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Oral Presentations

Assessment of the Accuracy of Fabricating Immediate Postoperative Obturator Plates Using 3D Printing Technology.

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Objectives: The aim is to evaluate the precision of digital design with the established methodology and the manufacturing of immediate postoperative plates by applying 3D printing technology in patients with planned resection of oral tissues due to cancer.

Materials and Methods: 10 patients aged 27 to 81 years before the planned resection of jaw tissues were qualified for the study. Before the surgery, an intraoral scan was performed with a Trios 3 scanner. Then, based on the digital impression and computed tomography images, postoperative plates were designed in the Blue Sky Plan 4 and Meshmixer software. The obturator plates were printed on a 3D printer. The plates were immediately inserted into the surgical site following the resection. Two weeks after the procedure, corrections were made and the obturating part was relined, then the restoration was scanned in a laboratory scanner. The superimposition of the designed plates and the plates after adjustments allowed for measuring the volume of their obturating part and calculating the percentage accuracy of the prepared prosthetic restorations.

Results: The average accuracy before planned soft tissue resection was 92.56%, before partial maxillary resection 81.97%, and before total maxillary resection 93.76%.

Conclusions: Digital obturator plate planning is a promising method for immediate care provision for patients undergoing resection procedures. The average accuracy of performed plates was 89.43%.

Keywords: Obturator, 3D-printing, head and neck neoplasms

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Autransplantation of Premolars With Complete Root Formation in the Anterior Region. A Retrospective Cohort Study

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Objectives: Aim of this retrospective cohortstudy was to assess the survival rate and success rate of autotransplantation of premolars with complete root formation to the anterior region. The influence of the prognostic factors patient age and practitioner competence on the survival rate and succes rate were determined.

Materials and Methods: Autotransplantation, performed in three dental practices restricted to periodontology in The Netherlands, were documented in a merged database. Cases were selected based on inclusion criteria (permanent teeth, donor tooth premolar, complete root formation (Morrees' classification 5), transplantation to anterior, endodontic treated, orthodontic treated after transplantation, follow-up > 1 year) and exclusion criterium (incomplete root formation (Morrees' classification $p < 0,05$).

Results: The study population consisted of 298 autotransplants. The 1-, 2-, 3- and 5-year survival rate was 100%. The 1-, 2-, 3- en 5-year succes was respectively 95,6%, 94,6%, 93,6% and 91,3%. During a mean follow-up period of 2,5 years (SD ± 1,70; range 1,00 – 11,83 years) 2 cases of tooth loss and 26 cases of complications with transplanted teeth were observed.

Conclusions: Autotransplantation is a procedure with high survival rate and success rate and therefore a suitable treatment option for replacing missing teeth. Prognostic factors patient age and practitioner competence could not be identified as factors with statistically significant prognostic influence.

Keywords: Autotransplantation, dental trauma, missing teeth

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Awake Bruxism Behaviors Frequency in a Group of Healthy Young Adults With Different Psychological Scores

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Objectives: The main aim of this study was to investigate the association between the psychological status and the frequency of awake bruxism behaviors assessed via the EMA approach in a sample of undergraduate dentistry students. The null hypothesis is that there is no statistically significant difference in the frequency of awake bruxism behaviors in students with different psychological statuses.

Materials and Methods: The frequency of five oral behaviors (i.e., relaxed jaw muscle, teeth contact, mandible bracing, teeth clenching, teeth grinding) was evaluated using a smartphone-based ecological momentary assessment (EMA) approach. The anxiety and depression status was investigated with the four-item patient health questionnaire for anxiety and depression (PHQ-4). ANOVA with Tukey post-hoc test was used to assess the difference in frequency of AB behaviors among the four PHQ-4 groups: group 1 normal (0-2), group 2 mild (3-5), group 3 moderate (6-8), group 4 severe (9-12).

Results: The difference in AB frequency among the four groups was statistically significant for relaxed jaw muscle (77.3%), teeth contact (13.4%), mandible bracing (6.9%), and teeth clenching (2.5%) but not for teeth grinding (0.4%). Based on these findings, the null hypothesis was rejected. The post-hoc analysis showed a statistically significant difference in the frequency of mandible bracing for the four groups. The frequency of relaxed jaw muscle condition was statistically different for all four groups, except between group 1 and group 2. Teeth clenching frequency was statistically different between group 1 and group 3, as well as between group 2 and group 3. Teeth contact frequency was statistically different between group 1 and group 3. No statistically significant difference was present between the four groups in terms of alert response rate.

Conclusions: Based on this study's findings, psyche seems to have a determinant impact on AB behaviors. The degree of psychological impairment seems to be correlated with the AB frequency. Thus, the patient's psychological status could be a possible explanation for significantly elevated bruxism behaviors.

Keywords: Awake bruxism, Ecological Momentary Assessment, Psychological status, Anxiety, Depression

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Bacterial Penetration Through Screw Access Hole in Screw-Retained Monolithic Zirconia Implant Crowns

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Objectives: The aim of this study was to test the bacterial penetration of screw access holes in monolithic zirconia implant crowns sealed using different methods.

Materials and Methods: 24 monolithic premolar zirconia (IPS e.max ZirCAD) crowns were divided into four groups (n=6) according to screw access hole sealing method: unbonded composite (UBC), bonded composite (BC), airborne-particle abrasion and bonded composite (ABC), negative control without screw access hole. The test system consisted of upper and lower chamber. Crowns with filled screw access hole were fixed in plastic upper chambers, occlusal part of the crown being inside of the chamber while apical part was outside. Polytetrafluoroethylene tapes were placed inside the apical parts of the crowns and freshly prepared *S. mutans* bacterial suspension was poured into the upper chambers. The lower chambers were filled with bacteria culture media up to the apical parts of the crowns. Bacterial penetration through the model system was assessed by visual inspection of the turbidity of the lower chamber. *S. mutans* identity was confirmed on agar plate culture. After 28 days the PTFE tapes were removed and transferred to nutritious medium, vortexed and sonicated before an aliquot of 50μl was plated on agar plates. After incubation at 37°C, the amount of bacterial growth was evaluated. The statistical analysis was performed using Fisher-Freeman-Halton exact test and pairwise comparison with z-test.

Results: In all the test groups bacterial penetration was noticed by the eight days (BC (1/6), ABC (3/6), UBC (6/6)), whereas control group stayed bacteria free. Bacteria penetrated through the screw access hole of all the specimens in UBC group within 24 hours, being significantly faster than in other groups (p=0.011).

Conclusions: The sealing method of the screw access hole affects the bacterial penetration. Using a resin bonding significantly reduces *xxxx* penetration but it does not prevent it completely.

Keywords: screw access hole, zirconia, implant crown

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Can Inadequate Prosthetic Restoration and Post Be Associated With Apical Periodontitis? A Retrospective Study

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Objectives: The aim of this retrospective cohort study was to determine the prevalence and correlations between root canal treatment, periapical status, and coronal restoration detected using cone beam computed tomography (CBCT) in elderly Polish population (60-79 years).

Materials and Methods: A total of 480 CBCT images were assessed. Collected data included: age, gender, the tooth location, the type and quality of the prosthetic restoration, and apical periodontitis (AP).

Results: There was a statistically significant correlation between the age of the patients and the number of preserved teeth; with age, the number of teeth in patients decreased. A crown with overhangs, open margins or caries adjacent to restoration (inadequate prosthetic restoration) was associated with an increased prevalence of AP (p <0.05). The type of prosthetic restoration (single crown vs. bridge abutment) was associated with the apical periodontitis, lesions were found significantly more frequently in the bridge abutment teeth than in single crown abutments (p <0.05). Moreover, the presence of a post metal/non-metal was significantly associated with the AP.

Conclusions: Inadequate prosthetic restoration and the presence of posts were associated with increased prevalence of AP.

Keywords: Cone beam computed tomography, apical periodontitis, prosthetic restoration, treatment outcome, epidemiology

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Clinical Illuminance Impact on Occlusal Morphology Digitalisation Ability: A Pilot Study

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Objectives: Intraoral scanners have become essential tools in dental practice, and achieving accurate results can positively impact treatment approaches. Nevertheless, varied factors, such as illuminance, may affect scanning accuracy. From that point of view, this clinical study aims to evaluate the impact of the clinic light's illuminance on the occlusal morphology digitalization ability.

Materials and Methods: Four groups were created based on clinical illuminance conditions: Clinical Lightness (CL) ~1000 Lux and Clinical Darkness (CD) ~0-15 Lux, and maxillary and mandibular arches. Ten digital scans (TRIOS4; 3Shape) were performed for the maxillary and ten scans for the mandibular jaw of a patient with ambient light settings. A master digitalization was performed according to The European Standard for Illumination (EN 12464) ~10.000 Lux. The 3D deviations between the reference data and digital scans were calculated and depicted on color-difference maps (Geomagic Studio 2015; 3D systems). A one-way ANOVA and Tukey test was used (a=.05).

Results: Significant differences in accuracy values were found among the maxillary and mandibular arches within the same clinical illuminance conditions(p<.001).

Conclusions: The results of this study, despite its limitations, highlight the significant differences in digitalisation values between the mandibular and maxillary arches under the same illuminance conditions.

Keywords: Accuracy, Illumination, Intraoral Scanners

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Comparison of Flexural Strength, Monomer Release and Wear Properties of Conventional PMMA, Milled PMMA and 3D-Printed Resin Built in Different Printing Angles For Occlusal Splint Fabrication

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Background: The development of digital dental technologies has led to the introduction of new materials and methods but with limited evidence regarding the various properties, including biocompatibility, which may be influenced by factors such as the printing angles of 3D printed resin, as this technology is still evolving compared to conventional methods and materials. Moreover, there is insufficient evidence to determine which technique is superior in terms of the flexural strength, monomer release and wear properties of occlusal splints.

Objective: The aim of this *in vitro* study was to evaluate the flexural strength, monomer release and wear resistance between conventional PMMA, milled PMMA and 3D-printed resins built in different printing angles (90° and 30°) for occlusal splint fabrication.

Materials and Methods: Four occlusal splint materials were evaluated, one conventional heat-cured PMMA (Oracryl [HP]), one milled PMMA (Kerox Premia [KP]) and two different brands of 3D-printed resins (FreePrint Splint 2.0 [FS] and KeySplint Hard [KS]), each fabricated at 90° and 30° printing angles. Specimens intended for flexural strength and wear tests were immersed in 37°C water for 50 hours, then subjected to thermal ageing using a thermocycler for 20,000 cycles, with each cycle consisting of a 30-second immersion in water at 5°C and 55°C. Flexural strength was evaluated using a three-point bend test on a universal testing machine. For the monomer release test, specimens were stored in 4 ml of distilled water. The specimens were stored in an incubator at 37°C, which was replaced daily. Methyl methacrylate (MMA) elution was measured using UV spectrophotometry on days 1, 3, 5, and 7. The wear test was conducted after 140,000 cycles using a chewing simulator (SD Mechatronik CS-4.4) and the volume loss was calculated using Autodesk MeshMixer software. Statistical analysis of flexural strength, monomer release and volume loss was performed using Shapiro-Wilk test and one-way ANOVA with Tukey's multiple comparison tests.

Results: The KP group showed the highest mean flexural strength values (115.5±5.3 MPa) which were statistically significant outperforming all other groups (p<0.0001). Comparing the different printing angles of the 3D-printed resins, the 90° FS group had a statistically significant higher mean flexural strength (60.5±3.8 MPa) than the 30° FS and 30° KS groups (p<0.0001). However, the difference between 90° KS and 30° KS were not statistically significant (p>0.05).

In terms of monomer release, on day 1, the KS group had the highest concentration at 19.2 ± 5.2 ppm, with was statistically different compared to the KP group (p<0.0001) and HP group (p<0.01). Meanwhile, the KP group exhibited the lowest concentration of residual monomer, at 7.6 ± 3.7 ppm, which was statistically significantly lower compared to both FS and KS groups (p<0.0001). From Day 1 to Day 3, the residual monomer concentrations significantly increased, peaking on Day 3, followed by a significant drop on Day 5, and then slight increased by Day 7, with the KS group maintaining the highest concentration throughout the 7-day incubation period.

In terms of wear, the KP group showed the lowest mean volume loss (2.5±1.3 mm3) which was statistically significant compared to the other 5 groups (p<0.01). The highest volume loss was observed in 90° FS (9±1.4.6 mm3). The analysis found that the differences in volume loss values between 90° and 30° built angles in FS and KS groups were statistically not significant.

Conclusion: The KP group demonstrated the highest flexural strength and wear resistance, significantly outperforming all other groups. Regarding different printing angles, the 90° FS group showed a significantly higher flexural strength compared to the 30° FS and 30° KS groups, emphasizing the influence of printing angles on the mechanical properties of 3D-printed resins. However, the difference in volume loss between the 30° and 90° printing angles was not statistically significant in terms of wear properties. The KP group exhibited the lowest concentration of residual monomer, meanwhile, the KS group showed the highest concentration until day 7. The observed fluctuating results indicated that monomer release was a continuous process over the 7 days of incubation.

Keywords: occlusal splint, flexural strength, monomer release, wear resistance, CAD/CAM

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Comparison of Mandibular Condyle Structure Changes in Patients With Different Prosthetic Restorations By Fractal Analysis

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Background: In patients with different prosthetic restorations, various prosthetic materials may result in alterations to the trabecular structure of the mandibular condyle over time.

Objective: The purpose of the study was to compare the changes in the trabecular bone structure of the mandibular condyles of patients utilizing implant-supported removable and implant-supported full-arch fixed prostheses by the fractal analysis method.

Materials and Methods: The study was conducted on panoramic radiographs of 72 condyles from 36 patients retrospectively (20 females, 16 males). The patients were divided into 3 groups: control group without prosthetic restorations (CG), implant-supported full-arch fixed prosthesis (FG), and implant-supported removable prosthesis (RG). Regions of interest (ROI) were selected (75x75 pixels) within the cortical boundary of the mandibular condyles in panoramic radiographs, and the fractal dimension (FD) was computed using ImageJ version 1.51. The ROI values for each patient were evaluated for the right and left mandibular condyles, and the mean values were calculated. Statistical analysis was performed with SPSS software. For statistical analysis, the One-Way ANOVA and the independent t-test were used, and the statistical significance was set at P<.05.

Results: The mean FD value was 1.34±.91 in the CG group, 1.25±.06 in the FG group, and 1.24±.74 in the RG group, respectively. There was a statistically significant difference between the CG and FG groups (P=.014). Additionally, there was a statistically significant difference between the CG and RG groups (P=.01). However, there was no statistically significant difference between the RG and FG groups (P=.986). In terms of gender, the mean FD value was 1.26±.79 for female patients and 1.3±.95 for male patients; there was no statistically significant difference (P=.213).

Conclusion: Regardless of the implant-supported fixed or implant-supported removable prosthetic restorations, morphological changes in the trabecular bone structure of the mandibular condyle may occur. The alteration of habitual occlusion, occlusal bite force, and mastication habits after prosthetic treatments may cause lower FD values.

Keywords: Fractal analysis, implant-supported fixed prosthesis, implant-supported removable prosthesis, trabecular bone structure,

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Clinical Outcomes and Complication Rates of Endodontically Treated Teeth With Fixed Dental Prostheses: A Retrospective Study

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Background: Endodontically treated teeth (ETT) often have significant structural damage and require multiple reinforcing methods during the reconstruction process.

Objectives: The aim of this study was to evaluate the complication rates of ETT with and without a post.

Materials and Methods: The study investigated various clinical factors, including technical complications as well as biological complications. All patients who had previously received cemented fixed dental prostheses (FDPs) were subjected to clinical and radiographical examinations during their follow-up visits. Clinical and radiographic assessments were performed to determine the cumulative survival rate, and life table survival analyses of FDPs in the presence of complications were performed.

Results: The study included 287 ETT evaluated in this study, in which 219 were placed in females and 68 in males, with an average follow-up time of 82.4 months. There were no significant differences between ETT with a post and ETT without a post with regard to the complication rates. Furthermore, no significant differences were found (p = 0.102) in the complication rates between types of final restoration. The complication rates of the FDPs without a post revealed a survival rate of 58% after 5 years, 44% after 10 years, and 29% after 15 years. Though, the kaplan–meier survival analysis showed not significant differences in the complication rates re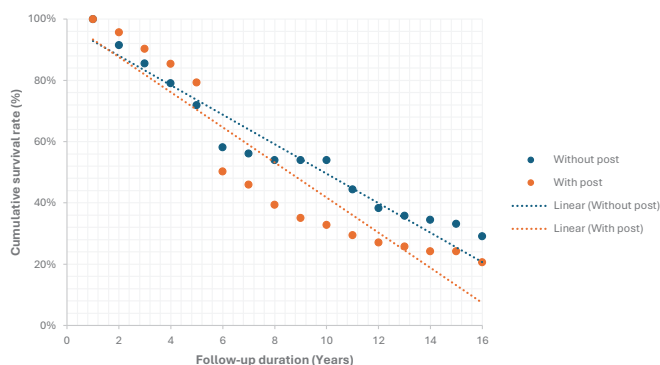gardless the existing of the posts (p = 0.830). On the other hand, the cumulative survival rate of the FDPs with a post was 50% after 5 years, 30% after 10 years, and 21% after 15 years.

Conclusion: ETT restored with FDPs with or without a post can show similar complication rates in a long-term evaluation. Furthermore, the types of final restoration may not have an effect on the complication rate.

Keywords: complications, crown, endodontics, nonvital, survival rate.

Keywords: Fixed prothesis, Endodontically treated teeth, Complications, Survival rate, Post

Figure 1. Kaplan–Meier survival function of endodontically treated teeth with or without post restorations for incidence of complications, (p = 0.830).

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Table 1. Types of complications that were found on the evaluated groups.

Groups		Endodontically treated teeth with technical complications (%)	P- value	Endodontically treated teeth with biological complications (%)	P- value
Gender	Female	15/219 (6.85%)	0.072	124/219 (56.62%)	0.0831
	Male	9/68 (13.23%)		31/68 (45.58%)	
Type of final treatment	Single crown	12/185 (6.48%)	0.267	102/185 (55.13%)	0.197
	Bridge or connected crowns	9/66 (13.63%)		38/66 (57.57%)	
	Direct restoration	3/36 (8.33%)		15/36 (41.66%)	
Type of Materials for The Prosthesis	PFM	16/177 (9.03%)	0.219	81/177 (45.76%)	0.201
	All Ceramic	3/74 (4.05%)		46/74 (62.16%)	
Location	Maxilla	20/169 (11.83%)	0.004	100/169 (59.17%)	0.007
	Mandible	4/118 (3.38%)		75/118 (63.56%)	
Site	Anterior	1/62 (1.61%)	<0.001	42/62 (67.74%)	<0.001
	Posterior	21/193 (10.88%)		99/193 (51.29%)	
	Anterior/posterior	2/32 (6.25%)		14/32 (43.75%)	
Presence of Post	Without Post	11/146 (7.53%)	0.533	79/146 (54.10%)	0.381
	With post	13/141 (9.22%)		76/141 (53.90%)	
Type of Post	Fiber	10/25 (40%)	0.095	13/25 (52%)	0.056
	Metal	13/100 (13%)		72/100 (72%)	
	Cast	1/16 (6.25%)		10/16 (62.5%)	
Total		24/287 (8.4%)		155/287 (54%)	

Deviations Caused by Tightening Torque on Polyetheretherketone Scan Body of Bone Versus Tissue Level Implant

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Objectives: This study aimed to evaluate horizontal and vertical discrepancies in PEEK implant scan bodies attached to two implant connection types (bone-level tapered and tissue-level implants) at varying torque levels using scanning electron microscopy (SEM).

Materials and Methods: 78 PEEK scan bodies were evenly divided between bone-level tapered implants (BLT) and tissue-level implants (TL). Subgroups of 13 scan bodies underwent torque application at 5, 10, and 15 Ncm, followed by argon gas coating and SEM analysis. BLT measurements included scan body length and implant-scan body angle on four surfaces (Buccal, Mesial, Distal, and Lingual). TL measurements covered PEEK scan body angles, gap lengths on all four surfaces, and scan body length on upper and lower surfaces.

Results: Significant differences in vertical discrepancies were seen in the TL group, decreasing from 5 Ncm to 15 Ncm (p < .001). At 5 Ncm, Angle L was smaller than at higher torques (p = 0.012), and gaps M, L, and D trended as 5 Ncm < 15 Ncm < 10 Ncm (P =.007, .018, .014), respectively. 15 Ncm resulted in upper-side tilting (P=.038), while all torques led to shifting to L (P=.049). In the BLT group, no significant differences were found in discrepancies with varying torque levels, but horizontal shifting to M occurred at 5 Ncm (P=.001) and 10 Ncm (P=.001) , and tilting was noted to D at 5 Ncm (P=.017) and to B at 15 Ncm (P=.016).

Conclusions: This study found significant deviations in vertical and horizontal measurements within the Tissue-level group due to torque application, with optimal outcomes observed at 5 Ncm or less. Both TL and BLT scan body groups exhibited significant horizontal changes and tilting towards specific surfaces, emphasizing the importance of considering torque levels for accurate digital workflows.

Keywords: Tissue level implant, Scan body, Polyetheretherketone, torque level

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Digital Occlusion Scan to Analyze the Effect of Occlusal Adjustment with Persistent Pain After Endodontics

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Background: Two of the common treatment options for (persistent) tooth ache are an endodontic treatment or extraction of the tooth. Digital occlusion using pressure sensors is a very sensitive technique and was used to analyze pressure spots on the occlusal surface before and after (minor) occlusal adjustment.

Materials and Method: The research population contains patients formed into two groups who have (unexplainable) persistent pulpitis-like complaints; a group with endodontic treated teeth and a group with healthy vital teeth. As a control, a group was analyzed without persisting pain after endodontic treatment. The treatment contained occlusal adjustment (ICAGD), guided by the digital occlusion analysis (T-scan® III). Pain was measured using the NRS-score and the occlusion was measured by the digital occlusal analysis (T-scan® III) using the variables: occlusion time, force outliers and analysis of the Center of Force (COF) pattern from initial contact till MIP.

Results: 22 patients with persisting pain were included in this study, 12 with pain on endodontic treated teeth and 10 with pain on healthy vital teeth. Another 12 patients were in the control group. A statistically significant difference was measured for all three variables (p < .05) except for the variable force outliers for the endodontic treated group (p = .121). There appears to be no linear correlation between the pain and the occlusion time, nor the force outliers (p > .35). All patients in the control group showed the ideal COF pattern (a straight line from initial contact to MIP).

Conclusion: Occlusal adjustment guided by a digital occlusion analysis seems to be helpful to diagnose the role of the shape of the occlusal surface in initial as well as persisting endodontic pain. As conclusion can be drawn that the digital occlusion analysis can have a significant contribution in the diagnosis of unexplainable toothache.

Keywords: Digital occlusion analysis, Persisting pain after endodontics, Diagnosis unexplainable toothache, Occlusal adjustment, No bacterial infection

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Effect of Chemical Composition and Microstructure on the Mechanical Properties of Resin Composite CAD-CAM Materials.

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Objectives: To assess the influence of chemical composition and microstructure on the mechanical properties (flexural strength, flexural modulus, and modulus of resilience) of ten commercially available resin composite blocks indicated for chairside CAD/CAM restorations.

Materials and Methods: The materials studied were Brava (BR; FGM Dental), Grandio-Block (GD; Voco), Shofu Block (SB; Shofu), Cerasmart 270 (CS; GC Dental Products), Brilliant Crios (BC; Coltene), Tetric-CAD (TC; Ivoclar Vivadent), Katana Avencia (KA; Kuraray Noritake), Lava Ultimate (LU; 3M ESPE), Mazic (MZ; Normon), Estelite P-Block (ES; Tokuyama Dental), IPS e.max CAD (EM; Ivoclar Vivadent) as positive control group, and G-Cam (GC; Graphenano) as negative control group. Mechanical properties were measured using a three-point bending test and density using pycnometry. The curing process were characterized by differential scanning calorimetry (DSC), and thermogravimetric analysis (TGA) was performed to determine the filler content. Data were analyzed using descriptive and inferential statistics. A principal components analysis (PCA) was also conducted to examine relationships between the different variables.

