided into two groups: a BF group ($n = 3$) and a control (CO) group ($n = 2$). In both groups, EMG recordings for three consecutive weeks were taken. Although the BF group recognized EMG activities exceeded the threshold in week 2, no BF signal was received in weeks 1 and 3 in the BF group or throughout the entire recording period in the CO group. The EEG recordings were taken during sleep in both groups. The power spectra of the EEG delta band and alpha band were analyzed using FFT algorithm.

Results: In the BF group, the alpha band power decreased and the delta band power increased during weeks 2 and 3 compared with those in week 1. Furthermore, in the BF group, the ratios of sleep stages 3 and 4 increased in weeks 2 and 3.

Conclusions: Daytime EMG-BF training may help improve the quality of sleep.

Poster Presentation No. 77

A correction method using colour information on facial point group

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Purpose: A three-dimensional (3D) measurement system consisting of a digital camera with two lenses and an application to analyze 3D images has been recently developed to measure the distances in remote locations. Similar to a camera, this system is portable and can easily photograph

objects. In a facial measurement scenario, it can appropriately and easily capture facial expressions with eyes opening. However, the capacity to build the 3D point group data was significantly influenced by object surface and colour qualities. To acquire detailed facial measurement information using the portable system, a correction method using colour information on point group data was investigated.

Materials and Methods: A stone facial model and a wax facial prosthesis were chosen as objects. Two stereo images were photographed using a general-purpose digital camera. Then, a 3D point group data was built using space measurement software. A noise removing procedure using the down sampling of digital colour information allowed for data smoothing.

Results: In addition to the effect of normal down sampling, the correction with light intensity detection allowed detecting more micro-structures and removing object noise. It is considered that light intensity is related to the actual irregularity of objects. The correction using colour information to remove noise on a point group may be valid for facial measurements.

Conclusions: The correction method using colour information is effective in removing noise in point group data.

Poster Presentation No. 78

In vitro evaluation of biaxial flexural strength of all-ceramics

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Purpose: The purpose of this study was to investigate the influence of core thickness and artificial aging on the biaxial flexural strength of selected all-ceramic systems.

Materials and Methods: In-Ceram Alumina (IC), IPS e.max Press (EM), Katana (K) was tested. Each all-ceramic group contained two core groups based on the core material thickness as follows: 0.5 or 0.8 mm. Specimens from each core group were subjected artificial aging and all specimens were tested for biaxial flexural strength in a universal testing machine either with or without being subjected aging.

Results: Aging procedures slightly decreased flexural strength in EM and IC. K group was not significantly affected by the aging regardless of the core thickness ($p < 0.05$). Core thickness had a statistically significant effect on flexural strength among the core groups. There were no significant differences between the before and after aging flexural strength values for the same core groups.

Conclusions: This study indicated that aging showed different effects on the strength of IPS e.max Press, In-Ceram Alumina, or Katana systems. Katana system exhibited greater flexural strength values. Decreases in flexural strength after aging were not significant in all core groups.

Poster Presentation No. 79

Effect of pH on the formation of hydroxyapatite in PEO process with hydrothermal treatment of the Ti alloy

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Purpose: Synthesis of hydroxyapatite on the surface of Ti_6Al_4V alloy was performed. Structure, morphology and properties of the surface layer were studied.

Materials and Methods: The synthesis was performed by the AC Plasma electrolytic Oxidation (PEO) in a calcium acetate and sodium phosphate containing electrolyte followed by hydrothermal treatment at different pH values. SEM, EDS and XRD were employed to characterize the produced surface layer.

Results: All the oxidized coatings contained Ca and P as well as Ti and O, and the porous coatings were made up of anatase, rutile and hydroxyapatite. After hydrothermal treatment, the hydroxyapatite was precipitated on the surface of the sample plate obtained by PEO and the hydroxyapatite thickness was about 15 μm .

Conclusions: The combination of PEO and hydrothermal treatment allows production of porous titania surface enriched with hydroxyapatite having the technological thickness suitable for dental surgery and favoring better osseointegration.

Poster Presentation No. 80

The internal fit of metal-ceramic restorations prepared by different methods

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Purpose: The aim of this study was to compare the internal fit of metal-ceramic restorations prepared by conventional casting, milling, direct metal laser sintering (DMLS) and selective laser melting (SLM).

Materials and Methods: Forty-eight, three-unit fixed partial denture shaped specimens were prepared on a bronze die for each group which represents prepared left mandibular second premolar and second molar. Twelve conventionally casted, 12 milled, 12 direct metal laser sintered and 12 selective laser melted cobalt-chromium (Co-Cr) metal frameworks were prepared, then opaque and veneer porcelain material were applied. All specimens were cemented using self-adhesive resin cement. After embedding the specimens into acrylic moulds, all specimens were abraded bucco-lingually to middle section. Internal gap of the restorations were measured on mesial, distal and occlusal area by using stereomicroscope. Data were statistically analyzed by one-way ANOVA ($\alpha = 0.05$).