Results: The mean flexural strength ranged from 130.93 MPa (SB) to 224.25 MPa (GD). The mean flexural modulus varied from 10.15 GPa (SB) to 20.88 GPa (GD). The mean modulus of resilience ranged from 0.67 MPa (LU) to 1.71 MPa (TC). Density values varied from 1.671 g/cm3 (SB) to 2.19 g/cm3 (TC). DSC plots only showed exothermic reaction peaks for BR. Inorganic filler content ranged from 60.65 wt% (BC) to 82.31 %wt (GD).

Conclusions: Density did not affect the mechanical properties of the tested materials. Instead, filler content proved to be a critical determinant. BR was the only material that exhibited free radicals. Therefore, the ability of achieving an adequate chemical bonding of these materials to the substrate remains questionable, since the industrial high-temperature-pressure polymerization results in a higher degree of conversion and less residual monomer in the material.

Keywords: CAD/CAM, Mechanical properties, hybrid materials, chemical composition, microstructure

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Effect of Implant Situation Andintra-Oral Scanners on the Scan Accuracy of Multiple Implants

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Objectives: The region of the implant and type of the intraora lscanner (IOS) may have an effect on the accuracy of intraoral scans.This study investigates the effect of IOS and FPD situation on the scan accuracy of three different located implants as anterior, premolar and molar regions

Materials and Methods: Bone and tissue leve limplan tanalogs were placed in a maxillary model as a central, first premolar and first molar sites as a tooth deficiency clinical statement.Reference standart tesselation language (STL) files of the models were generated by using an optica lscanner. Three IOS (Mediti700, Trios 3 andTrios 5) were used to perform partial-arc scans (test scans)of each model(n=10), which were exported in STL format.For each IOS's data set, the XYZ coordinates of the cylinders were obtained from the reference point and the deviations from the reference scanner were calculated using a 3D reverse engineering program (Geomagic Xsoftware). The trueness values were analyzed by One-way ANOVA test and Tukey's HSD test

Results: There was a statistically significant difference between the intra-oral scanners in termsof RMS measurements (p:0.038; p<0.05). Scan precision was affected by the interaction between the IOSs and the implant situation when 3D distance were concerned. There was a statistically significant difference between the intraoral scanners in terms of molar measurements (p:0.007; p<0.05).

Conclusions: We concluded that the Trios 5 scanner had the highest reproducibility and accuracy in the clinical setting (p:0.005; p<0.05).

Keywords: Accuracy, digital impressions, implant dentistry, intra-oral scanner, implant region

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Effect of Semipermanent Cement on the Tensile Bond Strength of Implant-Supported Monolithic Zirconia Crowns

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Objectives: The purpose of this study was to evaluate the effect of semi-permanent cement on the tensile bond strength of implant-supported monolithic zirconia crowns.

Materials and Methods: Forty-eight implant analogs and abutments were placed in autopolymerizing acrylic resin material. Digital impressions were taken of each abutment. The crown for each abutment was designed in the shape of the maxillary 1st premolar. Monolithic zirconia crowns were prepared to fit the abutments. The crowns were divided into 4 groups (n=12) and cemented with different semi-permanent cements. After thermal cycling, tensile testing was performed using a universal testing device (5 mm/min) and the value at which decementation occurred was recorded (N). The type of fracture was assessed after decementation. The results were statistically analysed using one-way analysis of variance and Tamhane's multiple comparison test (α=0.05).

Results: There was a statistically significant difference between the bond strengths of the cements used (P<.05). The highest bond strength value was found for EsTemp Implant. This was followed by Dentotemp, GC Fuji Temp LT and Temp-Bond Clear, in order from highest to lowest. Residues were found on the abutment surface in 8 specimens in the EsTemp group and in 11 specimens in the Temp-Bond group. In the Dentotemp group, it remained on the crown in half of the specimens and on the abutment surface in only 3 specimens.

Conclusions: Urethane dimethacrylate and methacrylate based cements have higher bond strength than other cements.

Keywords: Monolithic zirconia, Abutment, Tensile test, Semi-permanent

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Effects of Cervical Design and Cement Choice on Fracture Resistance of 3D Printed Permanent Crowns

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Introduction: 3D printed resin materials have recently emerged in the market, offering a wide range of applications in prosthodontics, from short-term temporary solutions to permanent crown applications.

Further research should be carried out to ascertain the mechanical properties of the material for them to be reliable permanent restoration option.

Objective: This study aims to evaluate the effect of different cervical finish line (CFL) designs on the fracture resistance of 3D printed full crown restorations, using various luting agents for cementation.

Material and Method: Thirty-six (N=36) caries-free maxillary second premolar teeth were randomly divided into three groups according to cervical finish line (CFL) Chamfer [C], Rounded shoulder [S] and Knife edge [K] (n=12). Premolar teeth were selected in order to understand the materials durability against lower occlusal forces prior to testing against with molars which are subjected to higher occlusal forces intraorally.

Preparations were standardized according to the finish line design using chamfer, rounded shoulder and knife-edge burs with the codes of 8878KP 314 018, 8856P 314 018, 6859HP 314 018 (Komet, Lemgo, Germany) respectively using a precision milling machine. (Artiglia Italia, Parma, Italy). After digital impressions of the abutment teeth were taken with an intraoral scanner (iTero

Element 5D) premolar full-crowns with identical occlusal surfaces were designed with ExoCAD version 3.1. (Exocad Gmbh) All the surfaces designed thicker or equal to manufacturer's instructions of minimum required thickness of 1 mm. Crowns were printed using printable resin material (Varseo Smile Crown Plus, Bego GmbH) and a DLP 3D Printer (VarseoXS 3D DLP Printer, Bego GmbH) with layer thickness set to 50 µm. Resin used in this study is methacrylate based and reinforced with micro-hybrid (0.7 µm) sized silanized dental glass in. The ratio of filler components is between %30-50 of the entire resin mass.

Post-printing process consisted of primary cleaning in a reusable ethanol solution (96%) using an unheated ultrasonic bath for 3 minutes, followed by a 2 minutes ultrasonic bath in a fresh ethanol solution (96%). Restorations were dried using an air syringe after ultrasonic bath and the base and support structures were separated using a side cutter. Afterwards restorations were light-cured with 1500 lighting exposures from each axial side (3000 exposures in total) by using a Xenon lamp-curing device (Otoflash G171; NK Optik GmbH) under nitrogen oxide gas atmosphere. After the completion of post-curing process, intaglio surfaces of each restoration were sandblasted (Cojet, 3M ESPE) using 50 µm Al_2O_3 particles (PerlaBlast, Bego GmbH), from 10 mm distance at 2 bar pressure for 10 seconds. Outer surfaces of the restorations were polished mechanically using rubber composite polishing attachments for slow-speed hand-piece.

Half of the specimens for each cervical finish line type (n=6) were cemented with conventional glass ionomer cement (Aqua Meron; Voco GmbH) [G] and the other half (n=6) were cemented with a self-adhesive resin cement (G-Cem One, GC International) [A] to ascertain whether self-adhesive resin cements offer superior properties compared to conventional, more cost-effective options such as glass ionomer cements. Specimens were stored in artificial saliva for 72 hours at 37°C in a dark environment to ensure full polymerization of the luting agents prior to the mechanical testing.

Mechanical testing was conducted using a universal testing machine (AGS-X, Shimadzu, Japan) under compression loading using a 4 mm diameter stainless steel ball at the center of occlusal fossa of 3D-printed crowns at a crosshead speed of 1 mm/min until failure. Fracture resistance (N) of the specimens were recorded by Trapezium X (Shimadzu, Japan) software. Data were analyzed using one-way ANOVA. (α= 0.05)

Results: The mean (±SD) fracture resistance ranged from 931N (±105) for KA group to 673 N (±202) for CG group *(Figure 1)*. No statistical differences were found between cervical finish line designs (P=0,197) and the choice of cement (P=0,062). But even though the difference was not significant, conventional glass ionomer cement showed lower fracture resistance compared to self-adhesive resin cement in every cervical finish line design.
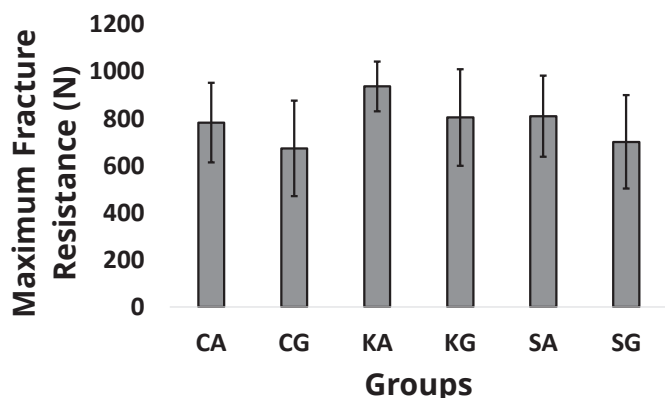

Figure 1.

A stereomicroscope (Leica M60, Leica Microsystems) was used to analyze the failure modes of all specimens at 20× magnification *(Figure 2)*. Failure types were categorized as adhesive or cohesive cement failure. Adhesive failures further divided into two groups according to the place where failure happened which are failure between dentin and cement and failure between restoration and cement. As expected cohesive cement failures happened more in every cervical finish line design with glass ionomer cement due to this material's lower
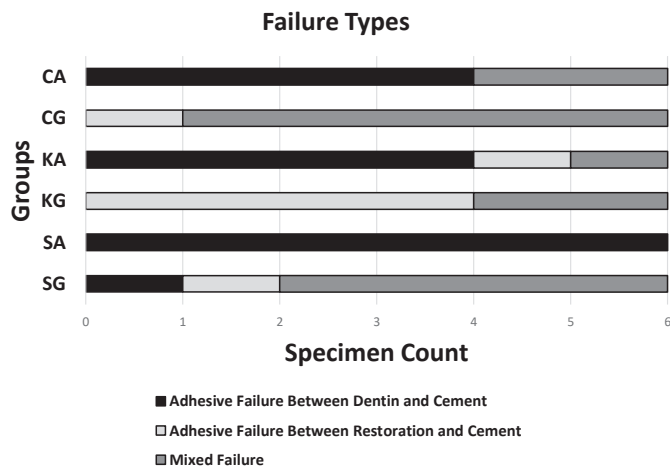

Figure 2.

cohesive strength. Failures between cement and restoration happened more often with glass ionomer cement due to this cement's higher adhesive strength with dentin. And failures between cement and dentin happened often with self-adhesive resin cement due to this cement's lower adhesion to dentin.

The shortcomings of this study's methodology were:

1. Study designs including extracted teeth inherently include the bias of using non-standard specimens due to the variations in size and quality of extracted teeth.

2. Only vertical quasi-static load was applied to center of the occlusal surfaces. Loading at an angle of 30° to a different place (like tubercular ridge) and cyclic loading of the crowns simulating the chewing motion might yield different results.

Conclusion: Within the constraints of this study's methodology and testing parameters it is noted that neither the cervical finish line design nor the type of cement significantly affected the fracture resistance of 3D printed permanent crowns. But all groups showed higher fracture resistance than the average masticatory forces applied on maxillary premolars clinically (222-445 N, mean of 322.5 N). A slightly higher fracture resistance was observed when the crowns were cemented using a self-adhesive resin cement.

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Effects of Simulated Gastric Acid Exposure on Optical Properties of CAD/CAM Ceramic Blocks

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Objectives: To investigate the effect of glaze and polishing procedures on the color stability (ΔE00) of Cerec Tessera, IPS e max and Vita Suprinity CAD/CAM blocks aging with simulated gastric acidic solution.

Materials and Methods: This study consisted of 3 main groups. Twenty specimens were fabricated from each group as Cerec Tessera, IPS e max CAD,Vita Suprinity. After mechanical polishing or glaze finishing, the specimens were randomly divided into twosubgroups (n=10). Half of speciemens were polished and half of speciemens were glazed for each group according to the manufacturer's instructions. After gastric acid solution application, ΔE00 of materials was calculated. L*, a*, b* values were recorded using a calibrated digital spectrophotometer (Vita Easyshade Advance 4.0). The data were evaluated by using Kruskal Wallis Test and Post Hoc Test at the significance level of 0.05.

Results: The effects of the glazing/polishing protocols and type of CAD/CAM blocks for aging process were significant for the L*, a*, b*, ΔE00, TP00 parameters (P<.005). ΔE00 values of tested ceramic materials were different (P<.005).

Conclusions: Gastric acid solution treatment produced significant changes in colour with the variables of all ceramic types with mechanical polishing/glaze finishing.

Keywords: CAD/CAM, hybrid ceramics, GERD, gastric acid, color change

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Ergonomic Behavior Differences of Dentists and Clinical Students During Dental Treatment: A Survey Study

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Objectives: Awareness of clinical dental students and dentists about ergonomic working, their ideas, and the measures they take while performing treatment is needed to contribute to the literature through self-assessment.

Materials and Methods: A total of 271 people participated in the survey: 38 were dentists, and 233 were dental clinical students from two different cities. Participants answered 27 questions correlated with gender, chronic disease, dominant hand, body mass index, active working time in the profession, and the frequency of suffering back and neck pain via Google Forms. Survey answers have 3-likert scale options: agree, undecided, and disagree. The SPSS package program was used for statistical analysis. When the data was obtained, Pearson chi-square analysis was applied. The statistical significance level was determined as p<0.05.

Results: The study revealed that ergonomic behaviours differ according to gender, active working time in the profession, place of work, and the frequency of suffering back and neck pain. No significant difference was detected according to the dominant hand, chronic disease, and body mass index. There is a relationship between active working time in dentistry and the question, "Listening to music while treating patients increases ergonomics" ($\chi2$=10.372; p=0.035). There is a relationship between the place of work in dentistry and the question, "Taking a long break is more ergonomic than taking a short break" ($\chi2$=6.180; p=0.045). The rate of those working at the university hospital who disagree with the question was 85.1% (57), which differs from those working in other places by 14.9% (10) and was statistically significant.

Conclusions: While 83.3% (228) of the respondents could fully explain ergonomics and its purpose, Only 21% (57) think it works under ergonomics. For long-term dental health, ergonomic awareness should be increased in the education process, and ergonomic work should be encouraged.

Keywords: Ergonomic behavior, dental clinical students, dental treatment

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Impact of Non-Surgical Periodontal Therapy on Non-Functional Masticatory Muscle Activities: A Case-Control Study

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Objectives: This investigation aims at assessing the association between non-functional masticatory muscle activity (NF-MMA) (i.e., mandible bracing, teeth grinding...) and periodontal status as well as evaluating the NF-MMA variation in response to the non-surgical periodontal treatment (NSPT).

Materials and Methods: 9 Patients with diagnosed stage III/IV periodontitis (test group) and 11 healthy patients (control group) were enrolled in the dentistry department of the University of Siena. Exclusion criteria were assumption of myorelaxant drugs, systemic diseases and incapability of self-performing oral hygiene.

All subjects underwent a protocol of 24-hour in-home recordings of masseter muscle activity using surface electromyography via a portable device, for a total of 2 series of three recordings each.

At baseline (T0), an extra- and intra-oral examination and a full-mouth periodontal charting were performed, together with the first series of recordings. One week after (T1), all subjects received NSPT following the European Federation of Periodontology guidelines. The second series of recordings was performed three months after T1 (T2).

Results: The Bruxism Time Index (BTI) (percentage of time presenting NF-MMA with respect to the total recording time) at baseline was comparable between the two groups, both for Awake-BTI (A-BTI)(2.52% control vs 3.47% test) and Sleep-BTI (S-BTI) (0.95% vs 1.14%).

After NSPT, the periodontal status of both groups significantly improved in T2 (Paired T-Test) (p=0.009 control group; p=0.01 test group).

Intraclass comparisons (Paired T Test) displayed an increase in A-BTI (3.47% vs 5.34%; p=0.023) and in S-BTI (1.14% vs 2.00%; p=0.07) in the test group at T2, while in the control group both variables were not significantly changed (A-BTI p=0.58; S-BTI p=0.94).

Conclusions: Within the limitations of the current protocol, this study provides data concerning the relationship between NSPT, which improves periodontal health and stability, and NF-MMA, highlighting that the frequency of NF-MMA might increase in periodontal patients after NSPT.

Keywords: Bruxism, Periodontitis, Electromyography

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Knowledge Levels of Dentistry Students about Artificial Intelligence Applications in Prosthodontic Treatment: A Survey Study

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Objectives: The purpose of the survey is to measure the knowledge level of dentistry students regarding artificial intelligence technologies and their awareness of artificial intelligence applications in the field of prosthetic dental treatment.

Materials and Methods: This study was conducted with 452 dentistry students. Students filled out a survey via Google Forms questioning attitudes towards the use of artificial intelligence in dentistry and prosthetic treatment. The survey included a 12-item Likert scale assessing prosthetic treatment applications of artificial intelligence and students' knowledge and opinions regarding these technologies. Chi-Square test was applied to analyze the data.

Results: The study revealed varying opinions based on gender regarding the effectiveness of artificial intelligence (AI) applications in prosthodontic dental treatment. Among male participants, 87.1% believed that AI-based diagnosis and treatment planning could be effective, while 89.1% of females shared this view. Additionally, 83.1% of males and 89.1% of females believed that AI applications could enhance educational knowledge. Furthermore, 90.5% of males and 92.4% of females anticipated widespread future use of AI in prosthodontic treatment. Notably, 75.3% of males and 92.4% of females perceived AI-assisted applications as potentially improving patient satisfaction. The study also found that 86% of males and 87.6% of females believed that AI-driven design of laminate veneers could enhance workflow efficiency. Similarly, 82% of males and 82.5% of females expressed confidence in AI-designed obturators to improve success rates. Lastly, 85.4% of males and 85.7% of females considered AI-supported color selection to enhance aesthetic outcomes. These differences were statistically significant. While students' knowledge of the use of artificial intelligence was generally sufficient, no significant difference was detected between grade levels.

Conclusions: In dentistry students; There is a general belief that artificial intelligence applications can be effective and beneficial in the field of prosthetic dental treatment. However, there are uncertainties regarding ethical and legal issues. Further research is needed in artificial intelligence applications, including patient groups and individuals of different age groups.

Keywords: Artificial intelligence applications, Dental students, Levels of knowledge, Prosthodontics

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MRI Evaluation from Operators with Different Levels of Expertise

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Objectives: The objective of this research study was to comparatively analyze the accuracy of image interpretation by a radiologist and five expert dentists in the interpretation of Temporomandibular Disorders (TMD) and Magnetic Resonance Imaging (MRI). The study aimed to evaluate the extent of consistency in the interpretation of images by the two groups. The analysis focused on the efficiency of the radiologist's interpretation against the unbiased readings provided by the expert dentists.

Materials and Methods: An MRI scan was conducted prior to the initial visit of patients. All patients underwent MRI using the same 3 Tesla machine, and the images were analyzed by a single radiologist. Five dentists, who were experts in diagnosing and managing TMD, evaluated each MRI for the presence of disc position with open and close mouth, functional limitation, degenerative changes, effusion, and diagnosis. The observers were unaware of the evaluation given by the radiologist, and they did not participate in the patients' care at any point. None of the examiners had access to any other investigations (e.g.,

radiographs, arthrography) that the patient had undergone. Equivalence test and proportion test enables us to determine whether there is equivalence between the radiologist judgments and those of the 5 experts. Finally, was studied the level of agreement between the 5 dentists.

Results: Radiologist interpretations cannot be directly compared to those made by others with varying levels of expertise. Excluding the radiologist, the remaining experts had over 70% agreement, indicating a high level of consensus.

Conclusions: It is worth noting that the exclusion of the radiologist may have had an impact on the overall level of agreement, as their expertise could have contributed to a more diverse range of opinions. Nonetheless, based on the available data, we can conclude that the agreement among the remaining experts was quite substantial.

Keywords: TMD, MRI, Effusion, Expertise

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Optimizing All-On-4 Full-Arch Restorations: Can Monolithic Zirconia Prosthesis Enhance Implant Biomechanics? An FEA Study

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Background: The all-on-4 treatment concept has gained popularity as an efficient and cost-effective choice for full-arch prostheses in edentulous patients. However, the biomechanical performance of various prosthetic materials such as monolithic zirconia in all-on-four implant supported restorations is an ongoing area of study. Monolithic zirconia is recognized for its strength and esthetic qualities, but its influence on full-arch implant biomechanics needs further investigation. How stress is distributed as well as the response of periimplant bone to functional loads are still areas that have not been fully explored. It is critical to understand these factors to optimize treatment results and improve long-term clinical success rates of patients with implant-supported full-arch restorations.

Objective: The goal of this study was to investigate the stress distribution and displacement of a full-arch all-on-4 implant-

supported monolithic zirconia prosthesis, as well as its influence on periimplant bone using Finite Element Analysis (FEA).

Materials and Methods: 3D finite element models of the mandible, mucosa, zirconia prosthesis, and implant complex and links [BlueDiamond® (BD), MegaGen, Daegu, Korea] were created using CT, DICOM, and STL data. Models were developed with a mesh generating tool (Visual-Mesh; ESI Group). Four simulations were completed, each with a distinct load direction [vertical and oblique (45°)] and a static load (160 N and 300 N, respectively). These loads were distributed to the posterior teeth, specifically, buccal slope of the buccal cusp, lingual slope of the buccal cusp, and buccal slope of the lingual cusp. Finite element analysis was performed using modeling software (Visual-Crash for PAM; ESI Group). The highest von Mises stresses and displacement measurements were then compared and assessed.

Results: Under 300N load (vertical and oblique), the cancellous bone exhibited the lowest von Mises stress (4.2 MPa), followed by the cortical bone (72.18 MPa). Fixtures exhibited the highest stresses, particularly in #35 at the distocervical area, which measured 481.59 MPa. The abutment screws in the same area yielded 287.13 MPa. The order of stresses received was as follows, from highest to lowest: fixture, abutment screw, abutment, prosthetic screw, ZrGen link, zirconia prosthesis, cortical bone, and cancellous bone. Our findings showed that the most stressed sections of each component were frequently located at the connection components. The zirconia prosthesis had maximum displacement at 154.02 μm (300N oblique).

Conclusions: Oblique loading led to increased stresses on the components and periimplant bone, as well as prosthesis displacement. However, these result remained within physiologic limits.

Given its favorable biomechanical performance, the full-arch all-on-4 implant-supported monolithic zirconia prosthesis can be considered a suitable definitive prosthesis for patients.

Keywords: All-on-4 treatment; monolithic zirconia, implant, complete arch, finite element analysis

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Patient Satisfaction of Implant-Supported Overdenture and Complete Denture

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Objectives: The aim of this study was to assess the satisfaction levels of patients 5-8 years after receiving implant-supported overdenture or conventional complete denture along with patient demographic informations, systemic diseases and clinical outcomes.

Materials and Methods: This clinical study enrolled 46 patients who received either mandibular implant-supported overdentures (22 patients) or conventional complete dentures (24 patients) in Faculty of Dentistry between 2016 and 2019. The study utilized the OHIP-EDENT questionnaire customized for edentulous patients, which consisted of 19 questions and 7 subcategories. The questionnaire subgroups encompassed functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Additionally, demographic information, systemic diseases and clinical outcomes regarding occlusion, retention, and stability (rated as excellent, good, and poor) were determined Statistical analysis was conducted using one-way analysis of variance (ANOVA) and independent sample T-tests.

Results: In the comparison between complete denture and implant-supported overdenture users, there was no significant difference in total satisfaction scores or satisfaction subcategory scores (P> 0.05). In both prosthetic treatments, whether patients had excellent, good, or poor occlusion did not affect the total satisfaction and subgroup scores (P > 0.05). However, functional limitation was higher in patients with poor retention or stability (P < 0.05).

Social disabilities, psychological disabilities and psychological discomfort were higher in females using implant supported overdenture than males.

The presence of hypertension or diabetes did not impact satisfaction scores and subcategories in patients with complete dentures (P > 0.05). However, it significantly increased physical pain in patients with implant-supported overdentures (P = 0.045, P = 0.033, respectively).

Conclusions: A proper occlusion may contribute to increased stability, though stability and retention are more critical for patient satisfaction. Interestingly, patients with hypertension and diabetes tend to report less pain when using conventional complete dentures than implant supported overdentures.

Keywords: occlusion, Implant-supported overdenture, Conventional complete denture, Patient Satisfaction

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Relationship Between Morphology of Stomatognathic System and its Function in the Group of Young Adults.

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Objectives: The stomatognathic system (SS) functioning is the result of extremely complex morphological and functional relationships taking place under the control of the nervous system. The aim of this study was to assess if morphology of the cranial bones may influence the function of SS.

Materials and Methods: 148 young adults aged 17-25 were included in a detailed examination of the stomatognathic system. Bone morphology was determined by the use of lateral cephalograms along with their detailed cephalometric analysis using the Ricketts' and McNamara's method. The functional diagnosis included surface electromyography tests (BioEMG II) and digital evaluation of occlusal conditions as a function of time (T-Scan III). The results were then subjected to statistical analysis taking the type of probability distribution of the obtained data into account.

Results: The reference values of the Ricketts and McNamara analyses do not apply to populations of a different size, age structure and ethnic origin than those on which they were developed. It has been proved that T-Scan and EMG tests are the complementary methods of SS diagnostics. However, their results should be interpreted separately. A relatively high sensitivity of the VERT index was also demonstrated, which seems to be a clinically transparent parameter characterizing the biotype of the face of the examined individuals, regardless of their gender and interdental relations.

Conclusions: It was found that the morphological and functional interactions of the SS area are multifactorial and it is impossible to indicate the leading parameters that modulate its functioning.

Keywords: T-Scan, stomatognathic system, physiological conditions, cephalometric analysis, surface electromyography

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Robotic Assisted Implant Surgery - Systematic Review in Context of the UN Sustainable Development Goals

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Objectives: There is an increasing prevalence for the use of Robotics within the surgical world. The success has sparked the discussion for it's use in dental implant placement.

Robotics, assisted or fully automated, allows accurate dental implant placement. The idea being that the results produced are reproducible, repeatable, and can increase the efficiency and accuracy of dental implant placement. Using robotics eliminates the risk of human error and allows increased flexibility, stability, and accuracy.

This study will review current clinical studies to allow assessment of the successful application of robotics for the placement of dental implants and its impact on delivering UN SDGs.

Materials and Methods: The study was registered on PROSPERO (CRD42024532370). Electronic searches up to January 2024 were carried out using Cochrane Central Register of Controlled Trial, OVID Medline and EMBASE to identify studies consisting of robotic assisted implant surgery. A manual search was also conducted. Human clinical trials and pre-clinical trials were selected. The primary outcome was the assessment of accuracy of RAIS.

Two investigators independently screened the studies. A third investigator was consulted to resolve any conflicts. The JBI critical appraisal tool was used to assess the risk of bias. Qualitative and quantitative synthesis of the included studies was performed. We planned to carry out a random effect meta-analysis. To evaluate the existence of heterogeneity and the total proportion of variability between-studies heterogeneity, χ^2 (p<0.1) and I^2 tests was used.

Results: Initial search resulted in 1354 studies. Following abstract and full text screenings, 8 studies were eligible and included in this review. Due to heterogeneity of the studies, a descriptive analysis was carried out.

Conclusions: There is increasing body of evidence suggesting that RAIS can improve the accuracy of dental implant placement. RAIS would also promote sustainable dentistry and improve inclusivity and access to dental services for all in developed and especially developing countries.

Keywords: Robotics, Dental Implant(s)

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Shear Bond Strength at the Interface of Monolithic Zirconia with 3 Different Core-Build Up Materials

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Objectives: Different materials can be used to reconstruct the core foundation in tooth-supported fixed prosthetic restorations. The bond strength of the core material to zirconia is an important factor in the long-term success of the restoration. The aim of this study was to investigate the effect of using different core build-up materials on the shear bond strength of monolithic zirconia.

Materials & Methods: In this experimental *in vitro* study, 60 zirconia ceramic specimens (10x10x2 mm) were prepared and divided into three groups based on the core material (n=20). Core build-up specimens in cylinder shape (10 mm x 4 mm) were fabricated using flowable composite (RubyFlow Flowable, Inci Dental, Turkey), nanohybrid composite (RubyCompNano, Inci Dental, Turkey), and compomer material (RubyCompomerFlow, Inci Dental, Turkey). Core-build up and zirconia specimens were bonded using zirconia primer and self-adhesive, dual-cure cement (RubySE Cem Inci Dental, Turkey) after sandblasted of the zirconia surfaces (CoJet, 3M ESPE). Shear bond strength was tested at their interfaces by using universal test machine. The failure modes were determined using a stereomicroscope. The data were statistically analyzed with a paired t-test for significant differences (p = 0.05).

Results: The highest values for shear bond strength were achieved in nanohybrid composite (7,8114±1,96542) followed by flowable composite (6,1114±1,42201), and compomer group (5,8032±1,71212). Nanohybrid composite material was significantly higher than other core materials. (p<0.05). There was no statistically significant difference found between flowable composite and compomer material. (p>0.05).

Conclusion: It was concluded that when evaluating the three core build-up materials' binding to zirconia, the nanohybrid composite showed significantly higher bond strength to zirconia and demonstrated to be the optimal core build-up material.

Keywords: monolithic zirconia, core build-up materials, shear bond strength, composite resin, failures

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Stress Distribution Analysis Implant-Supported Fixed Prostheses with Different Fabrication Orientations 3D Printed Monolithic Zirconia: FEA

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Objectives: Advancements in additive manufacturing now permit the creation of intricate structures while reducing material waste and costs, leading to its increased adoption in ceramic production. This study aims to evaluate the stress distribution in 3D printed zirconia crowns with varying manufacturing orientations on different implant abutments through finite element analysis.

Materials and Methods: Three different three-dimensional models were designed for a single-unit implant-supported fixed prosthesis according to the type of abutment (multi-unit, cemented, ti-base) using SolidWorks software. All models were positioned in the mandibular bone at the site of tooth 44. The crown designs were created in the Exocad design program, positioned on the implants in SolidWorks, and the resulting .stp files were used for finite element analysis. The abutment material was specified as titanium, the cement as dual-cure resin cement, and the prosthetic restoration as 3D printed 3Y-TZP zirconia (in both vertical and parallel fabrication orientations). A 150 N load was applied obliquely at a 30-degree angle buccolingually across the entire occlusal surface, and stress distribution was examined. The obtained stress distribution values were reported as von Mises Stress Values (vMS).

Results: Among all models, the lowest von Mises stress values for the restorations were observed in models produced with the parallel method, whereas the lowest stress values for implant components were recorded in models fabricated vertically. Furthermore, across the three different abutment designs for implant components and restoration materials, the highest stress values appeared in ti-base models, while the lowest stress values were found in multi-unit models.

Conclusions: In implant-supported fixed prostheses, excessive stress in implant components has been observed, which could lead to catastrophic failure. This FEA study demonstrates that models with parallel orientations exhibited lower stress in restorations, whereas higher stress was observed in implant components.These results should be re-evaluated with *in-vitro* models.

Keywords: 3D Zirconia, Finite Elements Method, Implant-Supported Fixed Prostheses, Abutment Types, 3D Print Layer Orientation

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Surface Roughness, Bond Strength and Hardness of 3D-Printed Resins Fabricated by Different Vat Polymerization Techniques.

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Background: In previous studies evaluating the effects of different technologies, mostly wear resistance, flexural strength, accuracy and color stability were examined. Knowledge regarding the effect of printing technology on shear bond strength and hardness is scarce in the literature.

Objective: The aim of this study was to evaluate the surface roughness, shear bond strength, and Vickers hardness of 3D-printed resins fabricated by different vat polymerization techniques.

Materials and Methods: 40 disk-shaped samples (Ø10×2-mm) were divided into four groups; 3D printed resins (Stereolithography; SLA and Digital Light Processing; DLP and Liquid Crystal Display; LCD) and milled PMMA (Ivory CAD). (n=10) After polishing all samples with 600-800-1000 grit abrasive papers, the surface roughness (Ra) was measured by using a non-contact profilometer. Composite resin was then applied to the specimen surface using a polytetrafluoroethylene mold. All specimens were then thermocycled. (5-55°C, 5000 cycles). SBS was measured using a universal testing machine at a crosshead speed of 1 mm/min. Vickers hardness (VHN) measurements were then performed. The data obtained were evaluated using 1-way ANOVA test followed by Tukey HSD for Ra and Vickers hardness values, while Tamhane's T2 tests were used for SBS values (a=.05).

Results: There was a significant difference between the groups in terms of SBS (p=0.02) and VHN (p<0.001) while Ra (p=0.148) values were nonsignificant. The Ra obtained in all groups was above the clinically acceptable threshold of 0.2 μm. DLP (68.90 MPa) and LCD (70.63 MPa) specimens had higher and similar SBS (p= 1.000) while milled PMMA (46.23) specimens had statistically lower SBS. DLP (33.87) had higher VH than all groups (p<0.01) other than SLA (P=.831), while MP (21.75) had lower VHN than all groups (p<0.01) other than LCD (24.94) (P=.143).

Conclusion: The SBS and VHN of 3D-printed resins were affected by different vat polymerization techniques. In terms of SBS and VHN, 3D-printed resins fabricated by the DLP technique were more successful. Additional surface treatments are required to reduce the Ra values in all of the milled and printed samples.

Keywords: 3D Printing, VAT polymerization, Surface Roughness, Shear Bond Strength, Vickers Hardness

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The Effect of Different Sintering Protocols on the Surface Morphology of Multilayered Monolithic Zirconia

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Objectives: The next generation zirconias, introduced after 4th and 5th generation monolithic zirconias, are multilayered zirconias with a polychromatic structure. These zirconias, incorporating 3Y-TZP, 4Y-TZP, and 5Y-TZP, enable speed sintering per manufacturer instructions, though the impact of this process remains unclear. The aim of this study is to determine the effect of speed and repetitive sintering on the structural and optical properties of multilayered monolithic zirconias.

Materials and Methods: In this study, multilayered zirconia blocks, including Katana Zirconia YML (Kuraray, J) (YML), and IPS e.max ZirCAD Prime (Ivoclar Vivadent, FL) (Prime), were used with both speed (SS) and conventional (CS) sintering protocols. Samples were designed using ExoCAD software (Exocad DentalCAD, Germany) and manufactured using a CAD/CAM milling machine. All samples (Ø12×1 mm) were randomly divided into two groups and subjected to three sintering cycles. L*, a*, b* values were measured with a spectrophotometer post 1st, 2nd and 3rd sintering, while X-ray diffraction (XRD) and Scanning Electron Microscope (SEM) data were collected. Translucency (TP) values were statistically analyzed using three-factors ANOVA to evaluate the effects of sintering speed and repetition. IBM SPSS Statistics software was employed for statistical analysis.

Results: The TP value of YMLCS is significantly higher than YMLSS and PrimeCS.PrimeSS has a higher TP value compared to PrimeCS, but the difference is not significant. In SEM images, particle sizes have increased in the repeated YMLSS and YMLCS groups. The particle size of Prime is noticeably smaller than all groups of YML. XRD analysis revealed a loss of monoclinic and tetragonal phases in YMLCS, YMLSS, and repeated sintering.

Conclusions: In clinical practice, conventional sintering is highly reliable for Katana Zirconia YML, whereas for the IPS e.max ZirCAD Prime group, the effect of speed and conventional sintering on translucency values is not significant. In repetitive sintering, an increase in translucency is observed.

Keywords: zirconia, sintering

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The Effect of Disinfectants on The Surface Roughness of Different Condenional Silicone Impression Mate

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Objectives: The characteristics such as stability of the disinfection methods used in measurements and surface clarity are negatively affected. The surface roughness of different silicones types disinfected with immersion method using hypochlorite and glutaraldehyde was measured using a profilometer.

Materials and Methods: This study was funded by the Scientific and Technological Research Council of Turkey(TUBITAK)(Grant Number:1919B012320693).A semi-circular sample with 6 holes, each 2mm deep and 15mm in diameter, compliant with ADA classification, was prepared.Zhermack zeta plus(ITALY) and Adcosill acplus(TURKEY) C-type silicones were prepared by mixing their catalysts and activators. After being placed in three compartments accordingly, the dimensions were examined for surface roughness after polymerization. Totally 24 samples divided into 4 groups. Group 1A, the specimens were soaked in 2% hypochlorite solution for 3 minutes to assess surface roughness. Group 2A, the specimens were soaked in 2% hypochlorite solution for 10 minutes to assess surface roughness. Group 1B, the specimens were soaked in 5% glutaraldehyde solution for 3 minutes to assess surface roughness. Group 2B, the specimens were soaked in 5% glutaraldehyde solution to assess surface roughness.

Results: There was a significant difference between Group 1A and Group 1B in terms of the arithmetic mean roughness value (Ra) and the mean roughness depth (Rz) values. Significant difference was between Group 2A and Group 2B Ra and Rz values . Significant difference was between Group 1A and Group 2A Ra and Rz values. Significant difference was between Group 1B and Group 2B Ra and Rz values ($p<0,05$).

Conclusions: In this study, it was observed that changing the type of disinfectant affected the surface roughness of the materials. Additionally, increasing the contact time of the measurement material with the disinfectant resulted in observable effects on the surface roughness of the material.

Keywords: Condense silicone, profilometer, surface roughness, hypochlorite, glutaraldehyde

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The Effect of Disinfection on Dimensional Stability in Condensation Silicones

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Objectives: Disinfectants can affect the dimensional stability of impressions, which may decrease the precision of restoration and, therefore, treatment quality. This study aims to compare the impact of disinfectants on the dimensional stability of impression materials using microcomputed tomography.

Materials and Methods: This study was funded by the Scientific and Technological Research Council of Turkey (TUBITAK) (Grant Number:1919B012338021). A full arch chrome-nickel master model was obtained by scanning a modified typodont mandible. Full arch impressions were taken using a two-step two-phase technique with condensation silicones. A total of 54 samples were divided into nine groups (n=6) according to disinfectant material type, disinfectant use, impression material brand. As impression materials Zetaplus (Zhermack, Zhermack SpA, Italy), Addplus (Addcosil, efesdental, Turkey), and oxasil Putty (Oxasil, Kulzer GmbH, Germany) putties, followed by oranwash L, acwash, oxasil Light FlowOxasil light bodies were used. After removal of the impression from the master model, impressions were immersed in disinfectants (%2 Glutaraldehyde, %5.25 NaOCl) for ten minutes. After 120 minutes from initial polymerization, samples were digitalized with microcomputed tomography (SKYCAN 1725, Bruker). Distance between the cusp tips of canines was measured. Kruskall-Wallis H and One-way ANOVA tests were used to compare data between groups. (p = 0.05).

Results: Groups were compared to observe the effect of disinfectants on dimensional stability. A maximum of 27,19 mm and a minimum 25,53mm distance were measured, with a total mean of 26,2915±0,31731mm. No statistically significant difference was found within the groups (p>0.05).. There was a significant difference between the group oxasil NaOCl group and Addcosil gluteraldehyde group (p<0.05).

Conclusions: In this study, the effect of disinfectants on dimensional stability was evaluated. Even if this study was in-vitro, master model from scan of typodont was used for the purpose of results being similar to clinical studies. Disinfectants not significantly affecting dimensional stability will not lead to a decrease in treatment quality. Further studies are needed with various disinfectants.

Keywords: C-silicone, Disinfectant, Dimensional stability, Microcomputedtomography,

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The Influence of Scanner Head Distance on Intraoral Scan Accuracy

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Objectives: The field of digital dentistry is rapidly expanding in modern medicine. The ability to transfer many tasks traditionally performed manually by dental technicians to CAD/CAM software significantly impacts the speed, cleanliness, and especially the high precision of work.

The aim of the project was to analyze scans depending on the distance between the dental arch model and the intraoral scanner head, as well as to evaluate the influence of scanning distance on the accuracy of intraoral scanners.

Materials and Methods: To obtain intraoral scans, a phantom of the upper dental arch from KAVO was used. The model was scanned 10 times using a reference scanner to achieve a realistic spatial representation of dental structures.

Test scans scans were performed 10 times using intraoral scanners, 3Shape – Trios 4 and Carestream3600, at five distances from the dental arch: 0; 2.5; 5.0; 7.5; and 10 mm. All files were exported in .stl format and compared using the least squares method (best fit) in the Geomagic Control X program.

Results: The results of the conducted research, presented in the form of graphical maps, showed that the Trios 4 scanner exhibited the smallest deviation from the reference scan at distances of 2.5 and 5.0 mm from the dental arch. The differences between the scanners were relatively small.

Conclusions: The study results indicated that scanning distance was a variable affecting spatial representation accuracy.

Keywords: 3D Scan, intraoral scan, digital stomatology

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The Use of FEM to Calculate Stresses in Connection Between Zirconia Coping and Veneering Ceramic

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Objectives: To investigate, using the FEM, the infusion of different notching angles with varying groove widths and depths on a zirconium dioxide coping with the aim of establishing the optimal connection conditions with veneering ceramic.

Materials and Methods: Ten rectangular sintered zirconia (3Y-TZP) samples were etched with a neodymium-yag laser Nd:YAG. Then, a profilometer was used to test the depths and spacing of the grooves. A notch profile was used to design the shapes and spacing of the grooves based on a finite element method (FEM) simulating zirconia. The following situations were simulated: an increase in groove width from 100% to 180% and depth from 40% and 80%; and a 40% depth and width. To calculate the stresses in the connection between zirconia coping and veneering ceramic, a model comprising grooves cut perpendicular was adopted. For discretization purposes we used twenty-node solid BRICK elements featuring intermediate nodes with three degrees of freedom in each node. The same load F=1N divided by the number of nodes on the external surface was applied to each node of the outer surface of the base. In subsequent computing variants the F load changed the orientation by angle from 0° to 45° every 15°.

Results: The highest level of material strain occurs at angleα= 0°σredmax =309MPa and the lowest at angleα=45°σredmax=220MPa. The highest positive stress pressure occurs at angleα= 0°pmax=251MPa, pmin=-354MPa and the lowest at angleα=15°, pmax=171 MPa, pmin=-186MPa. In the case of tangential stresses on the coping-veneering ceramic connection, the highest values were noted at angleα= 15°τmax=44.4 MPa and the lowest at angleα= 45°τmax=32.7MPa.

Conclusions: To reduce the load on the zirconia-veneering ceramic connection, the notches should be made at an angle ofα=45°. Maintaining the width of the groove bottom while increasing the depth offers fewer advantages than deepening and narrowing the groove bottom.

Keywords: zirconia, FEM, veneering ceramic

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Torque Verification of Different Types of Wrenches with the Use of the Own Construction Device.

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Introduction: There is a common opinion that the torque wrenches become discalibrated because of the multiple use and the sterilization process. Verification of the torque values indicated by the wrench is apparently impossible for the most of clinicians. And the implant system manufacturers mostly do not provide the service for control and calibration of the wrenches from their offer. Malfunctioning wrenches may cause inequality between the indication and the true torque and, consequently, generate many clinical problems. There are different types of the wrenches (rachets) available in the market. Most of them are based on the mechanical bending of the flexible arm indicating the torque on the appropriate scale. But there are also different devices that are breaking when achieving adjusted torque. Some of them are similar to the spring devices but some are similar to contra-angles.

Case Description: The paper presents the construction of the own device that allows for the torque verification of different types of the torque controllers. The principle of the measurement is based on the gravity (the arm of the wrench is situated horizontally and loaded with appropriate weight) and the value of torque is calculated according to the popular equation for the torque (related to the weight and the arm).

Discussion: Some modifications of the method depending on the type of torque controllers and the results of the preliminary tests regarding the precision of their measurements (correlation between the indication and the true value of the torque) will be also presented.

Keywords: Torque wrench, Torque control, Rachet verification

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Trueness of CAD-CAM Fabricated Frameworks and Crown Restorations

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Objectives: The present *in vitro* study aimed to examine the trueness of different frameworks and crown restorations using subtractive and additive Computer Aided Design - Computer Aided Manufacturing (CAD-CAM) fabrication techniques.

Materials and Methods: A typodont maxillary left first premolar tooth has been prepared with 1.5 mm occlusal, 1 mm axial reductions and chamfer margin configuration and scanned using an intraoral digital scanner. The data were transferred into a Standard Triangle Language (STL) file format and a crown, and a die model design were made using dental design software with a 50 μm cement space gap. This STL file of crown saved as the reference STL (R-STLc) and crowns were fabricated by using 2 additively (AM) (Crowntec, AMC_CT], C&B [AMC_CB] and 1 subtractively (SM) (DuoCad [SMC_DC]) manufactured resin-based materials (n=10). The STL file of the framework (R-STLf) was also saved, and specimens fabricated using one additively (Co-Cr alloy [AMF_CoCr] and 2 subtractively (AG PEEK, SMF_PE; Romatitan, SMF_Ti) manufactured materials (n=10). All restorations were digitized by using an intraoral scanner to generate test scan-STLs (T-STLc, T-STLf). T-STLs and R-STLs were imported into a 3D inspection software (Geomagic Control X v.2018.1.1) and the deviation analyses were calculated to reveal trueness values. Data were analyzed by using one-way ANOVA and Tukey-HSD tests (α=.05).

Results: The deviation values of SM crown and SMF_PE framework groups were significantly lower than AM contra parts (P<.05).

Conclusions: The SM crown restorations will have a better fit on the SM frameworks than the AM crowns. It is thought that AM restorations will have better trueness values when the printing technologies are developed by researchers, and production with 3D printers is promising, considering the advantage of rapid prototyping

Keywords: CAD-CAM, Additive manufacturing, Subtractive manufacturing

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Negative Experiences and Outcomes - What Patients with Temporomandibular Disorders (TMDs) are Telling Us

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Objectives: Recent reports suggest that current standards of care for Temporomandibular Disorders (TMDs) are not uniformly being applied in dental offices, and as a result patients may need to see multiple professionals before receiving a correct diagnosis and treatment plan. The main purpose of this investigation is to collect information on the experiences of TMD patients in order to understand the current level of general knowledge and proposed therapies about these disorders.

Materials and Methods: A five-item questionnaire was designed by the authors and posted in a social network forum to anonymously recruit patients. The five questions regarded the time from pain onset, the number of professionals seen before receiving the diagnosis, the type of provided therapy, whether they were told by a healthcare giver that TMD problems are correlated with dental occlusion/mandibular position, and their experienced referral pattern.

Results: One-hundred-twenty-nine (N=129) patients answered the questionnaire. The most frequent answer was that patients were in pain for more than one year. More than half of responders reported that they visited two or more specialists other than their general dentist (59.4%). Just 8,5% of patients resolved their problems in some days. Almost twenty patients were proposed prosthodontics rehabilitation to correct their dental occlusion. This may be linked to the fact that the majoority of patients were told by one or more healthcare providers that TMD problems are due to abnormalities of dental occlusion and mandibular position.

Conclusions: The results suggest that TMD management must be improved in order to reduce the number of patients that fail to solve the problem due to diagnostic delays. TMD patients are unnecessarily being delayed in finding correct diagnoses, and that they are at significant risk of receiving inappropriate care from their community dentists.

Keywords: Temporomandibular disorders, Temporomandibular Joint, TMD management, Negative experience

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POSTERS ABSTRACTS

P01: Influence of Complete Denture Adhesives on Microbial Adhesion and Biofilm Formation

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Objectives: This study aimed to ascertain whether various types of complete denture adhesives have an impact on the attachment and growth of Candida albicans and Streptococcus mutans in single- and mixed-species settings.

Materials and Methods: The quantity of commercially available cream adhesive products (n=6) was applied on sterile coverslips within the vertical laminar flow chamber. 1x106 CFU of *C. albicans* and *S. mutans* (in single- and mixed-species settings) was applied directly onto the creme adhesive-coated surfaces. After incubating coverslips at 37°C for 90 minutes, the specimens were cleansed gently with PBS to eliminate unbound cells. The adhered cells were detached by sonicating the coverslips for 10 minutes. Diluting of microbial suspension in a serial manner from 10−1 to 10−6 was performed and the drop technique was utilized to quantify the microbial adhesion to the denture-coated surfaces. In another experimental setting, the culture medium was switched out following the 90-minute incubation time and the specimens were left to incubate for a further 24 hours to form the biofilm. Biofilm formation was evaluated through resazurin-based staining assay.