Results: A significant difference were found between the groups of conventional cast, milling, DMLS and SLM ($p > 0.05$). SLM group showed the better internal adaptation than other groups.

Conclusions: All samples showed a clinically acceptable internal adaptation. All methods were found to be reliable in terms of internal adaptation. On the other hand, laser-sintering groups showed better internal adaptation, which is a result of high accuracy of combining micro-particles together.

Poster Presentation No. 81

Analysis of abutment convergence angles by 3D processing with stereovision

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Purpose: This study investigated axial wall convergence angles of abutment teeth using a computerized image processing with stereovision technology.

Materials and Methods: Three dimensional (3D) coordinate points were predicted from two dimensional (2D) images. Distances and angles between the points were calculated. Two examiners measured axial wall convergence angles for seven artificial abutment teeth, based on the stereovision images. The measured values with this stereovision-based method (SVBM) were compared to those with the traditional tracing-based method (TBM). A wax model with two different slopes were made ($n = 5$). The slope angles of the model were measured by both methods, and the differences between the measured and real values were evaluated.

Results: From the intra-class correlation coefficients, the intra-examiner and inter-examiner reliabilities were shown to be excellent for both methods. However, significant differences between the measured and real values were found in the measurements of the wax models with the TBM. The

differences were not significant in case of the SVBM.

Conclusions: This study indicated the limitation of 2D analysis for a 3D object by showing more accurate measurements by SVBM than by TBM.

Poster Presentation No. 82

Manufacture of conventional crowns using a chilled acrylic resin system: Innovation

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Purpose: Building conventional crowns and fixed bridges of reasonable quality requires scientific knowledge and careful clinical procedure. Perfect temporaries, mouldings and moulds are the result of careful and precise preparation of the remaining dental material, gingival retraction with a cord and use of suitable elastomers. One cannot ignore evidence showing that as currently performed, this type of work is complex, unsafe, time demanding, stressful and not very productive.

However, contrary to established practice, it is a constant desire of prosthodontists to have uncomplicated clinical routines that yield conventional prostheses of exceptional quality.

Materials and Methods: We developed a highly precise system to make crowns using chilled acrylic resin for moulding, which yields high precision moulds, models, casting patterns and metal copings based on simple, safe and reliable clinical steps.

Results: The system presents the following advantages: a) no need to use a cord in the gingival sulcus; b) no need to use elastomers; c) mouldings may be made in four to five days after the temporaries; d) mould corrections are possible; e) acrylic resin is inexpensive; f) chilled acrylic has a long handling time; g) mouldings may be corrected.

Conclusions: The innovative procedure which uses chilled acrylic resin causes no stress or tension.

Poster Presentation No. 83

Effect of varying core thicknesses and artificial aging on the colour difference of different all-ceramic materials

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Purpose: Clinicians should reserve all-ceramics with high translucency for clinical applications in which high-level aesthetics are required. Furthermore, it is unclear whether a correlation exists between core thickness and colour change. The aim of this study was to examine the effects of different core thicknesses and artificial aging on the colour stability of three all-ceramic systems.

Materials and Methods: Ninety disc-shaped cores with different thicknesses (0.5 mm, 0.8 mm and 1.0 mm) were prepared from three all-ceramic systems, In-Ceram Alumina (IC), IPS e.max Press (EM) and Katana (K). The colours of the samples were measured with a spectrophotometer and the colour parameters (L^* , a^* , b^* , DE) were calculated according to the CIE $L^* a^* b^*$ (Commission Internationale de L'Eclairage) colour system before and after aging.

Results: The effects of aging on colour parameters were statistically significant ($p < 0.001$), regardless of core thickness. For all systems, the CIE a^* values increased as the thickness of the core increased. Conversely, such increases in core porcelain thickness were correlated with decreasing CIE L^* and b^* values. Core thickness had a statistically significant effect on colour change among the groups.

Conclusions: Different core thicknesses (from 1.0–0.5 mm) and artificial aging affected colour stability of the all-ceramic materials tested.

Poster Presentation No. 84

Effect of placement techniques on correct positioning of veneers during cementation

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Purpose: Various cementation accessories and instruments may be used to locate veneer restorations properly during cementation. The aim of this study was to evaluate the effect of different veneer placement techniques on correct positioning of veneers during adhesive cementation.

Materials and Methods: Veneer type preparation with a mini-chamfer margin (0.6 mm) was made on a phantom tooth of maxillary right central incisor. The impression was made with a polyvinylsiloxane impression material (Affinis Precious) and die models (N = 30) were made of epoxy resin (EP85-215). Thirty veneer restorations were manufactured from a glass-ceramic material (e.max CAD) by a CAD/CAM system (Cerec 4.2). They were checked for marginal adaptation, glazed and divided into 3 placement groups. In the first group, veneers were picked-up and held using a placement applicator with an adhesive tip (Optrastick) during cementation and polymerization, while a dental cotton tweezers were utilized for the same purpose in the second group. In the third group, veneers were placed bidigitally and then polymerized (Bluephase N). Digital photographs were taken from each specimen before cementation while the veneers were securely seated on the dies. Secondary identically aligned photographs were also obtained after cementation and the difference per each die was recorded using digital subtraction software. The data were statistically analyzed (ANOVA, $p < 0.05$).