Results: Overall, in mixed-species settings of *C. albicans* and *S. mutans*, it was found that fewer microorganisms adhered to the cream adhesives compared to when each species was applied individually. The results after 24 hours of incubation were similar. In effect, biofilm formation was also lower in mixed-species settings compared to single-species settings of *C. albicans* or *S. mutans*. Furthermore, the analysis revealed notable variations in the quantity of adhered cells depending on the presence of PBS or saliva in the environment surrounding the adhesive-coated specimens. Specifically, it was observed a higher quantity of fungi and bacteria adhering in the presence of PBS compared to a saliva environment (50%/50%).

Conclusions: These findings underscore the importance of considering both microbial interactions and environmental factors in understanding the efficacy of denture adhesives in preventing microbial adhesion and biofilm formation.

Keywords: Denture adhesive, *C. albicans, S. mutans*, biofilm, adhesion

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P02: Relationship Between Anterior Guidance and Anatomical Formation of the Lateral Teeth

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Objectives: The aim of the study was to determine relations between the morphology of the posterior teeth occlusal surface and anterior controlling factors in young adults with full natural dentition

Materials and Methods: The research was carried out on plaster models obtained from diagnostic impressions of 50 people aged 18-21 with full natural dentition (Angle's class I).

Plaster models were scanned with the Zirkonzahn S600 ARTI optical scanner. The premolars and molars were dimensioned using the Exocad software. All precise measurements of the anatomical details of the occlusal surfaces were made on virtual models. The overbite and overjet of the central incisors were also measured.

The data were analyzed statistically. The normality of variable distributions was assessed using the Shapiro-Wilk test. Correlations between variables were evaluated using the Spearman rank correlation coefficient. Statistical significance was considered at the level of $p<0.05$. Calculations were performer using the Statistica 13.3 package from TIBCO.

Results: A statistically significant negative correlation was found between the overbite and the distal angle of the slopes of the distal buccal cusps for the second superior molar (R = -338892 and p = 0.016065). There is also a statistically significant positive correlation between the overjet and the distance between the tops of the mesial and palatal buccal cusps for the second upper molar (R = 0.398537 and p = 0.004149).

Conclusions: Morphology of the second superior molar occlusal surface is significantly related to the measurement of the overbite and overjet.

Keywords: CAD/CAM, occlusal surface measurement

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P03: The Influence of Placing Dental Implants with the Static Navigation on the Marginal Bone Level

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Objectives: The aim of the study was to show the relationship between the use of static navigation when placing dental implants and maintaining the bone level in the area of the implant platform.

Materials and Methods: The study included a group of 20 patients (10 women and 10 men) aged 27-61, generally healthy, without any accompanying systemic diseases and with good bone conditions not requiring additional augmentation procedures.

Digital planning method was used and implantation of titanium dental implants using static navigation was performed with a surgical guide. During the first surgical stage, after placing the implant, a digital X-ray was taken using the right-angle technique. During the second stage of surgical treatment, after 3 months in the case of mandible and 6 months in the case of maxilla, the implants were uncovered to check osseointegration and replace the closing screws with healing screws. A digital X-ray was also taken at this stage.

Digital X-rays from the day of surgery and the day of implant uncovering were analyzed. The degree of atrophy was defined as the difference in marginal bone level measured in millimeters.

The data were subjected to statistical analysis.

Results: In 17 patients, the marginal bone level did not change after the osseointegration period. In one patient there was a 1 mm atrophy, while in two patients there was a 0,5 mm bone apposition in the area of the implant platform.

Conclusions: The usage of static navigation has a positive effect on the marginal bone level around an implant. The research results may help to develop an effective algorithms affecting the osseointegration process and a stable final treatment result.

Keywords: Implants, static navigation, marginal bone level

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P05: Dental Conditions Relative to Risk Factors of Metabolic Syndrome Analysing Exhaled Breath - Preliminary Study

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Objectives: The aim was to investigate selected risk factors of metabolic syndrome and their impact on the dental conditions. Another goal was to determine whether exhaled air biomarkers can support in the diagnosis of metabolic syndrome risk factors.

Materials and Methods: The patients underwent standard subjective, physical examinations and completed dental and diabetes questionnaires (OHIP-14- Oral Health Impact Profile and FINDRISC- Finnish Diabetes Risk Score). The second part of the examination was one-time testing level of blood glucose, cholesterol, triglycerides and uric acid by utilisation strip method. Then, exhaled breath samples were collected in Tedlar bags and analysed for biomarkers, using a developed electronic e-nose system. The script in Python was used for the statistics.

Results: A total of 108 patients were examined (69 women and 39 men) in the age 45 years to 75 years. The mean age was 67.24 years. Characteristics of the study group of patients: mean BMI= 27.99; mean glucose levels: 109.96 mg/dL, mean triglycerides 203.83 mg/dL; mean uric acid concentration: 5.62 mg/dL; mean cholesterol concentration 170.43 mg/dL. According to the FINDRISK survey, the risk of developing type 2 diabetes is 12 patients at low, 34 at slightly elevated risk, 22 at medium, 29 at high and 11 at very high risk. According to the OHIP-14 questionnaire, patients indicated increased embarrassment related to their oral condition (question 5). There is also a marked increase in volatile organic compounds with increased BMI values and a decrease in H2S concentrations with age.

Conclusions: From the data obtained, there is an increased risk of metabolic syndrome in the study group of patients. The analysis of biomarkers in exhaled air can be a completely non-invasive method to support the diagnosis of risk factors for metabolic syndrome. A preliminary evaluation of the data showed its high relevance and the need for a more complex analysis.

Keywords: Metabolic syndrome, dental conditions, biomarker analysis, non-invasive methods

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P06: Precision in Practice: Navigating the Digital Dentistry Workflow at the Initial Appointment

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Introduction: This paper demonstrates how digital workflow is employed for the initial evaluation of patients in a UK-based dental practice.

Case Description: Nowadays, obtaining digital scans rather than traditional impressions is nearly always the preferred method. In a UK-based clinic, they started the utilization of dental digital workflow for the initial evaluation of patients. Obtaining baseline scans has revolutionised the traditional assessment methods, offering enhanced precision, efficiency, and patient experience.

During the initial appointment, the recording of medical history, plaque, and bleeding indices is complemented by the capture of digital scans for all patients. This has become their standard of care for all patients.

Having baseline scans has proven to have many advantages over the years, including patient education; the scans can show patients what their plaque index score appears to be on the digital scan, and this can significantly increase their motivation to receive treatment. Second, documentation: keeping baseline scans on file may allow you to utilise them for research at a later time. Lastly, experienced nurses, therapists, or hygienists can simply take these scans prior to the dentist starting his appointment, saving a significant amount of time.

Discussion: Digital scans can be routinely taken in addition to dental health indices and medical history to support patient education and future research. Delegating scan recordings to experienced staff optimises time efficiency.

Keywords: Digital Dentistry

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P08: Multidisciplinary and Aesthetic Approach to Fused Tooth in Anterior Region: A Case Report

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Introduction: The anomalies of shape are the most frequent class of anomaly a general dentist can encounter in the daily practice. The dental anomaly named as double tooth derives from the fusion of two or more adjacent tooth germs during the embryological period. If the fusion is complete, the crown appears clinically large, without any substantial groove. If the fusion is incomplete, the crown appears with a separating groove mainly situated on the vestibular surface. In addition, tooth transposition is an anomaly described as the positional interchange of two teeth in the same quadrant.

Case Description: In the present clinical report, a 15-year-old male patient has visited our clinic with a complaint of a gap between his teeth and an aesthetically unpleasant smile. In clinical and radiological examination, fusion between permanent teeth numbered 21 and 22 and transposition of teeth numbered 11 and 12 have been identified. Department of Orthodontics and Prosthodontics have reached a consensus to close the diastemas in the lower jaw and appropriately distribute the gaps for prosthetic restoration in the upper jaw. After orthodontic leveling and alignment, the gaps in the lower jaw arch were closed. The gaps in the upper jaw arch were also distributed according to the recommendation of the Department of Prosthodontics. The orthodontic treatment was completed in 21 months. Following orthodontic treatment, a 6-unit fixed restoration was planned between the maxillary canine teeth of the patient. Before preparation, root canal treatment was applied to the fused teeth. Following root canal treatment, the preparation of the relevant teeth was completed, and the patient's fixed prosthesis was finalized. Monolithic zirconia was chosen as the material for the fixed partial prosthesis.

Discussion: The patient was satisfied in terms of gingival health, aesthetics, function and phonation of the prostheses at the 1 and 6 month-follow-up periods.

Keywords: Dental, Fused teeth, Anomaly, Fixed Partial Denture

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P09: Prosthetic Rehabilitation of a Patient after Maxillary Resection due to Cancer Using Thermoformed Obturator

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Background: Patients after maxillary resection due to cancer require prosthetic rehabilitation (*Figure 1*). In this group of patients, dentures are made with an obturator, which by closing the connection between the oral and nasal cavities, fulfills several functions. Among other things, it prevents food and liquids get through to the nasal cavity during meals. It allows for speech articulation, recreating the proper airflow path between the nasal and oral cavities.

Traditionally, the obturator is an integral part of the dentures, relined with elastic material to protect the tissues in the postoperative defect (*Figure 2*). The disadvantage of this solution is the need to periodically replace the relining material. After a period of 3 to 6 months, it is necessary to replace the relining covering the obturator, which is subject to degradation. This procedure is difficult to perform. The patient's adaptation time to the obturator covered with the new relining material is also necessary. These unfavorable aspects have become an indication for searching for solutions that will enable longer use of the prosthesis with an obturator and will be easier in the clinical performance of the new one.

Figure 1.

Objective: Development of a method for performing a thermoformed obturator that is detachable from the dentures plate.
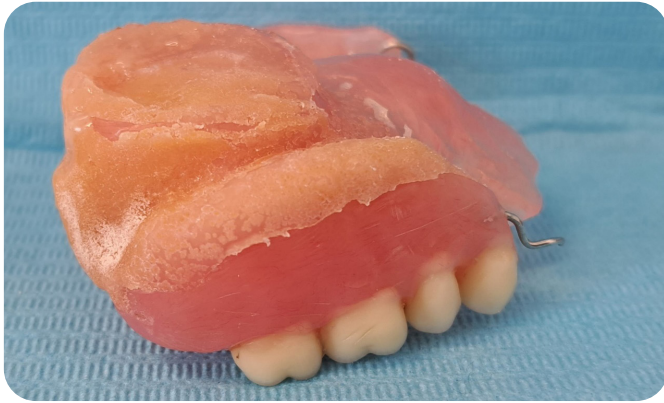
Figure 2.

Method: After cleaning the denture from the relining material, a part of the element connecting the denture with the obturator was formed on its plate *(Figure 3)*. Then, a functional impression was made on the denture plate with silicone material, with the mouth closed, of the postoperative defect. The impression was developed and adjusted so that it smoothly transitioned into the denture plate *(Figure 4)* .
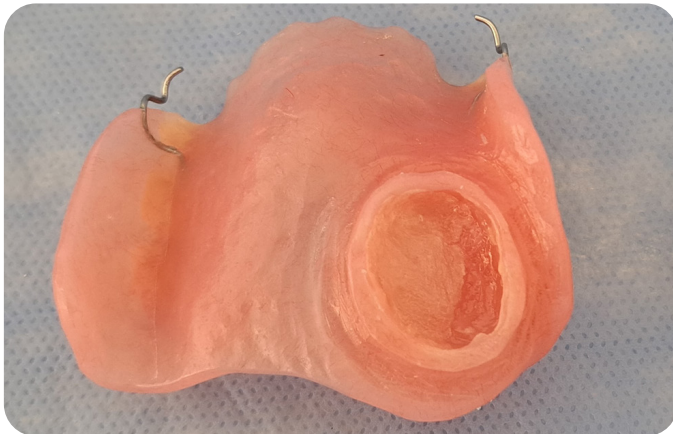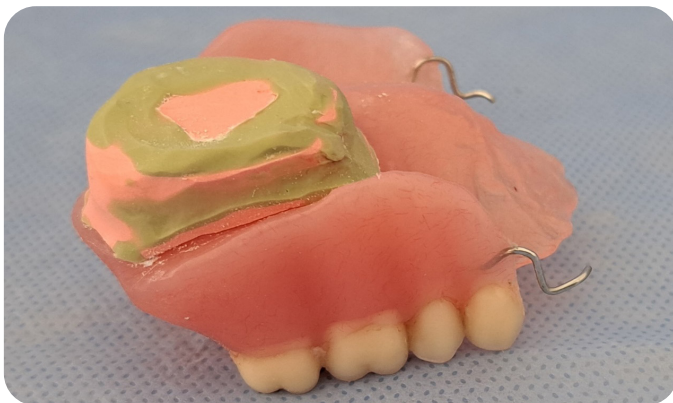

Figure 3.

Figure 4.

The next step was to form the obturator in the Erkopress device from Erkodent using a 0.6 mm thick Erkodur plate from Erkodent in accordance with the manufacturer's recommendations regarding the time and temperature of the process *(Figure 5)*. The obtained thermoformed part of the obturator was fitted to the denture plate. The insulating foil, which came from the

thermoformable plate and was located on the inner part of the formed obturator, was removed. The silicone material used to make a functional impression in the postoperative defect was designed to be stably mounted on the denture plate *(Figure 6)*. This allowed for the perform of an element fixing the obturator from acrylic resin to the denture plate *(Figure 7)*. The acrylic material Unifast Trad from GC was used in the work.
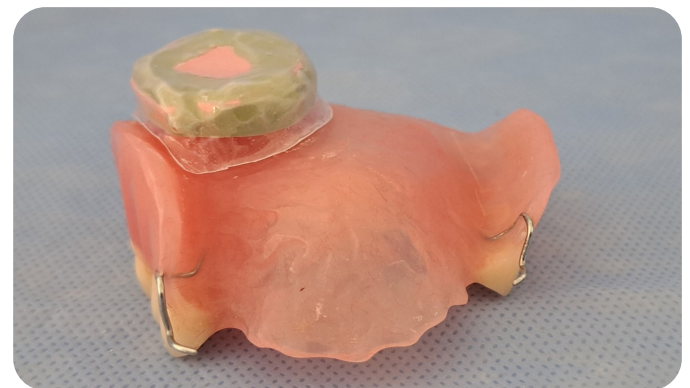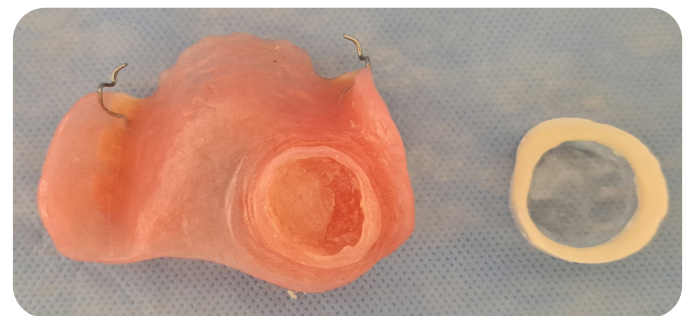

Figure 5.

Figure 6.

Figure 7.

In order to avoid a permanent connection between the denture plate and the thermoformed obturator, insulation was made. Vaseline was used for this purpose. After making the element connecting the obturator with the denture plate, the remaining silicone material was removed, obtaining a ready-made thermoformed obturator *(Figure 8)* .
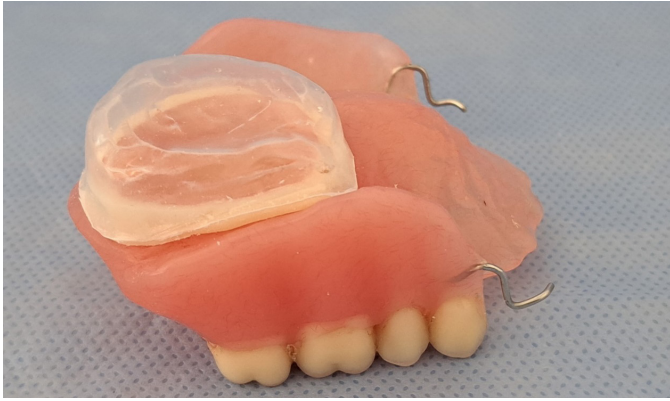
Figure 8.

Conclusion: In contrast to the traditional methods, a thermoformed obturator that is detachable from the prosthesis was obtained. The detachable obturator allows the clinician to create an additional obturator from a single functional impression or 3D scan of postoperative defect.

This type of obturator is characterized for its lower weight, which is particularly important when making prosthetic restorations for extensive defects.

Keywords: maxillary resection, prosthetic rehabilitation, thermoformed obturator

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P10: Prosthetic and Surgical Complementary Treatment after Orthognatioc Surgery for Class iii Skeletal Malocclusion

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Introduction: Combined orthognathic surgery and prosthetic treatment represent a comprehensive approach to addressing Class III skeletal malocclusion, a condition characterized by the lower jaw protruding beyond the upper jaw. This integrated treatment strategy aims to harmonize facial aesthetics, restore proper occlusion, and improve overall function and oral health.

Case Report: Patient presenting with a Class III malocclusion, resulting in facial asymmetry, dental misalignment, and functional issues such as difficulty chewing and speaking. Following a thorough evaluation, including clinical examination, radiographic assessment, and interdisciplinary consultation, a treatment plan was formulated. This plan involved a combination of orthodontic preparation, orthognathic surgery to reposition the jaws, and prosthetic rehabilitation to restore damaged teeth. After orthodontic and orthognathic procedure patient came to the office to complete the treatment. Surgical crown lengthening was performed and after stabilizing effect of the new gumeline position prosthetic treatment utilizing minimal adhesive dentistry was utilized. Prosthetic rehabilitation was tailored to the individual needs and goals of the patient, with a focus on achieving optimal occlusion, aesthetics, and long-term stability.

Discussion: The combined approach of orthognathic surgery and prosthetic treatment offers several advantages in the management of Class III skeletal malocclusion. By addressing both skeletal and dental components of the malocclusion, this comprehensive treatment strategy ensures a harmonious relationship between the facial skeleton, dentition, and surrounding soft tissues.

In conclusion, combined orthognathic surgery and prosthetic treatment represent a comprehensive and effective approach to addressing Class III skeletal malocclusion. By addressing both skeletal and dental components of the malocclusion, this integrated treatment strategy achieves facial harmony, occlusal stability, and improved oral function and aesthetics, ultimately enhancing the patient's quality of life.

Keywords: Adhesive dentistry, orthognathic surgery, crown lengthening, prosthetic treatment

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P11: Supportive Prosthetic Treatment of Adolecent Patient with Gorlin-Goltz Syndrome

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Introduction: Gorlin Goltz's syndrome is a rare autosomally inherited genetic disease, that is also known as nevoid basal cell carcinoma syndrome. Its diagnosis is based on the presence of major and minor criteria. Symptoms occur with variable intensity in nervus system, skin, endocrinal system, eyes and some of them manifest with skeletal and stomatognathic malformations.

Case Description: This work presents a case of a 10-year-old patient with a family history, diagnosed with disorder in the PTCH suppressor gene, confirming the occurrence of Gorlin Goltz syndrome. Manifestations within the stomatognathic system include occlusion disorders related to the occurrence of cystic tumors in mandible body on the right side and the mandible body and angle on the left side. The patient underwent prosthetic treatment using obturators during a two-stage surgical treatment of extensive bilateral mandible cysts.

Discussion: Gorlin-Goltz syndrome among others lead to occurrence of functional and aesthetic disorders within stomatognathic system. Apart from role in syndrome treatment radiological surveillance used in dentistry can play an important part in its early detection.

Keywords: Obturator, Gorlin-Goltz syndrome, odontogenic keratocysts, nevoid basal cell carcinoma syndrome

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P12: Multidisciplinary Treatment of Implant-Supported Fixed Prostheses in the Aesthetic Region: A Case Report

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Introduction: In implant-supported restorations to be made in the aesthetic area, ensuring the harmony, function, and aesthetics of the crown with the soft tissue around the implant can create difficulties for the dentist. In this case report, we present the adaptation of implant-supported prostheses with poor fit and aesthetics, periodontal surgery applications, and aesthetic and functional results.

Case Description: A 22-year-old female patient without any systemic disease applied to Tokat Gaziosmanpaşa University Faculty of Dentistry with aesthetic concerns and gingival appearance of her implant-supported fixed prostheses with occlusal screws numbered 12-22, which were implanted three years ago (Medentica Gmbh, Hugelsheim, Germany). Clinical and radiological examination of the patient revealed 1-2 mm marginal bone loss on the labial surface of the implants, thin gingival biotype, a reflection of implant metal colour in the labial gingival region, presence of laceration in the gingiva and contour inconsistencies in the implant-supported fixed prostheses. First, implant-supported fixed prostheses were removed, and closure screws were inserted. Bleeding foci were created, and the gingiva was allowed to heal for two weeks. After the necessary adjustments were made to the contour of the implant-supported fixed prostheses, a subepithelial connective tissue graft operation was applied to the relevant area. Following the healing period, an increase in gingival thickness and gingiva compatible with the arranged implant-supported fixed prosthesis was achieved. Gingivectomy and gingivoplasty were performed on the maxillary incisors to improve the aesthetics, and gingival levels were aligned. After the treatments, the patient's aesthetic expectations and functional needs were successfully met.

Discussion: Aesthetically and functionally appropriate rehabilitation of tooth deficiencies in the anterior region is only possible with interdisciplinary coordination of all diagnostic, planning, and treatment procedures. Implant-supported prostheses can be improved in the proper case of patient selection and appropriate treatment planning.

Keywords: Implant prosthesis, periodontal surgery, multidisciplinary, esthetics

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P13: A Novel Impression Method Technique for Mobile Teeth: A Clinical Case

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Introduction: Prosthetic replacement is frequently required as a component of corrective therapy to regain both the functionality and aesthetics of periodontally compromised dentition. Impression taking of patients with a periodontally compromised dentition is often challenging while fabricating prosthodontic restorations and orthodontic devices.

Case Description: This article describes a precise and secure method for creating an impression on a patient with mobile and/or misaligned teeth. The approach described involves building a reservoir on mobile teeth to decrease during impression-making. The procedure included using polyvinyl siloxane impression material with a stock tray and a two-stage putty-wash method. Initially, the custom reservoirs of mobile teeth are created on casts obtained from a preliminary impression. After that, these reservoirs were applied to the mobile teeth of the patient before a definitive impression was made. In the first stage of the wash method, the reservoir was covered with putty impression material. In the second stage, the impression was made using low-viscosity impression material after removing reservoirs in putty impression.

Discussion: When mobile teeth serve as abutment teeth for removable partial dentures or fixed prostheses, it is vital to minimize tooth displacement during the impression procedure. For a minimum displacement, local impression pressure against mobile teeth could be reduced by using impression materials with low-viscosity and slow hardening, trays with a thicker spacer for the impression materials and were seated at a moderate speed. The main advantage of this technique is that it provides adequate space for low-viscosity impression material for mobile teeth and replaces mobile teeth during slow hardening of impression.

Keywords: Mobile teeth, impression techniques, polyvinylsiloxane

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P14: Hemisection in the Dental Implants Era – Why do we Still Consider this Option?

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Introduction: In the age of dental implants, the question of whether to save or extract natural teeth remains a critical consideration in dental practice. Despite the advancements in implant technology, the preservation of natural dentition continues to be a primary goal in modern dentistry. This discussion explores the rationale behind prioritizing the conservation of natural teeth over extraction and replacement with dental implants.

Case Report: Patient with the lower compromised multirooted molar came to the office to restore it. The goal of the patient was to save the tooth, and she refused to install the implant. The one part of the tooth was removed and the second was restored utilizing post, core and crown. Restoration was splinted with the neighboring tooth which also required reconstruction.

Discussion: The decision to save a natural tooth involves a comprehensive evaluation of various clinical, functional, and patient-specific factors. From a functional standpoint, natural teeth offer superior proprioception and chewing efficiency compared to dental implants, contributing to overall oral health and well-being. Furthermore, preserving natural teeth helps maintain the integrity of the surrounding bone and soft tissues, preventing bone resorption and preserving facial aesthetics.

Additionally, saving natural teeth can be more cost-effective for patients in the long term, as it avoids the initial expense of implant surgery and the potential for future complications or replacement. From a psychological perspective, retaining natural teeth preserves the patient's sense of identity and emotional attachment, which may be compromised by tooth loss and replacement with implants.

Furthermore, advancements in endodontic techniques and materials have significantly improved the success rates of root canal treatments, making them a viable alternative to extraction.

Through a comprehensive assessment of clinical, functional, and patient-related factors, dentists can determine the most appropriate course of action to optimize oral health outcomes and patient satisfaction.

Keywords: Hemisection, dental implants, prosthetic treatment

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P15: Prosthetic Treatment of Patient with Mandible Resection

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Introduction: Mandible resection, often necessitated by conditions such as oral cancer or severe trauma, poses significant challenges to patients' oral function, aesthetics, and overall quality of life. Prosthetic rehabilitation plays a pivotal role in restoring these aspects, aiming to provide patients with functional restoration and aesthetic enhancement. This report outlines the prosthetic treatment of a patient who underwent mandible resection, detailing the multidisciplinary approach employed to address their specific needs and challenges.

Case Report: The patient, with a history of tumor presented with mandible resection. Following comprehensive evaluation and collaboration with the surgical team, a prosthetic treatment plan was formulated. Surgical reconstruction, utilizing reconstructive techniques was performed to restore jawbone structure and support. Subsequently, customized prosthetic solutions were designed and implemented to address the patient's functional deficits and aesthetic concerns.

The prosthetic treatment included implant supported restoration, tailored to the patient's unique anatomy and functional requirements was performed. Special considerations were given to stability, function, and aesthetics, with a focus on achieving optimal outcomes. Speech rehabilitation techniques, in conjunction with prosthetic interventions, were employed to address any speech difficulties resulting from the mandible resection. The patient was provided with thorough education and support throughout the treatment process, including instructions on oral hygiene, dietary recommendations, and ongoing care.

Discussion: The prosthetic treatment of patients with mandible resection requires a multidisciplinary approach, involving collaboration between oral surgeons, prosthodontists, maxillofacial prosthetists, and other healthcare professionals. Customized prosthetic solutions, ranging from removable dentures to implant-supported prostheses, play a crucial role in restoring oral function and aesthetics. Special attention must be given to patient education, psychological support, and long-term management to ensure successful outcomes.

Ultimately, prosthetic treatment aims to improve patients' quality of life by restoring oral function, facial aesthetics, and self-confidence in the face of significant anatomical and physiological changes

Keywords: Mandible resection, prosthetic rehabilitation, head and neck tumor, quality of life

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P17: Occlusal Splint as a Part of the Therapy of TMJ Anterior Disc Displacement

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Introduction: The temporomandibular joint (TMJ) anterior disc displacement (ADD) is a specific temporomandibular disorder with different clinical signs. ADD with reduction (DDWR), sometimes called clicking joint, is typical for joint noises during opening and closing movements. Contrary, ADD without reduction (DDwoR), known as „locked joint", more likely presents with visible limited jaw opening

Case Description: 30-year-old woman in the 1st trimestr of pregnancy came with the complaint of pain in the right TMJ. She suffered from type 1 diabetes mellitus treated with insulin pump. She described very limited and painful opening attack (1 finger) with strong yawning pain followed with joint rigidity a month ago. Clinical examination proved chronic pain in the right TMJ, with active opening range 35 mm (passive opening range 53 mm with pain), silent click at 12 mm on closing. During protrusive moment the click is lost. Palpation of the chewing muscles was not painful. The diagnose was assessed as DDwoR and TMJ two-way chronic synovitis. The conservative treatment included caring mode, local heat and anterior repositioning appliance (ARA). NSAID were contraindicated due to pregnancy. Conventional ARA without any individualized data was fabricated and delivered in the same day. The intraoral scanner and digital facebow was used to prepare more comfortable and precise ARA using digital workflow in one week. Within 3 weeks patient described pain and limited opening regress.

Discussion: The conservative treatment of DDwoR is prefered. The imaging methods as well the farmacotherapy were limited due the pregnancy in this case. Individualized ARA brought the comfort and loss of pain for the ADD patient.

Keywords: Occlusal splint, Anterior disc displacement

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P20: Twenty-Year Follow-up of Prosthetic Treatment - A Case Report

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Introduction: Surviving deciduous teeth and permanent teeth impacted in the jawbone pose a problem both as an impairment of function but also treatment option. Prosthetic restorations made for a patient in his 20s need to be replaced after 20 years.

Case Description: A 43-year-old patient came in to replace prosthetic restorations that had been in use for 20 years. He used removable prosthetic restorations in both dental arches, in the form of overdentures. In the upper jaw - the dentures were supported on prosthetic crowns on teeth 16 and 26 and a vertical ball attachment on the root post in tooth 21. In the lower arch - the prosthesis were supported on telescopic crowns on teeth 34 and 35. Both dentures were mechanically damaged, and in addition, the ball attachments had lost retention.

Discussion: The treatment plan consisted of removal of surviving deciduous teeth. In upper arch crowns and ball attachment on the root post new one was made, and new overdenture as well. In lower arch - new denture on existing prosthetic telescopic crowns was made. Due to the presence of impacted permanent teeth in both jaws, there was no other treatment alternative.

Keywords: Overdenture, Impacted teeth

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P23: Association Between Removable Denture Use and Cigarette Smoking – Results from the Bialystok Plus Study

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Objectives: The purpose of this study was to assess whether there was an association between cigarette smoking and the use of removable dentures.

Materials and Methods: The cross-sectional study of 2141 randomly selected Bialystok citizens was conducted between October 2018 and January 2024. The extend of tooth loss and the presence or absence of dentures were assessed separately for the maxilla and mandible during oral examination conducted by four calibrated dentist in a dental office setting. The survey questionnaire referred to the smoking habit. Study population was divided into non-smokers (people who had never smoked, group A) and smokers (people who had smoked cigarettes at any time in their life, group B). Among group B, two subgroups were created: B1 (current smokers) and B2 (former smokers). Data were analysed separately for upper and lower jaw. Chi2 test was used to find whether the smoking habit was associated with denture use, with the significance level at $p<0.05$.

Results: For the maxilla, 231 (10.8%) participants used an acrylic partial denture, 92 (4.3%) a metal framework partial denture, and 126 (5.9%) a complete denture. There were 453 (21.2%) cases with tooth loss not replaced with a denture. For the mandible, the numbers were 164 (7.7%), 98 (4.6%), 73 (3.4%) and 705 (32.9%), respectively. 1219 (56.9%) participants declared having a smoking habit (group B), and 391 (32.5%) were current smokers (group B1). Dentures were more prevalent in group B than in group A, in both upper and lower jaw ($p<0.0001$). Comparing B1 and B2 subgroups, having dentures in the upper jaw was associated with being a current smoker ($p<0.01$).

Conclusions: The study found that a smoking habit was associated with the risk of tooth loss and the need to use dentures.

Keywords: Complete denture, partial denture, cigarette smoking, tooth loss

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P24: The Functional Analysis of Complete Dentures Manufactured using a Digital Protocol - *in vivo* Study

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Objectives: A clinical functional evaluation of novel complete dentures manufactured using a digital protocol.

Materials and Methods: 10 healthy patients, who had been using analogue manufactured complete dentures, were given new dentures obtained in a digital protocol. T-Scan was made (OT) to assess occlusion conditions, electromyography (EMG) was applied in order to make an analysis of the muscle activities in the central occlusion. The study was made in old dentures, next, in the new dentures on the day of the denture's replacement, after 1, 3 or 6 months since then, respectively.

Results: Mean Occlusion Time (OT) was 0.25 s and 0.29 s, while mean L/R distribution of forces was 53.7 / 46.3 and 52.4 / 47.6 in the old and new dentures immediately after replacement, respectively. The OT were 0.18 s and 51.8 / 48; 0.17 s and 51.5 /48; 0.18 s and 51.7 / 48.3 after 1, 3 and 6 months after denture's replacement, respectively. EMG study in the old dentures revealed mean values of TAP, TAL, MMP and MML as 24.1 μV, 30.5 μV, 35.2 μV and 22.9 μV, respectively; no symmetry or synergy was found within the scope of activity. In new dentures immediately after replacement mean values were as follows: TAP 28.5 μV, TAL 16.8 μV, MMP 36.6 μV, MML 26.1 μV. In turn, after 1 month of using they were: TAP 28.8 μV, TAL 22.5 μV, MMP 33.5 μV, MML 32.2 μV, after 3 months TAP 30.0 μV, TAL 23.7 μV, MMP 33.2 μV, MML 30.0 μV, and after 6 months TAP 29.0 μV, TAL 24.6 μV, MMP 34.2 μV and MML 31.0 μV.

Conclusions: The novel dentures have improved muscular activity of the stomatognathic system and restored the muscles' function.

Keywords: CAD/CAM, complete dentures, electromyography (EMG), T-Scan

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P25: Biomechanical Analysis of an Aramany Class VI Obturator Prosthesis for Maxillary Defect

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Objectives: The purpose of the study was to evaluate the biomechanical effects of an obturator prosthesis in an Aramany class VI defect compared to a removable partial denture (RPD) prosthesis.

Materials and Methods: 3D geometric skull model was developed through CBCT data using modeling software. Aramany class VI defect anterior to the right and left second premolars was created. A partially edentulous maxillary model with the same missing teeth but without bone defect was also created as control. A maxillary obturator prosthesis and an RPD prosthesis were virtually constructed for their respective models in a similar framework design (Visual-Mesh). Static load of 100 N was applied to marginal ridges of incisors and canines, and to triangular ridges of buccal and palatal cusps of premolars in a 45° oblique direction. Maximum von-Mises stress and displacement values were analyzed and compared for each model (Visual-Crash).

Results: The maximum von-Mises stress value for the metal framework of the obturator prosthesis (216.3 MPa) was lower than that of the RPD prosthesis (315.9 MPa). PMMA resin showed similar maximum stress values (4.3 MPa) for both models. Moreover, the maximum stresses on the surveyed crowns of each model were almost the same (149.4 MPa on the right side and 93 MPa on the left side in the obturator model, and 154.2 MPa and 99.4 MPa, respectively, in the RPD model). The obturator model had significantly higher maximum von-Mises stresses on the periodontal ligament of the remaining teeth compared to the RPD model. Moreover, the prosthesis displacement distribution pattern of each model was also significantly different.

Conclusions: Aramany class VI obturator prosthesis had a significant biomechanical impact on the remaining abutment teeth rather than on bone or prosthesis itself. Therefore, attention should be paid to the prosthesis framework design and the maintenance of supporting dental tissues for the long-term prognosis of obturator prostheses.

Keywords: Obturator, finite element analysis, Aramany class VI, Maxillofacial defect, Removable partial denture

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P26: A Manufacture Protocol for Complete Dentures using a Milling Cutting Method and Face Hunter

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Introduction: Description of the manufacture procedure for complete dentures using a milling cutting method with an individual correction of the prosthetic plane.

Case Description: Steps of the protocol:

1. Subjective and objective study, the evaluation of dentures used.

2. The sampling of functional impressions with the use of silicone masses of decreasing tension on dentures used by a patient after the functional formation of their edges with Function type masses.

3. The recording of occlusion on the pre-prepared prosthetic impressions using a silicone recorder.

4. Scanning of dentures and their occlusive relations by means of a laboratory scanner in order to obtain virtual working models.

5. Taking a 3D face photograph of the dentures used by means of the Face Hunter device.

Face Hunter offers an individualized adjustment of the prosthetic plane and a unique incorporation of the restoration in a given subject.

6. Designing new restorations in a computer programme.

7. A milling cutting of Try-in test dentures in order to make a control in the oral cavity.

8. Control of the test dentures at the dentist's office.

9. The performance of new prosthetic restorations using a milling cutting method in the PMMA target material.

Discussion: The Face Hunter device offers an individualized incorporation of dentures in patients' faces, which considerably improves an aesthetic aspect of the complete dentures.

Keywords: CAD/CAM, Complete denture, Face Hunter

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P28: Assessment of Nutritional Status in Patients Suffering from Oral Cancer after Removable Prosthetic Restorations.

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Objectives: Head and neck cancers and their surgical treatment may lead to considerable deformations of the prosthetic field, chewing function impairment and aesthetics disorder. The effect of this condition is manifested by patients' malnutrition affecting a lower tolerance of oncological therapy side effects, a prolonged recovery time and bad prognostication.

The study was aimed at assessing nutritional status in patients operated on due to head and neck cancers after the use of removable prosthetic restorations

Materials and Methods: 25 oncological patients operated on due to the neoplasm and 25 healthy edentulous patients as a control group. Removable acrylic dentures were prepared for the patients.

A nutritional history and its calculations in Dieta 6.0 programme prior to the prosthetic treatment and 6 weeks, 3, 6 and 12 months after the withdrawal of dentures.

Findings were applied to statistical analysis. Fridman, Wilcoxon and Mann-Whitney tests, and Spearman correlation, were used to analyse the results. Significance level of $p \leq 0,05$ was adopted.

Results: The study revealed that oncological patients ate meals of greater calorific value compared to patients from the control arm. They contained more protein with the predominance of animal protein as well as lipids and carbohydrates. Also, it was observed that after 6 weeks of using removable prostheses calorific values of the meals and nutritional values were considerably smaller in both groups. This may suggest that patients' adaptation to new prosthetic restorations was hampered.

Conclusions: Based on this study, we have demonstrated that removable prosthetic restorations considerably improved the patients' nutritional status. A change in nutritional preferences and a wide range of products selected have been observed

Keywords: Oral cancer, nutrition, removable prosthesis

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P29: Impact of a 3D Printed Guide on the Retention and Stability of RPD

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Background: The retention and stability of Removable Partial Dentures (RPDs) are influenced by the functional features and the quality of clasp systems or precise attachments. The ideal path of denture insertion, which is enhanced by guiding planes on natural teeth and/or crown reconstructions, improves RPD retention and stability. Biomechanics are crucial in determining the optimal path of insertion. Forces generated during mastication need to be evenly distributed across the dental arch to prevent stress on abutment teeth and denture-bearing tissues.

Objectives: Specialization in dental labor for fixed and removable prostetics, is sometimes problematic, that the crowns using as abutments for partial dentures are not equiped with guiding planes in optimal path of insertion.. The evolution of software for 3D RPD design planning includes the provision of an optimal path depicted by parallel pins. The 3D printing process culminates in the production of a plastic guide with visible parallelized pins and windows, facilitating precise parallel preparation of guiding planes on the abutment teeth. In case, where the abutment teeth are threated with crowns, the crowns needed parallelized guiding planes. In order to complete this plastic guide with paralel pins we need to follow up in the robotics in prosthodontics.

Materials and methods: Comparison of the effect of classical abutment tooth preparation and preparation using a 3D printed guide with parallel guide pins on the retention and stability of RPD.

Results and Conclusion: The integration of 3D printing technology in the design and preparation of Removable Partial Dentures (RPDs) significantly enhances their retention and stability. The precision of 3D printed guides allows for accurate preparation of guiding planes, ensuring an ideal path of insertion that evenly distributes occlusal forces, thereby reducing stress on abutment teeth and denture-bearing tissues. This technology also improves design planning by providing a clear visualization of the optimal path of insertion, which, combined with considerations of jaw movement and force distribution, leads to better-fitting, more stable dentures. Consequently, the use of 3D printed guides enhances overall functionality and patient satisfaction, particularly in complex cases where traditional methods may be less effective, thus improving the accuracy and effectiveness of prosthetic treatment.

Keywords: Prosthodontics, removable partial denture, guiding planes, parallel pins, chitubox (software), 3D printing.

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P31: The Assessment of the Finish Line in Prepared Teeth After Troughing Using Multiple Methods

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Objectives: The adequate gingival retraction with the double cord technique is crucial for taking high quality prosthetic impressions. The study aimed to check does the use of a 980 nm diode laser in combination with the double cord technique increase the retraction efficiency compared to the conventional technique.

Materials and Methods: The number of 26 teeth were prepared for prosthetic crown reconstruction. One week after the teeth preparation, the gingiva was retracted, before taking the impression, using following three methods: the classic method of double cord technique (Group 1, n=26); gingival troughing (Group 2, n=26) with 980 nm diode laser (Smart m PRO, Lasotronix, Poland) at 4.0 W ton: 20 ms, toff: 80 ms; combination of the diode laser troughing and double cord technique (Group 3, n=26). Retraction was performed under local anesthesia with 40 mg adrenaline and 0.005 mg articaine hydrochloride (Septodont, France). The impressions were taken using the same impression technique and the same impression materials: A-silicone, Bisico S1, and S4 (Bisico, Germany). The casting models from class 4 dental stone were fabricated and digitally scanned with the laboratory scanner Medit Identica (Media, Korea) The visibility of the preparation margin for each impression technique were compared with a computer software (Blender Institute, Holland). The lengths of the visible fragments of the preparation margin around a single abutment were summed up and the percentage of the total tooth circumference was calculated for each impression technique separately.

Results: The best visibility of the preparation area (99,52% of the tooth circumference) was obtained using a combined technique (double cord technique and laser throughing). The lower percentage of visibility of the prepared tooth margin amounted to 93,67%, and 76,12% of the tooth circumference were obtained for the two retraction cords (Group 1) or the laser troughing alone (Group 2), respectively.

Conclusions: The additional application of 980 nm diode laser improved the prosthetic impression quality and the visibility of the preparation margin.

Keywords: Gingival retraction, laser troughing, double cord technique, prosthetic impression, finish line

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P33: Aesthetic Rehabilitation in the Anterior Region Using Permanent 3D-Printed Veneers

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Introduction: The use of 3D-printing in dentistry has exhibited rapid growth in recent years and along with the development of new materials it can be used for permanent applications. 3D-printed resins are widely used in dental procedures due to their numerous benefits. The aim of this presentation is to show the use of 3D printed resin as the material of choice through a case of an esthetic smile transformation using veneers.

Case description: A 43-year-old man presented requesting to improve the esthetics of his smile with the shape of his teeth being his main complaint. After clinical and radiographic evaluation, the final treatment plan included four 3D printed composite veneers at the central and lateral maxillary incisors. The digital simulation of the treatment plan was designed and after making the 3D digital wax up we proceeded to the mockup appointment.

The core of the veneers was made using 3D printed resin light-curing, free-flowing plastic based on methacrylic acid and was layered to optimize the esthetic result using light-curing composite consisting of 50% opalescent ceramic particles. The tooth preparations were done through the mockup to evaluate the preparation thickness and following the digital workflow the final impressions were taken and the restorations were designed in the CAD software. The final restorations were sandblasted with Al_2O_3 110μm and the cementation was performed using light-curing resin-based cement.

Discussion: Achieving the full potential of 3D printing relies on improvements in both dental materials and processes. Some printed resin materials have reached successfully mechanical properties comparable to milled and hybrid ceramics. Moreover, research indicates that the bonding to 3D printed restorations demonstrates excellent initial bond strength. Therefore, 3D Printed resins can provide an excellent alternative for numerous cases as they can be used for not only temporary but permanent restorations as well.

Keywords: permanent, 3D printed, veneers

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INITIAL SITUATION

2D DIGITAL SIMULATION

INITIAL DIGITAL IMPRESSIONS

3D DIGITAL WAX UP USING THE FACE SCAN

MOCK UP

END RESULT

DIGITAL IMPRESSION OF FINAL PREPARATIONS

COMPARISON BETWEEN INITIAL SITUATION AND POST FINAL PREPARATIONS

P34: Microtomographic Examination of Lymph Vessels' Presence in Teeth Designated For Fixed Prostheses

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Objectives: The purpose of this study was to demonstrate the presence of lymphatic structures within the dental pulp of healthy and carious teeth using computer microtomography. In clinical practice, similar teeth are frequently qualified for fixed prostheses performance.

Materials and Methods: The study was conducted on human teeth obtained after extraction for periodontal and orthodontic indications. Healthy as well as inflamed teeth were examined. Evaluation and visualization of lymphatic vessels in teeth was performed using high-resolution computed microtomography. Specimens were prepared, using different types of contrast. A registration of the slides was performed using a microtomograph 1172 SkyScan, Bruker.Analysis of the topographs and visualization of the vessels was performed using CtVox and CtVol programs.

Results: Microtomographic examination of healthy and cariously changed teeth revealed areas in the pulp, where vessels were visible. On the basis of the study performed, it cannot be confirmed whether the vessels visible in the tooth pulp are lymphatic vessels.

Conclusions: The pulpal lymphatics' existence is debatable. Even though there are numerous signs that suggest there are lymphatic vessels in the pulp of the tooth, this problem is still unsolved and requires more investigation and development of new methods to detect lymphatic vessels in teeth.

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P39: A Multidisciplinary Approach in the Management of Congenitally Missing Maxillary Lateral Incisors.

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Introduction: This case involves a 23-year-old female patient with congenitally missing upper right and left lateral incisors, who has been wearing an upper partial denture for several years. The patient desires a fixed replacement for her missing teeth and is exploring treatment options. She has a history of orthodontic treatment and has maintained spaces for possible implants or fixed prostheses in the missing lateral incisor regions.

Case Description: The case presents an opportunity to explore different treatment options for hypodontia, considering the patient's needs and desires. As evidenced by much literature, resin-retained bridges can provide a predictable and minimally invasive treatment modality for managing congenitally missing teeth Pjetursson *et al* 2008, King *et al* 2015. The patient also presented with Localised plaque-induced gingivitis, following personalised oral hygiene advice and PMPR (BSP S3 guidelines), optimum tissue health was restored. The first appointment was impression taking and the second/last was cementing the double cantilever bridge. The patient was satisfied and had no complaints when they were seen again for follow-ups after one week, a year, and two years.

Discussion: Preserving the space with orthodontic treatment and managing gingivitis were essential phases before opting for prosthodontic modalities. Consider resin-retained bridges as they have a high survival rate and a high patient satisfaction rate.

Keywords: Resin retained bridge

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P40: *In Vitro* Accuracy of Different Bite Registration Techniques in Edentolous Maxillary Arch

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Objectives: This study investigated the effect of three digital bite registration techniques on the accuracy of intraoral scanning in maxillary edentulous and mandibular dentate arches.

Materials and Methods: A maxillary edentulous and a mandible fully dentate models were created. Four dental implants were placed in the maxilla, fitted with scan bodies, and reference scans were obtained using a Nikon Altera 10.7.6 scanner. Digital impressions were acquired ten times for each model using a Trios 4 intraoral scanner. Three different digital bite records were collected for each pair of mandible and maxilla scans. The first one was a bite record without additional material (WSB), the second utilized a silicone index between the models (WSB silicone), and the third followed a pre-preparation scanning protocol (Pre-PREP). The data was exported in STL format, which was assessed for trueness and precision using statistical analysis.

Results: According to mean trueness values, WSB exhibited the lowest value, 173 µm, followed by WSB silicone 242 µm and Pre-PREP 620 µm. The differences were significant only when comparing Pre-PREP to WSB and Pre-PREP to WSB silicone (p <.05). Regarding precision, WSB demonstrated a mean value of 171.5 µm, followed by WSB silicone with 213.8 µm, and Pre-PREP with 222.2 µm with no significant difference between the groups.

Conclusions: The presence of interarch bite registration material adversely affected interocclusal record accuracy, while WSB silicone presented a suitable substitute for WSB.

Keywords: Prosthodontics, Bite Registration, Dental Implant, Digital Dentistry, Accuracy

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P41: Effects of Abutment Screw Preload in Implant Connection Systems: A 3D Finite Element Study

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Objectives: The purpose of this FEA study was to evaluate and verify the effects of the presence of the preload condition on abutment screws under the occlusal load for internal hexagonal connection systems.

Materials and Methods: The finite element models consisting of bone blocks, implant systems (BlueDiamond®, MegaGen, Daegu, Korea), and crowns were created. With these components, a total of 2 models with different conditions were constructed for FEA: internal hexagonal system with preload (Model 1) , internal hexagonal system without preload (Model 2). An 11.3-degree oblique load (100 N) to the axis of the implant was applied on the occlusal surface of the crown for the models with occlusal load. A preload of 300 N was applied in the abutment screw of the model1. The maximum von Mises stress, maximum principal stress, and maximum displacement of the components of the models were evaluated.

Results: Among the components, the abutment screw showed the greatest increase under occlusal load in the von Mises stress values with preload conditions between 274 MPa in the model 1 and 13 MPa in the model 2. Regardless of the preload condition, the implant showed the highest stress values of all parts, followed by the abutment. When comparing the internal hexagonal system with preload and the internal hexagonal system without preload, the maximum stress values of the internal hexagonal system with preload (Model 1) were higher in the screw, crown, ZrGen Aubtment (274, 47, 260 MPa in the model 1 and 13, 46, 33 MPa in the model 2). For both connection systems, irrespective of the preload or occlusal load, the smallest stress values were obtained in cancellous bone (1.68 MPa in the model 1 and 1.68 MPa in the model 2), followed by cortical bone (20 MPa in the model 1 and 20 MPa in the model 2).