Results: Mean values ($\text{mm}^2 \pm \text{SD}$) were as follows: G1: 2.2 ± 0.6 ; G2: 3.7 ± 0.7 ; G3: 0.7 ± 0.4 . G3 demonstrated significantly lower misfit values than other groups ($p < 0.05$).

Conclusions: Holding veneers bidigitally during cementation may be the most reliable method in terms of proper placement.

Poster Presentation No. 85

Influence of oxygen-inhibited layer on bonding performance of adhesive systems

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Purpose: This paper investigates the influence of the oxygen-inhibited layer on the surface properties and bond strength of different adhesive systems.

Materials and Methods: The bonding systems used in this study were Scotchbond Multipurpose (SM), Clearfil SE Bond (SE) and Scotchbond Universal (SU). Adhesives were applied to the bovine enamel and dentin, and light irradiated, and the oxygen-inhibited layer was either retained or removed. Surface free-energies were determined by measuring the contact angles of tested liquids on the cured adhesives. Enamel and dentin bond strength of the adhesives with and without oxygen-inhibited layer were measured. Ultra-structural observation of the resin-dentin and resin-enamel interface was made by scanning electron microscopy.

Results: The total surface free-energy values, polarity force and hydrogen-bonding force of cured adhesives with an oxygen-inhibited layer were significantly higher than those of cured adhesives without an oxygen-inhibited layer. The bond strength of SM and SE bonded to enamel and dentin showed no significant differences between specimens with and without the oxygen-inhibited layer. However, the bond strength of SU with the oxygen-inhibited layer was significantly higher than the without the oxygen-inhibited layer to both enamel and dentin.

Conclusions: The results of this study indicated that the surface free-energy characteristics of the oxygen-inhibited layer of dental adhesives were different depending on the type of adhesive. In addition, the presence of the oxygen-inhibited layer of single-step self-etch adhesive promotes stronger bonding, unlike the other types of adhesive system.

Poster Presentation No. 86

Flexural strength of fixed dental prosthesis with and without fibre reinforcement

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Purpose: Fibre reinforcement is recommended to enhance the stability of temporary bridges. The aim of this study was to evaluate the flexural strength of three-unit fixed dental prosthesis (FDP) with and without fibre reinforcement.

Materials and Methods: Three-unit FDPs were fabricated on a standardized master pattern with a premolar and molar using a deep-drawn film. Five specimens were produced with the following materials, respectively: Structur Premium QM (SP), SP with Grand Tec (SPG), Tuff-Temp (TT), TT with Dentapreg (TTD), Luxatemp (LT) and Luxatemp with Ribbond (TTR). All specimens underwent artificial ageing (mechanical loading 240,000 cycles, thermal undulation 5°/55 °C 5,000 cycles). To measure flexural strength, all specimens were loaded in a 3-point bending test rig until fracture in a universal testing machine (Zwick Roell Z010, preload 1 N, $v = 1$ mm/min). Statistical analysis was performed using SPSS 20.0 (Mann-Whitney U-test, $p < 0.05$).

Results: Highest flexural strength was found in specimens made of SP (1902 N \pm 938 N). Lowest values were found in specimens made of TTD (1394 N \pm 216 N). The values of the FDPs with and without fibre reinforcement did not differ in a significant way ($p > 0.05$).

Conclusions: Fibre reinforcement did not lead to a significant increase in flexural strength. Therefore, the additional use of fibres does not seem to be recommendable for clinical practice.

Poster Presentation No. 87

Lithium disilicate. Can it be the ceramic material of choice?

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Purpose: One of the major changes in modern restorative dentistry is the evolution of all-ceramic systems. The dentist is able to achieve restorations with improved aesthetic properties. One of the most recent systems is lithium disilicate, a material which imparts to the restoration a more natural effect with properties that support the function of the stomatognathic system. In this presentation lithium disilicate will be described and analyzed through its application in clinical cases. The aim was to present the types of restorations that can be fabricated along with the material's properties (biological, mechanical and optical).

Materials and Methods: Clinical cases will be presented, restored with lithium disilicate prostheses concerning, veneers, single crowns in the aesthetic zone, combinations of veneers and crowns as well as customized hybrid implant abutments.

Results: The presentation of the applications of lithium disilicate through these clinical cases illustrates the optical and biological advantages of the material. The natural appearance that provides to the prosthetic restorations and the possibility for different kinds of prosthetic solutions makes lithium disilicate a valuable treatment modality in modern dentistry.

Conclusions: Lithium disilicate is a modern ceramic system. Both laboratory and clinical studies provide positive long term outcomes for use in restorative dentistry. At the same time both the dentist and the dental technician need to know in depth both the properties and limitations of lithium disilicate in order to achieve optimal performance of the restorations.