Conclusions: The presence of a preload condition significantly affected the biomechanical behaviors of the components of 2 systems. The preload condition should be included in FEA to achieve more realistic results.

Keywords: implant, finite element analysis, internal hexagonal system, preload

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P42: Prosthetic Rehabilitation of Edentulous Jaws with All-on-Six Full-Arch Implant-Supported Fixed Prostheses: A Case Report

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Introduction: Edentulism is defined as a debilitating, irreversible, and complex pathological condition that is described as the final marker disease for oral health. An implant-supported fixed prosthesis is a recommended alternative treatment for complete edentulous patients within the framework of evidence-based dentistry. This case report presents the implant prosthetic rehabilitation of a patient with completely edentulous maxilla and mandible with all-on-six treatment approach.

Case Description: A 58-year-old male patient presented complete edentulism in both jaws due to the severity of decay was referred to our clinic for aesthetic and functional problems. After taking a comprehensive medical and dental history, current clinical information was supported by full-mouth periapical radiographs, a panoramic radiograph, and assessment of cone-beam computed tomography. There were no detected pathologies or any limitations that could affect the treatment. The patient's maxillomandibular relationship and vertical occlusal dimension assessments were found to be appropriate for making full-mouth fixed prostheses. The surgical phase consisted of the placement of six implants for each jaw. The plan for the all-on-six full-arch rehabilitation was initiated with delayed implant loading protocol. After four months, the jaws were rehabilitated with fixed full-mouth restorations. Group function occlusion was performed. Finally, the patient was instructed in oral hygiene and motivated for improved maintenance. No complication was noted after 1-week, 6-months and one-year follow-up periods.

Discussion: Implant-supported all-on-six full-mouth restoration offers better acceptance through improved function, aesthetics, phonetics, and increased comfort to the patient as well as enhancing masticatory efficiency. This treatment may be a viable and cost-effective option for individuals with complete edentulism to significantly enhance their dental function, comfort, and aesthetics while enhancing their quality of life.

Keywords: EDENTULOUS JAW, all-on-six implant supported fixed prothesis, full-arch rehabilitation

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P47: Success Vs. Failure Criteria in Complex Oral Rehabilitation of Edentulism and its Complications

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Objectives: Complex oral rehabilitation in cases of extensive partial edentulism and total edentulism and its associated complications presents a multifaceted challenge for dental practitioner. Edentulousness is often accompanied by alveolar bone resorption, compromised soft tissues, and decreased quality of life. This category of patients necessitates comprehensive treatment strategies.

Materials and Methods: Success in complex oral rehabilitation depends by factors like occlusal stability, aesthetics, patient satisfaction, and functional restoration. Criteria used to definite the therapeutic success extends beyond technical achievements to encompass long-term outcomes and patient-centered perspectives. Conversely, indicators of therapeutic failure include prosthetic complications, implant failures, persistent discomfort, and patients' dissatisfaction. Clinicians must understand the dynamic relationship between success and failure criteria in edentulous rehabilitation.

Results: The implant-prosthetic treatment outcome is significantly influenced by factors such as patient expectations, systemic health, anatomical challenges, and psychological resilience. Literature data underscores the importance of a holistic approach to complex oral rehabilitation, integrating clinical expertise with patient-centered care paradigms. Clinicians must delineate clear success and failure criteria, to tailor treatment plans, mitigate risks, and optimize outcomes for patients undergoing complex oral rehabilitation.

Conclusions: Further research and interdisciplinary collaboration can refine existing protocols and enhance the overall efficacy of edentulism rehabilitation strategies.

Keywords: implant, edentulism, oral rehabilitation

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P49: Digital Analysis of Dentition in Practical Work of a Dental Orthopedist

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Objectives: To study the possibilities of digital analysis of dental arches in the practice of an orthopedic dentist

Materials and Methods: We examined 30 patients with partial loss of teeth, who underwent immediate preliminary (IP) prosthetics within 24 hours after installation of implants or the earliest prosthetics (EP) from 2-3 days. The control group included 21 practically healthy individuals.

Using the T-scan III device (Tekscan, USA), the characteristics of occlusion relationships were studied. The qualitative characteristics included the total occlusal load trajectory (TOLT). Quantitative characteristics include occlusal balance (OB) of the dentition in the position of central occlusion.

Results: During the study, in the control group, it was determined that the trajectory of the total occlusal load was a relatively straight line, in addition, the occlusal balance between the right and left sides of the dentition was optimal with 50% to 50% ratio.

When studying electronic occlusiograms in individuals of the main group, TOLTs, having various directional options, were identified. TOLT going toward the anterior teeth before the treatment was identified in 14 patients (46.67%), after the

treatment the number of patients increased to 18 (60%); towards the premolars - 10 patients (33.33%) before the treatment and after - the number patients decreased to 7 (23.33%); towards the molars - in 6 (20%) and 5 (16.67%), respectively.

Optimal OB (50% to 50%) was observed in 7 patients (23.33%) of the main group; after IP, the number of patients increased and was observed in 18 (60%) patients. An acceptable OB (40% to 60%) was determined before treatment in 14 patients (46.67%), after IP only in 7 patients (23.33%). An unacceptable OB (30% to 70%) was detected in 9 patients (30%) before treatment, and in 5 (16.67%) of 30 patients studied after IP.

Conclusions: Analysis of occlusion using "T-scan III" made it possible to study quantitative and qualitative characteristics at different stages of implantation treatment, eliminate inaccuracies and errors in a timely manner in order to create a balanced occlusion, and therefore reduce the likelihood of complications from the masticatory muscles and temporomandibular joint.

Keywords: Occlusal balance, Interocclusal relationships, Contact points

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P50: Comparison of Different Occlusal Indicators in the Analysis of Occlusal Contacts: A Clinical Report

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Introduction: To establish a restoration compatible with stomatognathic system, it's important to adjust occlusal contacts accurately. Occlusal markers are employed to locate and identify occlusal contacts. The accuracy of these markers is crucial for achieving balance and harmony, which is the primary aim of occlusal therapy. There's limited information about the accuracy of these materials. The effectiveness of current occlusal analysis techniques depend on various factors including the thickness, durability, and flexibility of recording materials, as well as oral conditions and clinician's interpretation. Both qualitative (articulating paper, schim-stock, waxes, silicon impressions) and quantitative methods (photo occlusion, T-scan) are utilized to assess occlusal relationships.

Case Description: In this clinical report, occlusal contacts were analyzed in a 22-year-old dental student with intact dental occlusion. Two different thicknesses of articulation paper, shim-stock, and T-scan were used. Occlusal recordings were obtained at the maximum intercuspal position and maximum bite force. Successively, articulation papers and shim-stock were held with forceps and the patient was instructed to clench their teeth five times each. Standartized intraoral photographs were taken after the application of each material. While the subject remained in the same position, bite recordings were obtained with the T-scan digital occlusal analyzer . Photographs and T-scan recordings were compared.

Discussion: The images of occlusal contacts obtained from the application of four different methods were analyzed comparatively. Although articulation papers are more commonly preferred due to their ease of use and affordability, as their thickness increases, they tend to produce more scattered and dense markings, making it more difficult to detect occlusal contacts. In contrast, T-Scan sensors have a standardized thickness, which is crucial for ensuring consistency in consecutive occlusal evaluations. T-Scan systems not only display occlusal contacts but also provide parameters such as bite timing and forces, offering more precise results than traditional methods and facilitating record storage.

Keywords: T-Scan, dental occlusion, digital occlusal analysis, articulating paper

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P51: Impact of Overbites and Overjets on Selected Stomatognathic Muscle Activity

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(Medical University of Bialystok)

Objectives: Assessment of the relationship between overbite and overjet and the activity of selected muscles of the stomatognathic system in a group of young adults with full natural dentition.

Materials and Methods: 162 (K-78/M-84) patients with full natural teeth aged 18-21 and correct occlusal conditions.

Measurement of overbite and overjet in clinical conditions and assessment of muscle activity (EMG) of selected muscles of the masticatory system (masseters, temporal muscles, sternocleidomastoid muscles, anterior bellies of digastric muscles). Muscle activity was assessed in central occlusion and during lateral movements of the mandible. The obtained research results were subjected to statistical analyses using Statistica 13.

Results: Average value of overbite: 3.08±1.83mm (n-162), average value of overjet 2.18±1.47mm (n-162). A significant relationship was found between the activity of the masseter and digastric muscles in central occlusion and the size of the overbite: (MM-R r=0.19 p<= 0.02;MM-L r=0.17 p<= 0.03;DA-R r=0.21 p <= 0.01;DA-L r=0.23 p<=0.004). The activity of temporal muscles in lateral movements of the mandible significantly correlated with the overbite: (TA-R/RM r=0.20 p<=0.012;TA-L/RM r=0.28 p<= 0002;TA-R/LM r=0.19 p<= 0.02;TA-L/LM r=0.24, p<= 0.002).

A significant correlation was found between the activity of the temporal muscles and the overjet during lateral movements of the mandible: (TA-R/RM r=0.23 p=<0.004;TA-L/RM r=0.27 p<=0.001; TA-R/LM r=0.18 p<=0.024;TA-L/LM r=0.20 p<=0.01;DA-R/LM r=0.20 p<=0.01;DA-L/LM r=0.18 p<=0.02).

Conclusions: The size of the overbite significantly affects the activity of the masseter and digastric muscles in central occlusion. The size of the overjet has a significant relationship with the activity of the temporal muscles and digastric muscles

Keywords: occlusion, overbite, overjet, masseter muscles, temporal muscles

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P52: Implementation of Occlusal Analysis and Adjustment During Orthodontic Treatment of Patients with Juvenile Idiopathic Arthritis

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Objectives: To analyze the efficiency of conducting proper occlusal analysis and adjustment during orthodontic treatment of the patients with juvenile idiopathic arthritis in order to minimize possible risks and achieve optimal results.

Materials and Methods: 11 young patients with diagnosis of juvenile idiopathic arthritis (according to ILAR criteria) and malocclusion aged from 18 to 34 years (mean age 22.64±4.82) who included 6 females and 5 males were examined and underwent orthodontic treatment at Dental Medical Center of Bogomolets National Medical University. All patients underwent clinical and CBCT X-ray examination. Digital occlusal analysis was performed with Medit Occlusion Analyzer v.1.02 software using intraoral scans of the jaws and bite records obtained with Medit i500 intraoral scanner. The orthodontic treatment was applied in case of absence or after elimination of temporomandibular disorders manifestations and included expansion of dental arches, normalization of the teeth positions with bracket system and straight arches using small forces, bite blocks and restoration of dental hard tissues when needed. Occlusal analysis and adjustments were carried out every 4 weeks during active teeth movement stage and every 2 weeks at the final stage of rehabilitation.

Results: provided orthodontic treatment in combination with application of bite blocks and direct dental hard tissues restorations allowed to expand the dental arches, align the midline and normalize the occlusal contacts of the teeth in static and dynamic occlusion in all patients. There were no signs of premature contacts, occlusal overload, deterioration of periodontal lesion or temporomandibular disorder manifestation recurrence. CBCT x-ray showed no signs of decrease in bone density or resorption.

Conclusions: Implementation of proper digital occlusal analysis and adjustment during orthodontic treatment of the patients with juvenile idiopathic arthritis within the framework of a personalized approach to their rehabilitation ensures the minimization of risks and is a guarantee of achieving optimal results.

Keywords: Occlusal adjustment, dental occlusion, orthodontics, malocclusion, juvenile arthritis

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P53: The Comparative Use of Different Occlusal Indicators and Occlusal Adjustment in Full-Mouth Rehabilitation

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Background: Occlusion refers to the static relationship between the masticatory or incisal surfaces of the maxillary and mandibular teeth or their analogs.[1] In all intraoral restorations, occlusion must be considered for long-term biological and mechanical success. It is important to achieve an occlusion where occlusal loads are evenly distributed on all teeth, implants, and restorations.[2] Occlusal contacts that disrupt the harmonious relationship between the upper and lower teeth or restorations, restrict or misdirecting jaw movements are referred to as premature contacts, early contacts, or occlusal interferences.[3] Occlusal equilibration involves the correction of stress-inducing occlusal contacts through selective grinding of the teeth and restorations.[4] Materials used to identify the location of occlusal contacts are referred to as occlusal indicators, which are divided into qualitative and quantitative methods.[5] In qualitative methods, the determination is limited to the locations of occlusal contact points. Examples of qualitative indicators include articulation papers, foils, and metallic shim stock films. In contrast, quantitative methods enable the assessment of both the timing and intensity of occlusal contacts. The T-Scan (Tekscan Inc., South Boston, MA, USA), a computerized occlusal analysis system, serves as an example of a quantitative occlusal indicator.[6]

Case Description: A 36-year-old male patient with no history of systemic diseases presented to our clinic for treatment of his complaints. The patient had previously received 6 implants in the maxilla but also exhibited extensive tooth and periodontal loss. Following radiographic and intraoral examinations, full-mouth rehabilitation was planned after the extraction of tooth #14. Canine-guided occlusion was selected. Occlusal analysis on the diagnostic model indicated that cement-retained, implant-supported restorations with porcelain fused metal restorative material would be utilized. Consequently fixed bridges supported by implants were placed on #17-15 (with the support of this a cantilever was placed on #14), #12-22, #25-27 in the maxilla. A single crown on tooth #13 and splinted crowns on teeth #23-24. In the mandibular arch, fixed partial dentures were fabricated on teeth numbers #35-37, #32-33 (with the support of this a cantilever was placed #34), #31-41-42-43 and #45-47.

The occlusal contact points of the full-mouth rehabilitation, incorporating both implant-supported and tooth-supported restorations, were initially identified using articulation papers (65 μm, Swedish Dental Supplies AB) and foil (8 μm, Bausch Arti-Fol®) of varying thicknesses. These contact points were subsequently analyzed and refined using the T-Scan system (60 μm, T-scan III, Tekscan Inc, USA) for precise occlusal adjustment.
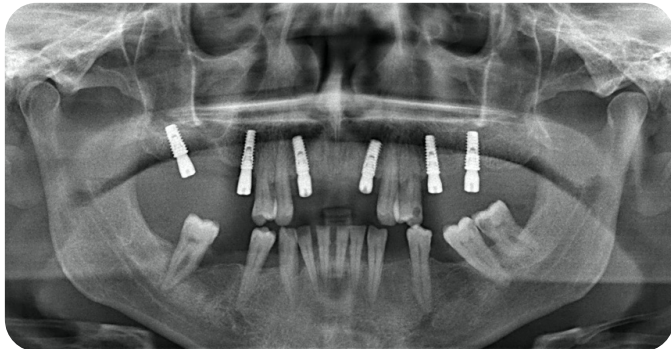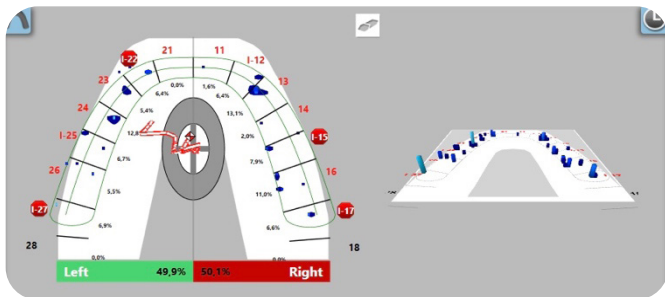

Figure 1. Panoramic radiograph.

Figure 2. The image of the T-Scan record taken from the patient before adjustments.
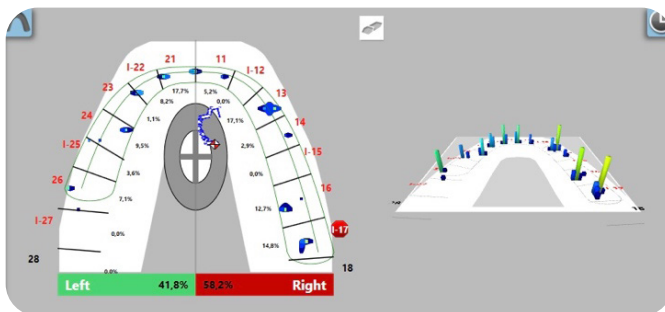
Figure 3. The image of the T-Scan record taken after the occlusal adjustments were completed.

Table 1. Data of the T-Scan recording

	Before Occlusal Adjustment	After Occlusal Adjustment
Occlusion Time	0.29	0.33
Disclusion Time	1.23	0.16
Force Distribution of The Right Side (%)	58.2	50.1
Force Distribution of The Left Side (%)	41.8	49.9

Conclusion: In this case report, three different occlusal indicators were compared and adjusted for the arrangement of occlusal contacts. Articulation papers and foils are frequently preferred in clinics due to their affordability and easy accessibility, but they can produce inaccurate markings due to

Figure 4. Initial frontal view of the arches.

Figure 5. Final smiling frontal view.

saliva interference. Furthermore, it is not possible to accurately ascertain the sequence in which the marks were formed or their respective intensities. T-Scan can measure occlusal contact positions, timings, and force distributions, and it can differentiate between implant and tooth supports. Its sensor is synthetic and resistant to saliva wetting, it can detect the proportional amount of force, and it can specifically indicate the location of the highest intensity contacts of a single tooth. While this method is costly, it is also challenging to implement and time-consuming.

Keywords: Occlusion, occlusal interferences, occlusal indicators, occlusal adjustment, T-Scan

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P56: Dependence of Functional Occlusion on Oral Health

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Introduction: Functional occlusion and articulation of the upper and lower dental arch is a basic prerequisite for effective initial processing of food. The proper alignment of teeth during biting and chewing, can be influenced by oral health. From the point of view of holistic medicine, general and oral health cannot be separated from each other. Trouble-free mastication is important for ensuring quality nutrition of the body and at the same time, the regular function of the masticatory muscles, which requires sufficient blood supply, supports increased oxygen saturation of the brain. Functional occlusion primarily includes healthy teeth and periodontal tissues.
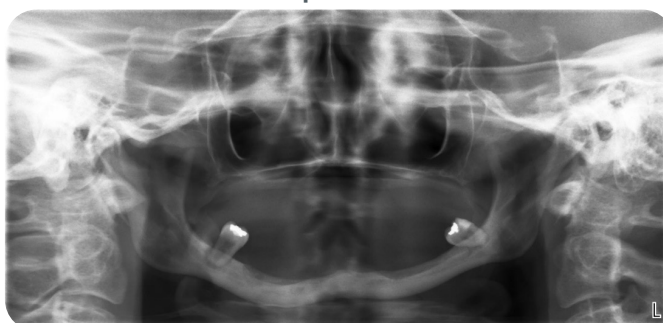
Case Description

Case report 1: The case report describes a female born in 1961 with Ehlers-Danlos syndrome, type 8, associated with periodontal disease. Ehlers-Danlos syndrome affects 1 in 5000 people and is an inherited disorder of the elastic connective tissue. It is characterized by hyperelasticity of the skin, hypermobility of the joints, poor wound healing, atrophic scars, and calcified subcutaneous cysts. It can also involve congenital cardiac defects. The syndrome affects both sexes and is typically recognized from birth. It follows an autosomal dominant or X-linked inheritance pattern. The first complete description of the syndrome was given by A.N. Chernogubow in 1892. In this patient's history, she experienced hypermobility of the joints due to extremely lax ligaments, skin pigmentation, and hypertension. Both her mother and son are also affected. The patient has periodontal disease, which has led to early tooth loss, atrophy of the alveolar bones, and problematic function of her lower removable partial denture (RPD).

Rehabilitation

Hypermobility and pigmentation of skin

OPG before and after implantation

Case report 2: The case report describes a male born in 1957 with Hajdu-Cheney syndrome, a rare condition occurring in fewer than 1 in 1,000,000 people. The syndrome is characterized by a hypoplastic maxilla and sinuses, irregularly positioned teeth, hypodontia, premature tooth loss, and extreme atrophy of the alveolar bone. The patient also suffers from severe osteoporosis, which has led to compression fractures of the vertebrae. In this patient's history, he presents with infraocclusion of the lateral teeth and embedded wisdom teeth. He has been on long-term bisphosphonate medication. Due to the condition of his dental implants, atypical conventional complete upper and lower dentures were manufactured.

OPG

Rehabilitation

Case report 3: The case report describes a male born in 1999 with multiple agenesis. Multiple agenesis refers to the congenital absence of teeth. The prevalence of hypodontia ranges from 0.1 to 0.9% in the primary dentition and 2 to 10% in the permanent dentition. In this patient's history, 19 permanent teeth are missing. He has abnormal interjaw relations and traumatic occlusion. The patient underwent orthodontic pretreatment, followed by conventional prosthetic rehabilitation, which involved a block of crowns in the upper jaw with a removable partial denture (RPD) stabilized by attachments. The lower fixed bridge was supported by deciduous teeth, and functional occlusion was achieved by increasing the bite. Implants are being considered for the future. The final reconstruction was completed on May 19, 2016.

OPG – 2013-2024

Discussion: Natural teeth or their functional replacement by fixed or removable dentures are a key aspect of oral health. This is an integral part of overall health and prevention of many chronic diseases. The condition of the oral cavity and the whole maxillofacial system can affect general health. Functional occlusion secured by satisfactory dentures clearly supports not only quality nutrition of the whole organism, but also significantly helps positive stimulation of the brain centers responsible for maintaining cognitive functions. It thus becomes an important preventive factor for the possible onset of dementia and Alzheimer's disease, as reported by recent studies. The aging of the population brings many challenges in the field of health care, the aim of which is to improve the quality of life of the elderly, including the preservation of physical and mental health. Removable dentures help the patients to restore self-confidence and well-being when smiling, and thus positively influence the patient's psyche.

Conclusion: Dental caries, pulpitis, periodontal disease, missing teeth or imbalanced dental conditions together with specific diagnoses can contribute to improper functional occlusion. The interconnectedness is clear. Maintaining good oral health practices, such as effective toothbrushing and regular dental check-ups, is crucial to minimize potential impacts on proper occlusion and articulation.

Keywords: Ehlers-Danlos syndrom, Multiple agenesis, Hajdu-Cheney syndrom, implants.

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P62: Estimation of the Properties of Zirconia-Based Ceramics Crowns Abraded with Alumina Particles

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Objectives: The aim of the study was to estimate the fracture resistance, allotropic changes and hardness of zirconia-based crowns after air-abrasion with alumina particles of different sizes.

Materials and Methods: Zirconia-based dental ceramics crowns and cuboid-shaped specimens (Ceramill Zi; AmannGirrbach AG, Koblach, Austria) were made using the CAD/CAM technology (CeramillMap 300, CeramillMind, CeramillMotion; AmannGirrbach AG). The specimens were air-abraded with 50 μm (G 50) or with 110 μm (G 110) alumina particles (Alustral; Omnident Dental HandelsgesellschaftmbH, Rodgau, Germany). The control group (G 0) was left untreated. The fracture resistance of the crowns was assessed in a universal testing machine (Zwick Z2.5 zwickLine; ZwickGmbH&Co.KG, Ulm, Germany). The presence of allotropic transformation within the ceramics surface was assessed with X-ray diffraction (PANalytical Empyrean; PANalytical B.V., EA Almelo, The Netherlands). The Vickers hardness was measured (HV1kp; Zwick/Roell ZHμ; ZwickRoell Indentec; ZwickGmbH&Co. KG). The Kruskal–Wallis one-way analysis-of-varianceby-ranks test was used to determine statistical significance (α = 0.05).

Results: The median fracture resistance of zirconia-based crowns (G 50) after air-abrasion with 50 μm alumina particles was 593 N ($p < 0.001$), the median hardness was 1734 HV1kp ($p < 0.001$), the 26% increase in the monoclinic phase volume was observed. The median fracture resistance obtained for crowns (G 110) abraded with 110 μm alumina particles was 632 N ($p < 0.001$), the median hardness was 1531 HV1kp ($p = 0.05$), 40% volume of the monoclinic phase was detected. In the control group (G 0) the median fracture resistance of crowns was 378 N ($p < 0.001$), the median hardness was 1531 HV1kp ($p = 0.05$), the monoclinic phase was undetectable.

Conclusions: Alumina air-abrasion of zirconia-based ceramics surface increases the fracture resistance of crowns and the volume of the monoclinic phase. The use of 50 μm alumina particle abrasion causes a significant increase of the Vickers hardness of zirconia surface.

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P63: Changes in the Stress State of Metal Inlay Restorations Bonded with Selected Resin Cements

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Background: The resin materials used in the cementation of inlays exhibit polymerization shrinkage stress which may affect the integrity of the interface between the cement and the tooth structure.

Objectives: This study investigates changes in the stress state of metal inlay restorations bonded with cement during water aging (56 days).

Materials and methods: Three types of cements were employed: adhesive resin cement (NX3, Variolink Esthetic), self-adhesive cement (Maxcem Elite Chroma, Breeze), and universal adhesive cement (Nexus Universal, G-cem One). A cylindrical sample made of CuZn alloy (type MM54, Huta Będzin) was utilized to simulate the inlays. Using metal inlays of 5.90 mm in diameter, 50 μm of cement layer were obtained. Photoelastic analysis with a circular transmission polariscope (FL200, Gunt) was employed to measure the stress state. The epoxy resin plates were imitate tooth tissue. The cements were photopolymerized according to the manufacturer's instructions, with lamp output irradiance of 1450 mW/cm2.

Results: Total stress observed after 0.5 h from polymerization for all cements were close to 4 MPa. After water immersion, a notable reduction in contraction stress occurred due to hygroscopic expansion. After two months (56 days), Variolink Esthetic (1.0±0.9 MPa), Breeze (-1.0±0.9 MPa), G-Cem One (0.9±0.8 MPa), and Nexus Universal (-0.4±0.7 MPa) showed stress close to zero. However, NX3 and Maxcem Elite Chroma showed high hydroscopic expansion stress, -6.5 MPa and -5.5 MPa, respectively.

Conclusions: All tested cements generated contraction stress, which decrease during immersion in water. Dynamic of this stress dropping is connected with type/composition of cement.

Keywords: dental prosthesis; metal-cement connection, water absorption; shrinkage stress; photoelastic analysis

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P64: Comparison of Tribological Properties of Modern Polymeric Materials used in Prosthetic Dental Treatment

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Objectives: The aim of the study was to examine and compare the tribological properties of modern polymeric materials used in prosthodontics in the manufacture of fixed dental prostheses.

Materials and Methods: The materials used in the study were PEKK: Pekkton (Cendres Metaux), PEEK: breCAM. HIPC (Bredent) and Copra PEEK (Whitepeaks), FRC-type material Cerasmart 270 (GC), PMMA material (Huge) and 3D Pro Multilayer zirconium dioxide (Aidite) as a comparison material. Cylindrical specimens with base diameter (d)=20mm and height (h)=20mm were cut from factory discs or blocks using CAD/CAM technology in a Zircon Zahn milling machine. Six test specimens were made of each material. A series of tribological tests were performed for each sample, which were carried out in a dry and corrosive environment on an Anton Paar Tribotester TRB test stand. The weight change of the samples was determined using a RADWAG analytical scale.

Results: The lowest values of percentage weight loss after both dry and liquid friction were observed for zirconium dioxide material, while the highest values were observed for PMMA. The average percentage weight loss of individual samples after friction tests in dry and corrosive environments, respectively, was as follows: Pekkton 3.01% and 1.94%, breCAM. HIPC 2.96% and 2.44%, Copra PEEK 3.35% and 2.98%, Cerasmart 270 4.35% and 3.51%, PMMA 7.03% and 5.86%, 3D Pro Multilayer 2.2% and 1.56%. There were statistically significant differences between the groups of materials tested in terms of percentage weight loss after dry and liquid friction.

Conclusions: All examined materials showed lower values of percentage weight loss during liquid friction tests than during dry friction what indicate that the presence of a corrosive environment increases wear resistance of tested materials. To ensure the lowest possible material loss, the correction of prosthetic restorations should be carried out in liquid environment.

Keywords: polymeric materials, fixed dental prostheses, tribological properties

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P65: Influence of Water Absorption on Polymerization Shrinkage Stresses in Dental Resin Cements

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Background: Self-adhesive cements simplify the process of bonding prosthetic restoration by eliminating the need for additional treatments. However, conventional adhesion is preferred for low-retention restorations. New universal cements offer a versatile solution, serving as both self-adhesive and conventional adhesive luting material when combined with a universal bond.

Objectives: This study aimed to assess the evolution of the stress state, specifically the contraction stress produced during photopolymerization and the hygroscopic expansion, in various types of resin cements subjected to water aging.

Materials and methods: The study examined the shrinkage stresses generated during polymerization by new universal adhesive cements with total-etch adhesive (Nexus Universal, G-CEM One) compared to adhesive (NX3, Variolink Esthetic), adhesive resin with self-etch primers (Multilink Automix, Panavia 2.0), and self-adhesive cements (Breeze, MaxCem Elite). The influence of the aqueous environment on the stress state was determined, as well as the adsorption of water by the tested materials. The stress state was measured using photoelastic analysis. To characterize absorbency dynamic changes in samples' weight during the water conditioning were determined.

Results: The lowest contraction stress from tested materials exhibited Panavia 2.0 (5.8±0.9 MPa) while Variolink Esthetic and Multilink Automix obtained the highest values around 12 MPa. All studied materials exhibited contraction stress relief during water immersion (84 days) due to hygroscopic expansion. Breeze exhibited the highest absorption (3.2±0.3 %) and caused the highest stress values due to water expansion (from 0 to almost 5.4 MPa).

Conclusions: Despite relatively high absorption values, new universal resin cements did not show hygroscopic expansion stress.

Keywords: self-adhesive cement, photopolymerization, contraction stress, photoelastic analysis

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P66: Does Dental Ceramics' Post-etching Cleaning Influence its Surface Chemical Composition and Durability of Adhesive Bonding?

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Objectives: Adhesive cementation of all-ceramic prosthetic restorations fabricated glass ceramics involves hydrofluoric acid etching of ceramic surface. Despite rinsing the etchant from ceramic surface with water spray, some debris can still be present on the surface, potentially influencing the durability of adhesive bonding. Hence additional cleaning was proposed, using orthophosphoric acid or ultrasonic cleaning with different media. The study aimed to evaluate the influence of post-etching cleaning of dental ceramic surface on its chemical composition and durability of adhesive bonding.

Materials and Methods: Samples of three different ceramics: leucite-reinforced (LGC), lithium disilicate (LS2) and zirconia-reinforced lithium silicate (ZLS) were fabricated, flat-polished and ultrasonically cleaned. The surface was sandblasted, followed by hydrofluoric acid etching for 60, 20 or 30 seconds, respectively. The etchant was rinsed off the surface using air-water spray (control) and additional cleaning was performed: ultrasonic cleaning in water/ethanol, orthophosphoric acid cleaning followed or not by ultrasonic cleaning in water/ethanol. After cleaning, the adhesive bonding was performed, and the samples were subjected to artificial ageing (6000 thermal cycles, 5-55°C). Shear bond strength (SBS) was tested. The surface was examined in SEM, whereas changes in surface chemical composition were evaluated using TOF-SIMS method.

Results: For LGC ceramics, the highest SBS was noted after cleaning with orthophosphoric acid followed by ultrasonic cleaning in ethanol, whereas this method resulted in the lowest SBS for both LS2 and ZLS ceramics. For LS2, all cleaning methods resulted in higher SBS than in control group, with the highest values after ultrasonic cleaning in ethanol. In the case of ZLS ceramics, the highest SBS was achieved after cleaning with orthophosphoric acid. High SBS after cleaning was correlated with low concentration of fluoride on the surface as noted by TOF-SIMS.

Conclusions: Post-etching cleaning of the ceramic surface influenced the adhesive bond strength, whereas the choice of the most effective cleaning method is material specific.

Keywords: chemical composition, dental ceramics, hydrofluoric acid etching, post-etching cleaning, bond strength

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P67: Hybrid Ceramic Surface Treatment for Adhesive Bonding

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Objectives: The study compared the adhesive bond strength of two CAD/CAM resin ceramic blocks after being subjected to various surface treatments.

Materials and Methods: Samples of two different CAD/CAM dental materials: resin nanoceramics (RN) (Katana Avencia) and polymer-infiltrated ceramic-network material (PICN) (Vita Enamic), were fabricated, flat-polished and ultrasonically cleaned. The surface treatment involved sandblasting, hydrofluoric acid etching, application of silane coupling agent or ceramic primer, application of universal bonding agent. Following the surface treatment, the adhesive bonding was performed using light curing composite or resin composite cement. After 24-hour water storage, shear bond strength (SBS) was tested, and the bonding interfaces examined to assess the type of failure.

Results: For both tested CAD/CAM materials, the highest SBS values were obtained after surface treatment that involved sandblasting, followed by hydrofluoric acid etching and silane application, finalized by universal bonding agent placement. In this group, the failure mode was predominantly cohesive. The lowest SBS values were noted when ceramic primer was used followed by resin cement, presenting with adhesive failure modes in resin nanoceramics, and mostly cohesive in case of PICN. However, it should be underlined that in this group, PICN samples were HF etched prior ceramic primer application.

Conclusions: The results indicate the application of universal bonding agent as a crucial factor in achieving high SBS values when bonding to tested CAD/CAM materials.

Keywords: CAD/CAM, bond strength, adhesive surface treatment, resin nanoceramics, polymer-infiltrated ceramic-network material

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P68: Surface Wettability Change after Titanium Surface Laser Processing

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Background: The clinical success of endosseous dental implants correlates with their osseointegration. The faster and more intensive the process, the better the results. Osseointegration is related to many features such as the characteristics of the implant surface. The surface wettability, is one characteristic, that influences the host bone reaction. An implants hydrophilic surface can improve the reaction of host bone after implantation and hasten the osseointegration process in vivo, making it a desired surface feature.

Objectives: The aim of this study was to analyze the effect of femtosecond laser modification of titanium on its topography and wettability.

Materials and methods: Femtosecond laser processing in two (A-B) different conditions was performed on the surface of titanium previously sandblasted with carborundum and covered with hydroxyapatite (HA) using two distinct regimes (1-2). Laser settings differed in power, velocity, and frequency. The obtained surface modifications were analyzed by means of scanning electron microscopy (SEM), and static contact angle studies were performed to investigate the surface wettability.

Results: Laser processing resulted in two different surface modifications. For the settings A surface was covered with parallel groves while the B laser setting did not change the HA coating. The water contact angle for the first HA coating ranged from 144.8 for the laser setting B up to 146.3 for the laser setting A. For the second HA coating, the results ranged from 20.51 for laser setting A to 56.27 for laser setting B.

Conclusions: Laser processing condition A resulted in the creation of a laser-induced periodic surface structure. Surface wettability was found to relate to both the laser processing and HA electrodeposition. However, further biological analysis is needed for the evaluation of osseointegration.

Keywords: Processing technologies, coatings, laser processing, periodic surface structure texturing, wettability, titanium

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P69: Changes in the Chemical Composition of Ceramic Dental Implant Coatings after Laser Irradiation

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Background: The surface of endoosseous dental implants interact with the host bone on different levels. The result of such interaction can lead to the clinical success or to failure. The chemical composition of the implant surface is one of the features that influences the reaction of the host. Ceramic compounds such as hydroxyapatite (HA) improve osseointegration and provide long-term success. Such coatings, however, can pose a threat to the bone in the form of delamination.

Objectives: Aim of the present study was to analyze the presence of HA on the surface of titanium after femtosecond laser irradiation of the electrodeposited HA coating. The goal was to incorporate the HA into the titanium surface to increase its osseoconductive properties and decrease the delamination risk.

Materials and methods: Two different HA coatings on titanium were electrodeposited (1-2). Each coating was modified by three different laser treatments (A-C) performed with different power, velocity, and frequency. The surfaces were evaluated by energy dispersive spectroscopy (EDS), Raman spectroscopy and X-ray diffraction analysis (XRD).

Results: The calcium concentration expressed as weight % as determined by EDS on sample 1 ranged from 0.55 (1-A) up to 9.1 (1-C) with the P concentration in the range 0.36 (1-A) to 5.04 (1-C). For the samples 2 the Ca concentration ranged from 0.05 (2-B) up to 2.72 (2-C), with the P concentration in the range 0.09 (2-B) up to 1.86 (2-C). XRD confirmed the presence of HA on all samples with the most intense peaks present in samples 1-A and 2-A. Raman spectroscopy confirmed the presence of HA without the substitution by other ions in crystal lattice and with no other forms of calcium phosphates.

Conclusions: Femtosecond laser irradiation alters the chemical composition of HA coating on titanium depending on the laser irradiation protocol. Further biological analysis are needed to evaluate the interactions of such coatings *in vivo*.

Keywords: Processing technologies, coatings, laser processing, periodic surface structure texturing, hydroxyapatite, titanium

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P70: Micro- and Nanoplastics from Occlusal Splints: An Underestimated Problem?

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Objectives: Micro- and nanoplastics are omnipresent in nature, food and the human body, raising concerns about their health effects. Bruxism, affecting 8% to 31% of Western adults, involves teeth clenching, grinding, or gnashing. Occlusal splints, commonly used to treat bruxism and temporomandibular disorders, may wear due to the intense forces exerted during bruxism. Aim of this pilot *in-vitro* study was to estimate the quality and quantity of micro- and nanoplastics resulting from the use of occlusal splints in cases of bruxism.

Materials and Methods: Specimens made of splint material underwent isothermal testing within a chewing simulator, simulating two-body wear, using distilled water over a consistent number of press cycles. These specimens where fabricated from PMMA using CAD/CAM milling and conventionally vacuum-formed from PET-G. Polished zirconium dioxide served as the material for antagonists. After complete liquid evaporation, particles where visualized by scanning electron microscopy, followed by quantity and size analysis.

Results: Experiments revealed significant releases of abraded micro- and nanoplastics in various sizes and shapes due to occlusal splints wear. Particle evaluation was impacted by agglomeration of small particles, potentially resulting in size overestimation.

Conclusions: This study showed that occlusal splint use leads to the abrasion of micro- and nanoparticles in various sizes and shapes. Further analytical methods are necessary for a detailed particle description, and addressing the issue of agglomeration is crucial for future analysis. By quantifying and characterizing microplastic particles released from occlusal splints, this study addresses gaps in knowledge regarding the health risks associated with microplastic exposure in dentistry.

Keywords: occlusal-splints, micro-plastics, nano-plastics, bruxism, wear

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P71: Novel Cellulose-Carbopol Gels for Oral Cavity Applications

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Objectives: The rapid degradation of active substances in the oral cavity is one of the main problems of gel delivery systems. This is due to insufficient adhesion of the gel to the mucosa and the surface of the dental prosthesis, as well as washing out of the preparation by saliva. Cellulose derivatives and Carbopol are promising bioadhesive polymers that can be used in oral applications. Using bioadhesive gels ensures the maintenance of an appropriate therapeutic concentration of the substance. It makes it possible to extend the drug's contact time with the mucous membrane. This is of particular importance in combating bacterial and fungal infections.

Materials and Methods: We prepared gels using cellulose derivatives and Carbopol 940. The study presents research on oral gels' rheological, lubrication, and wetting properties. We used shear rheometry over a wide range of shear amplitude, frequency, and temperature to evaluate rheological properties. The friction coefficient was measured using a ball — 3 plate method and a shear rheometer. The contact angle of prepared gels was measured on acrylic and polydimethylsiloxane polymers.

Results: Compared to commercial gels, preparations made with cellulose derivatives and Carbopol 940 have superior and more consistent rheological properties, such as dynamic viscosity, storage modulus, and loss modulus. Moreover, the gels formulated using these ingredients have a lower coefficient of friction and better wettability.

Conclusions: Hydrogels have become important in recent years due to the countless applications discovered and progress made by researchers. Many of them are made of natural compounds, which is necessary to significantly reduce pollutants and the possibility of their integration into the human body without exposing oneself to any risk. Natural polysaccharides that produce hydrogels, such as cellulose and its derivatives, have favorable rheological properties.

Keywords: Gel, Rheology, Lubrication, Cellulose, Carbopol

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P72: An *in vitro* Study of fFluoride Ions Release from Liquid Nanohybrid and Microhybrid Composites

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Objectives: The primary objective of this study was to assess and compare the release of fluoride ions from two selected dental liquid materials, namely Flowable Composite (Henry Schein) and Flow-Art (Arkona), which are commonly used for cavity restoration. Two distinct groups of liquid dental materials, microhybrid composite (Flow-Art) and nanohybrid composite (Flowable Composite), were subjected to rigorous testing.

Materials and Methods: In order to prepare the samples, a special form was utilized. Both materials were then cured for 20 seconds, following the manufacturer's guidelines, using the Bluephase Style 20i polymerization. During a period of 12 weeks, the release of fluoride ions from both materials was analyzed in four different solutions: artificial saliva with pH levels of 4.5, 7.0, and 7.5, as well as deionized water. To carry out this analysis, an ORION 9609 ion-selective electrode was employed at specific time intervals. The measurement of fluorine values in ppm and µg/mg was conducted for each sample. Prior to submerging the material samples into the prepared solutions, their weights were measured. After a week of fluorine release and at the end of the study (12 weeks), the alteration in sample weight was recorded. The disparity in sample masses was then calculated.

Results: Among the various research groups, the pH 4.5 artificial saliva after 24 hours showed the highest average fluorine release (2.990 ppm) from the Flowable Composite material. On the other hand, the Flow - Art material exhibited the highest fluorine release values among the research groups in artificial saliva pH 7.5 after 96 hours of testing (0.138 ppm).

Conclusions: According to higher levels of fluoride ions observed in the case of Flowable Composite material, we may assume that it has better remineralization potential and it is reasonable to utilize it when treating carious lesions.

Keywords: fluoride ions release, nanohybrid composites, microhybrid composites, liquid dental materials, tooth decay prevention

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P74: Analogue Face-Bow Registration Transfer to Virtual Articulator - Optimized Clinical-Laboratory Method

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Background: To achieve the most individualized treatment plan for the patient and therefore, provide them with successful reconstructive treatment, it is essential to gather all the available data, which not only facilitate communication between the clinician and dental laboratory, but also minimize the risk of inaccuracy in the digital workflow. Despite the increasing integration of intraoral scanning and corresponding CAD/CAM softwares in clinical practice the vast majority of VAs (virtual articulator) do not take into consideration the patient's specific maxillary arch spatial relation to the axes of rotation of the mandibular movements. Especially in complex cases, the correct relation of the two models to the reference plane of the head and individual movement parameters embedded in VA are the key points for the occlusal integration of a restoration. Majority of the VAs' softwares share the same structures and working principles as traditional MAs (mechanical articulators). In case of no additional 3D data arch scans are positioned manually by the technician using the upper arm of the articulator as the parallel to horizontal reference plane. Over the years, different methods have been proposed for transferring the position of the arches and assembling in VA. The two main approaches have been developed aiming to solve the problem. „Indirect workflow", which requires 3D-printing of the intraoral scans and physically mounting them on the mechanical articulator and then transferring data to VA by using a laboratory scanner with articulator scan function. „Direct workflow" where virtual facebow systems or jaw motion tracking devices are necessary. Disadvantage of the latter is the financial inaccessibility for most of the dental clinics, while the indirect workflow is a time-consuming phase that generate mounting inaccuracies due to uncontrolled technique and materials. The presented clinical-laboratory method describes a straightforward alternative to transferring patient's specific data from the analogue facebow into the VA software.

Objectives: Digital transfer of the maxillary virtual models into the VA software with the aim to preserve the interarch relationship and spatial position relative to the skull.
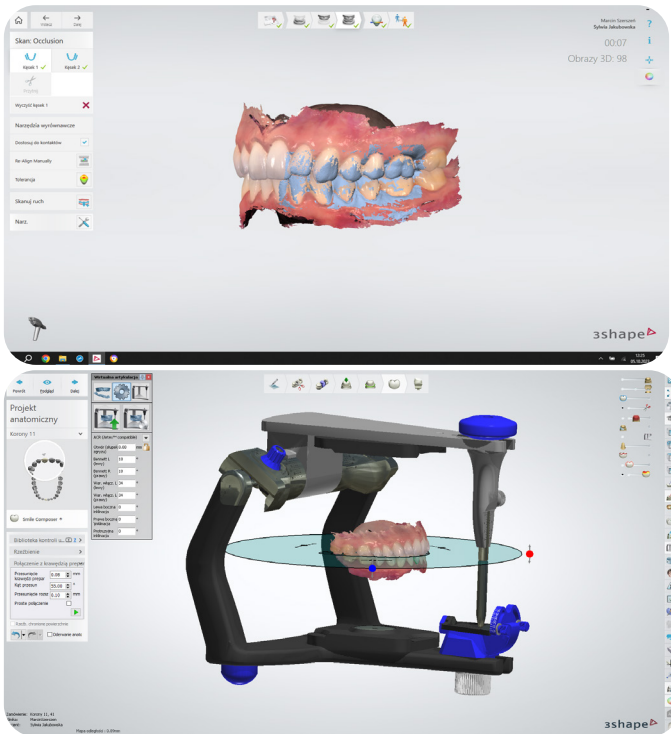
Materials and methods:

Figure 1. Registration of dentition and maximum intercuspidation was performed using an intraoral scanner (Trios 3, 3Shape, Denmark) and exported from the native software.
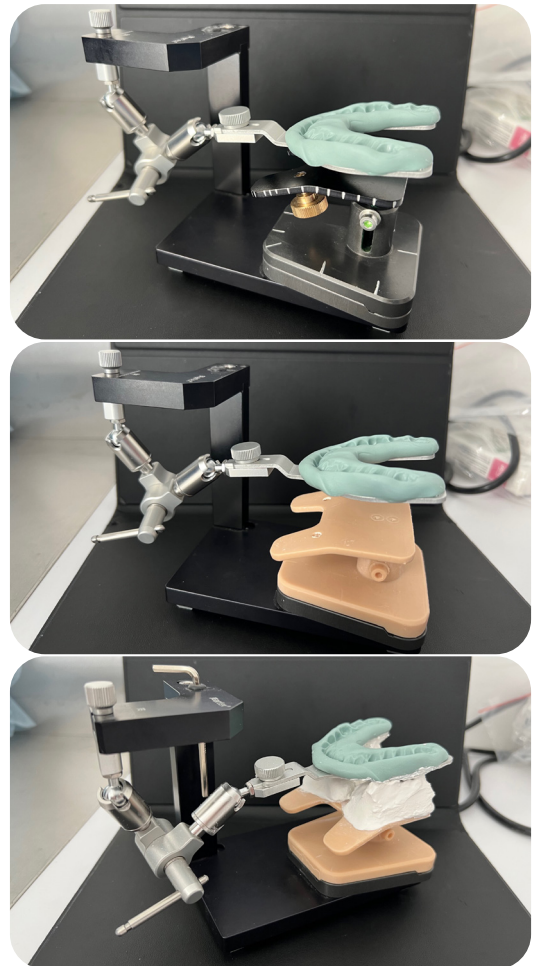

Figure 2. Then registration using an analog face-bow (Artex, Amann Girbach AG, Austria) was taken.

Figure 3. The face-bow fork block and fork were then placed in the transfer stand and mounted on the transfer stand table using an articulation gypsum.
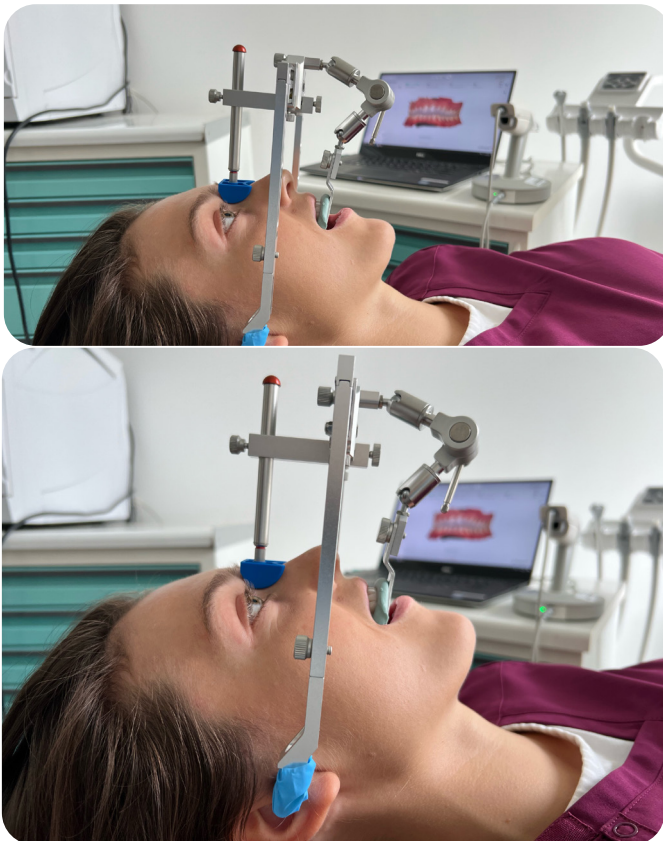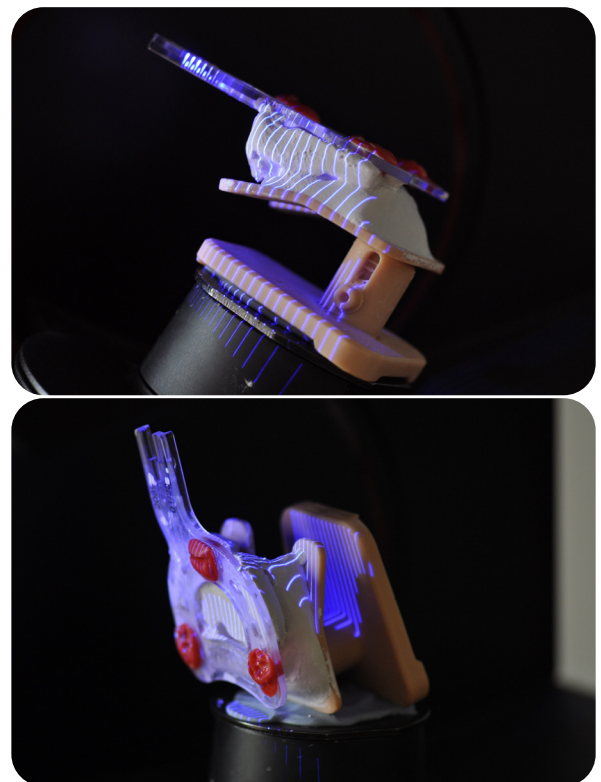

Figure 4. The entire unit was scanned using an extraoral scanner (E3, 3Shape, Denmark) in a dental laboratory.

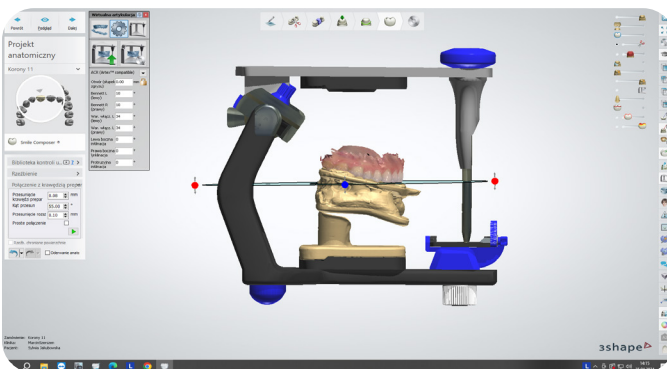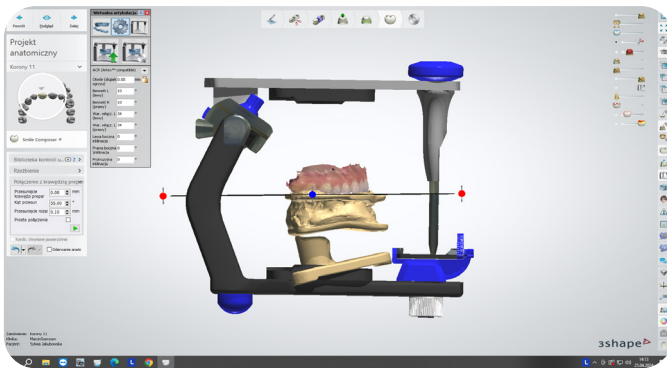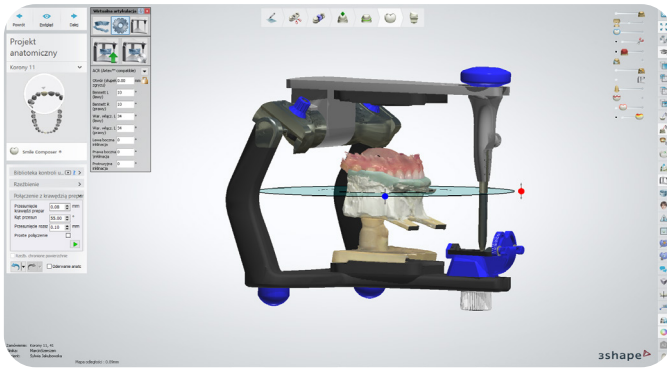**Figure 6**. Integration of facial scan in the virtual articulator.
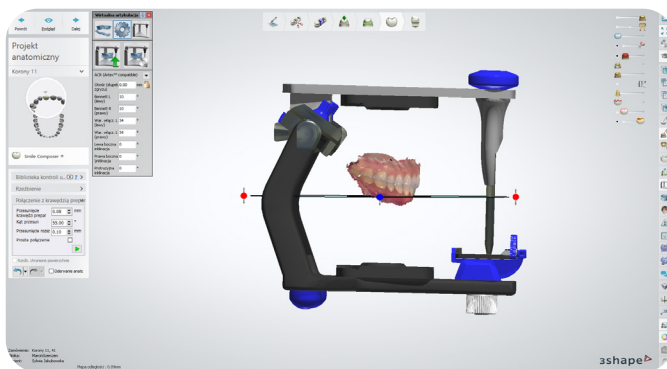
Figure 5. The data was transferred to CAD software (Dental System, 3Shape, Denmark).

Results: Reference scan of the printed transfer table with mounted bite fork was added to create a consistent feature for aligning patient's face bow registration with the VA. Scanned transfer table' base corresponded to virtual articulator' s structure.A spatial connection between the physical face bow and the VA was established and remained unchanged across different transfers. Maxillary scans were aligned with the matching occlusion registration impressed on the bite fork by best-fit alignment feature of the software. Mandibular arch scan was subsequently aligned by using maximal intercuspal position registration.

Conclusions: Multiple methods allowing the generation and transfer of virtual models into VA have been characterized in the literature. Presented technique describes a direct approach to achieving intraoral scan mounting with preservation of the interarch relationship and position relative to the skull. Integration of the scanned intraoral situation and digitalized analogue face bow registration was used for the three-dimensional positioning in VA in a simple and repeatable protocol. This procedure eliminates the error-prone and time-consuming analogue steps, which require mounting physical casts with articulating gypsum. It is adaptable and can be integrated into the prosthetic workflow once the corresponding reference scan of bite fork with transfer table is obtained.

Clinical relevance: It can allow the design of restorations that are harmonious with the mandibular movements, occlusally well integrated. In consequence facilitating the communication with dental laboratory and reducing chair side adjustment time.

Keywords: Virtual articulator mounting, face bow, reference plane, intraoral scanner, digital patient

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P75: Natural Language Understanding to Assess Oral Health-Related Quality of life

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Objectives: Natural Language Understanding (NLU) is a subfield of artificial intelligence concerned with the computational understanding of human language. This technology can provide objective quantitative assessment of interviews in qualitative research. Thus, we hypothesize that NLU could assess oral health's impact on quality of life by analysing semi-structured interviews.

Materials and Methods: To test our hypothesis, the transcripts of semi-structured interviews conducted on 10 participants (aged 16–25 years) suffering from hypodontia were analysed using IBM Watson NLU Text Analysis. The automated analysis identified entities and keywords in the transcripts. It produced a quantitative analysis of sentiment (positive, negative) and emotions (joy, sadness, anger, fear, and disgust) for the specific interview questions.

Results: NLU analysis of the transcripts showed a predominantly negative sentiment towards hypodontia and its management; 93.2% of the identified entities presented a negative sentiment, while only 6.8 % had a positive sentiment. NLU analysis revealed that patient sentiment correlated inversely with age (R= -0.49), treatment waiting time (R= -0.22), and OHIP score(R= -20). Negative sentiment and sadness were strongest when patients were asked about the history of their dental problems and their feelings about their teeth, but they expressed joy and positive sentiment when asked about the successful dental work provided. Also, the keywords associated with negative sentiment were mainly those related to treatment length and delays.

Conclusions: In summary, NLU could detect patient's negative sentiments towards oral health conditions, and it could be helpful in qualitative dental research.

Keywords: Quality of life, Artificial Intelligence, Natural language processing, Hypodontia, Patient outcomes

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P76: Prediction of Dental Implant Treatment Using Computer Simulation

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Objectives: This study aims to utilize computer simulation on patient-specific models to predict dental implant treatment outcomes.

Materials and Methods: Three-dimensional models of the implant-bone interface were created using CT scans of a patient who underwent mandibulectomy and received surgical reconstruction for the treatment of SCC. The patient presented with functional and aesthetic concerns, urgently seeking restoration of mastication function. Anatomic data and prosthetic components were separately modeled using dental CAD software. A screw-retained type prosthesis was designed, with simulated cement layers between custom abutments and the mesostructure, and between the mesostructure and prosthesis. Contact surfaces were simulated at the mating surfaces between the abutment and the top of the implant, screw head and abutment, and abutment screw and implant inner part. Attachment areas for jaw closing muscles, including the masseter, temporal, internal pterygoid, and upper part of the condyle, were constrained. Preloads of 500N were applied to the abutment screw to mimic clinical conditions. Oblique loadings were applied to the left and right sides of the posterior teeth, simulating biting on hard food. Von Mises stress analysis and displacement analysis were performed to assess biomechanical behavior and predict treatment prognosis.

Results: The FEA simulations accurately predicted stress distribution, strain patterns, and component displacement under different loading scenarios. Von Mises stress analysis identified critical areas of stress concentration, while displacement analysis revealed implant stability and micromotion relative to surrounding bone and tissues. Sensitivity analyses allowed for the optimization of treatment plans to minimize risks and improve long-term prognosis.

Conclusions: Patient-specific finite element analysis offered a powerful tool for predicting dental implant treatment outcomes. By integrating anatomical data and biomechanical analysis, clinicians can optimize treatment planning, assess implant stability, and predict treatment prognosis with greater accuracy and precision. This approach holds significant promise for enhancing clinical decision-making and improving patient care in implant dentistry.

Keywords: Dental Implant, Computer simulation, Mandibulectomy, Prognosis, Prosthesis

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P80: Association Between Self-Reported Bruxism and Tooth Wear in Northern Finland Birth Cohort (NFBC) 1966

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Objective: to investigate the progression of dental wear using digital dental models in 12-year longitudinal cohort study and to evaluate its association with the self-reported bruxism in subjects including in the Northern Finland Birth Cohort 1966 (NFBC1966).

Methods: In a follow-up baseline of the NFBC 1966 study a subgroup of subjects (n=101) was examined in 2000. Alginate impressions were taken from the dentition. The gypsum casts were digitized by using 3D surface laser scanner. At second follow-up in 2012 the digital 3D models were taken of the dentition of all subjects using an intraoral scanner. Data on sleep (SB) and awake bruxism (AB) was collected in 2012 through a questionnaire. Surface processing, registration and measurements of the tooth were accomplished by Rapidform2006 software at both time points *(Figure 1)*. Association of average and percentage tooth wear with AB and SB was assessed using regression analysis.

Results: Progressive tooth wear of premolars (p-value 0.012), canines (p-value 0.031) and incisors (p-value 0.016) had statistically significant association with SB. Progressive tooth wear of canines (p-value 0.014) had statistically significant association with AB.
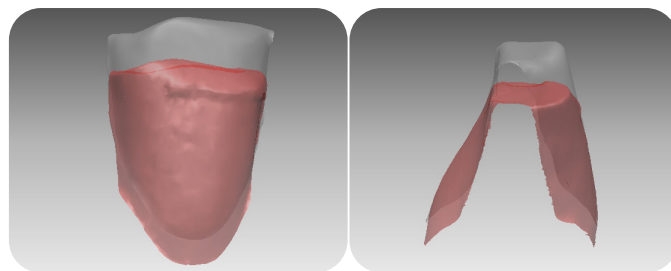

Figure 1. Digitalized dental models in both time points

Conclusion: Progressive tooth wear is associated with self-reported bruxism among middle-aged adults. Tooth wear was more extensive among subjects reporting sleep bruxism compared to subjects reporting awake bruxism. Further studies are needed to evaluate the possible confounding factors for these associations.

Keywords: sleep bruxism, awake bruxism, tooth wear, longitudinal study, self-reported

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P81: TMJ Disc Position of Two Sides in Multisection MRI Analysis in TMD Patients

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Background: The temporomandibular joints are the only articulations coupled not only functionally, but also anatomically. Despite this, most studies consider TMJs of the same individual independently and data on the position of the disc from both sides are not available.Moreover, even thoughthere are a large number of articles discussing the TMJ disc position in MR images, most of these studies analyze TMJ disc position in the sagittal plane only.

Objective: The aim of this investigation was to assess the simultaneous occurrence of various types of disc positions in both temporomandibular joints (TMJs) of the same individual.

Materials and Methods: Multisection magnetic resonance imaging (MRI) analysis was conducted in 191 patients (148 women, 43 men; aged 14-60 years) with clinical symptoms of disc displacements according to the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) criteria. The disc positions of both sides of the same patient were evaluated on all oblique sagittal and coronal images in the intercuspal position (IP) and open-mouth position (OMP).

Results: The studies show a statistically significant convergence of the TMJ disc position in cases of normal superior ($\chi2=37.64$; Ccor=0.57), anterior ($\chi2=43.32$; Ccor=0.61), and anterolateral position ($\chi2=55.86$; Ccor=0.67) in the IP in both TMJs of the same patient ($p<0.001$).

In OMP the lack of disc reposition occurs significantly more often in both joints than in just one, but the strength of this convergence is slightly greater in the frontal plane than in the sagittal plane($p<0.001$).

Conclusion: Multisection analysis of MR images shows symmetry in the occurrence of certain types of TMJ disc positions in the same TMD patient, which may confirm that both joints should be considered as one functional unit.

Keywords: Magnetic resonance imaging; Temporomandibular joint disc; Temporomandibular disorders

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P82: Managing the Occlusion and the Temporomandibular Disorder in a Stringed Musical Instrument Player

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Introduction: Musicians, especially string instrumentalists, can experience occupational facial problems. The management those problems concerning the necessary prosthodontic treatment can be challenging for completing clinical stages successfully. This case report aims to describe the successful prosthodontic management of a 50-year-old menopausal professional violinist's fatigue and pain of the jaw, as a result of playing her instrument, something not thoroughly investigated in current literature. We focused on successful clinical evaluation and management using a simple and proper prosthesis design.

Case Description: A professional violin musician, a 50-year-old menopausal woman, teacher and player for a national orchestra, was presented to our dental practice specialized in prosthodontics. The patient's main presenting complaint was difficulty in playing the violin and pain on the left side of her face, limited mouth opening, and a history of clicking. The problem is predominately on the left side and has been present for five months. She feels the problems are exacerbated while playing. The clinical examination of the violinetist involved the evaluation of the mandibular cinematic movements. Upon examination the left masseter and lateral pterygoid were tender. The patient had a bilateral soft, consistent click upon opening. A left temporomandibular joint (TMJ) disc displacement and associated muscular spasm were diagnosed. An anterior repositioning (ARPS) splint and a stabilization splint were indicated to help her with the pain, without disturbing the performance, the music quality, and her quality of life in general.

Discussion: Dental practitioners need to pay more attention to facial problems concerning musicians, as a consequence of their musical performance. The dental profession can be advanced and the dental patient's experience can be enhanced when we adapt to the musicians' needs and desires in order to improve their quality of life and perform adequately.

Keywords: Facial pain, Occlusal splints, Temporomandibular disorders (TMD), Musical instrument, Musician

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P83: The Effect of Tens Therapy on EMG Activity of Masticatory Muscles and Mouth Opening in Patient's With DDwoR: A Case Report

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Background: Intra-articular disorders of the temporomandibular joint (TMJ) are an abnormal positional relationship between the disc and the condyle, articular eminence, and articular fossa. The etiology of disc displacement without reduction(DDwoR) is unclear; however, anatomical factors, parafunction, trauma, or hypermobility of the joints have all been reported to play a key role in structural changes to the TMJ, which could result in disc displacements. Clinically, the main symptoms of DDwoR are characterized by TMJ pain and limited mouth opening ("closed lock"), the distance between the upper and lower incisors is less than 40 mm.

Objective: A 19-year-old male patient was referred to our clinic with a history of pain in the right joint region and limitation of mouth opening. In the clinical examination there was limited mouth opening (28mm) and the limited lateral movement on the effected side. The Visual Analogue Scale (VAS) was taken to determine the severity of the patient's pain and the score was recorded as 9. In order to evaluate Temporomandibular Joint Disorders (TMD) of patient, joint vibration analyses (BIO-JVA, BioResearch, Inc. Milwaukee, WI, USA,) were performed. It is a precise, quick, non-invasive, passive device that objectively records all the vibrations of the underlying tissue during function, distinguishes which side the vibration originates on, creates a visual image of the vibration and measures its intensity. The data of the patient as a result of JVA and TMJ examination were analysed in the JVA Flow Chart and the patient was diagnosed with acute disc displacement together with the clinical examination *(Table 1)*. Before the application of occlusal splint, to increase the limited mouth opening and reduce pain. TENS therapy was applied 3 days a week for 40 minutes for 1 month with ULF- TENS device. To evaluate the changes in the activity of masticatory muscles and occlusion, the electromyographic(EMG) activity of the masseter and anterior temporalis muscles and digital occlusal analysis were recorded synchronously. Recordings were performed before, after the first session and 1 month after TENS treatment in clenching, right and left lateral movements.

Materials and Methods: Before starting TENS therapy, electromyographic activity of the masseter and anterior temporalis muscles was recorded using BioEMG III (BioPAK, Bioresearch Associates Inc., Milwaukee, WI, USA). Occlusal analysis was conducted with T-SCAN III (Software version 9.1, Tekscan Inc., South Boston, MA, USA). The appropriate sensor and holder were attached to the computer, and sensor sensitivity was adjusted to detect 3 or 4 red occlusal contacts. Prior to electrode placement, the skin was cleaned with alcohol. Surface electrodes (Bioflex, Bioresearch Associates Inc., Milwaukee, WI, USA) were placed parallel to the muscle fibers, with a ground electrode on the neck. The T-SCAN III system recorded occlusal contact sequences from initial contact to maximum intercuspation in real-time, quantifying timing and forces. Recently, these technologies have been synchronized to simultaneously record high-definition electromyographic activity and occlusal contact force data. The ULF-TENS device (QuadraTENS, BioResearch Associates Inc., Milwaukee, WI, USA) was applied 3 days a week for 40 min. After TENS therapy, BioEMG III and T SCAN III recordings were repeated. This allows clinicians to analyze and correlate specific occlusal contacts with corresponding electromyographic changes. The distribution of bite forces before and after treatment is presented in table 2.

Table 2.

DISTRIBUTION OF FORCE(%)	BEFORE TENS THERAPY		AFTER TENS THERAPY	
	Right Side	Left Side	Right Side	Left Side
MULTIBITE	29.1	70.9	50.1	49.9
RIGHT LATERAL	85.2	14.8	100	0
LEFT LATERAL	0	100	0	100

Results: After the TENS treatment, the patient had reduced EMG activity in resting, but had increased EMG activity in both masseter and anterior temporalis in clenching. The changes in the EMG activities of the masticatory muscles in the right and left lateral movements before treatment, after the first session and 1 month later are presented in table 3 . In the present study before the TENS therapy, the patient had limited mouth opening (28 mm) after therapy it increased to 44 mm. After the TENS therapy, the patient's orofacial pain complaints and the VAS (Visual Analog Scale) score decreased to 1.

Table 1.

	LEFT	RIGHT
TOTAL INTEGRAL	9.2	19.8
MAX OPENING	25	25
INTEGRAL<300Hz	7.2	16.6
INTEGRAL>300Hz	2.0	3.3
>300 / <300 RATIO	0.28	0.20
PEAK AMPLITUDE	0.5	1.3
PEAK FREQUENCY	173	124

Table 3.

	Before TENS Treatment				After First Seans				1 Mouth After Treatment			
	TA-R	TA-L	MM-R	MM-L	TA-R	TA-L	MM-R	MM-L	TA-R	TA-L	MM-R	MM-L
Right Lateral	11	25	14	8	9	5	6	12	37	4	9	4
Left Lateral	4	28	13	8	3	21	4	11	2	6	8	12

Conclusion: After the treatments, it was observed that the amount of mouth opening of the patient increased and EMG activity of masticatory muscles decreased. Fertout *et al.* showed that TENS therapy lead to an increase in mouth opening by 8.7% to 19.46% . The stabilization splint was applied to the patient and the follow-up continued.

P84: Canine Guidance and Temporomandibular Disorders: A Systematic Review of Existing Evidence

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Objectives: For many years, old gnathological dogmas supported the belief that canine guidance (CG) should prevent individuals from developing temporomandibular disorders (TMD). This systematic review aims to analyze all the scientific literature on the topic to find if there is a clear relationship between canine guidance and temporomandibular disorders and highlight any other possible clinical implications for the presence or absence of CG.

Materials and Methods: In August 2023, a comprehensive systematic literature search was executed across the PubMed and Scopus databases. Adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, the search utilized the keywords "Canine guidance" and "Temporomandibular disorders". Only articles in English with accessible abstracts were included. Two authors independently screened studies based on title and abstract, resulting in 25 full-text retrievals. Following the removal of duplicates and irrelevant citations, a consensus led to the exclusion of 22 articles, leaving three manuscripts for detailed analysis. To summarize data, a PICO-structured reading model was adopted

Results: All three studies focused on adult populations, enrolling a total of 606 patients. Of these, two studies (66.6%) compared the presence of canine guidance in healthy individuals against those with TMD, while one study (33.3%) compared canine guidance in patients exhibiting varying temporomandibular joint statuses, as observed through MRI scans. None of the studies established a statistically significant relationship between the presence or absence of canine guidance and TMD.

Conclusions: While many clinicians commonly assume a correlation between CG and TMD, our systematic review reveals a notable gap. Despite this assumption, high-quality scientific literature on this topic is still lacking. Our research process led us to only three relevant manuscripts that failed to establish a clear link between the presence or absence of CG and TMDs. This finding underlines the need for cautious interpretation of assumptions and emphasizes the urgency for more meticulous research.

P85: TMJ Magnetic Resonance: Expert Survey on the Most Influential Articles

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Objectives: To highlight the publications that have been most influential for the evolution of knowledge and use of the magnetic resonance imaging (MRI) applied to the temporomandibular joint (TMJ).

Materials and Methods: In February 2023, a literature review in the Medline and Scopus databases was performed in order to identify all peer-reviewed English-language studies concerning the use of MRI as a mean of investigation for the TMJ structures. Articles were ordered based on the relevance (i.e., "best match") in Medline and highest citations in Scopus. Based on titles and abstract reading, the 50 most relevant articles in Medline, and the 50 most-cited articles in Scopus were identified. Eight experts in the field of TMJ disorders were contacted and asked to take part in a two-round Delphi survey to select the most influential articles. A Google Form was used.

Results: The search term "temporomandibular joint AND magnetic AND resonance" carried out 2561 results. Based on the number of experts who endorsed an article, during the first round, the articles were cut from 100 to 30. During the second round, the experts indicated the most influential articles in the history of MRI applied to TMJ: Petersson A., 2010; Paesani *et al.*, 1992; Manfredini *et al.*, 2008; Katzberg *et al.*, 1996; Tasaki *et al.*, 1996; Westesson *et al.*, 1987; Schiffman *et al.*, 2014; Katzberg *et al.*, 2005; Ahmad *et al*, 2009; Larheim T.A., 2005.

Conclusions: Based on the list of publications that have mostly impacted the scientific community it will be possible to keep trace of the progression of knowledge and draw future research.