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SS-001 Mechanical Properties of Nanoparticle-Enriched with TiO_2, ZnO and ZrO_2 in 3D-Printed Denture Base Resins

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PURPOSE: This study aimed to investigate the effects of incorporating titanium dioxide (TiO_2), zinc oxide (ZnO), and zirconium dioxide (ZrO_2) nanoparticles at various concentrations on the flexural strength and elastic modulus of two 3D-printed denture base resins.

MATERIALS-METHODS: A total of 270 specimens (64x10x3.3 mm) were fabricated and divided into 27 groups (n=10). Nanoparticles (TiO_2, ZnO, ZrO_2) were incorporated into group A (Asiga, DentaBASE, Australia) and group B (DentaFab, PowerResins Denture,Turkey). resins at concentrations of 0.25%, 0.5%, 1%, and 3% by weight. Non-enriched PMMA served as control group. Specimens were subjected to 3-point bending test and Flexural strength and elastic modulus were recorded. Data were analyzed using Three-way ANOVA, with Tukey HSD or Tamhane's T2 *post hoc* comparison tests ($p<0.05$).

RESULTS: Significant differences in flexural strength and elastic modulus were observed based on resin group, nanoparticle type, and concentration ($p< 0.001$). The three-way interaction among resin type, nanoparticle type, and concentration was statistically significant. The highest flexural strength was recorded in group A with 0.5% ZrO_2, while the lowest values were observed in group B with 3% TiO_2. Group A generally exhibited higher flexural strength, whereas group B demonstrated superior elastic modulus. Among the nanoparticles, ZrO_2 and ZnO, particularly at 0.5%, significantly improved mechanical properties. Conversely, 3% TiO_2 resulted in a substantial reduction in both properties ($p< 0.001$).

CONCLUSIONS: The incorporation of metal oxide nanoparticles into 3D-printed denture base resins influences mechanical properties in a manner dependent on resin and nanoparticle concentration. Use of concentration of 0.5% for all nanoparticles tested were the most favorable group that improved both flexural strength and stiffness. In contrast, higher concentrations of TiO_2 impaired mechanical performance. These findings support the potential of nanoparticle reinforcement to optimize the mechanical behavior of 3D-printed denture base materials.

Keywords: 3D printed resin, denture base, nanoparticles, mechanical properties, flexural strength,elastic modulus

SS-002 Surgical and Prosthetic Rehabilitation Strategies for Alveolar Ridge Deficiencies: A Clinical Case-Based Perspective

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OBJECTIVE: Alveolar bone defects pose a significant challenge in achieving optimal esthetic and functional outcomes in fixed prosthetic rehabilitations. This presentation aims to demonstrate the importance of ridge reconstruction in restoring soft and hard tissue contours essential for prosthetic harmony. A series of clinical cases is presented to illustrate the integration of surgical technique and prosthetic workflows in patients with moderate to severe ridge deficiencies.

MATERIALS-METHODS: This case-based presentation includes patients with localized or generalized alveolar ridge defects in the anterior and posterior regions. The surgical procedures were performed using the novel titanium platelet-rich fibrin (T-PRF) technique. Following adequate healing periods, fixed teeth or implant-supported prostheses were designed using digital workflows to optimize esthetic parameters, including emergence profile, gingival symmetry, and interdental papillae formation.

RESULTS: All patients achieved satisfactory esthetic and functional outcomes following staged surgical-prosthetic management. The use of the T-PRF surgical technique contributed to increased ridge volume and enhanced peri-prosthetic tissue integration. Superimposition and comparative analysis of digital scans obtained preoperatively and at 1, 3, and 6 months postoperatively revealed a measurable gain in tissue volume in areas with alveolar ridge deficiencies.

CONCLUSION: Successful fixed prosthetic rehabilitation in esthetically critical zones requires not only accurate prosthetic planning but also effective correction of alveolar ridge deficiencies. A collaborative surgical-prosthetic approach with T-PRF improves predictability and ensures long-term stability in both hard and soft tissues. These cases underscore the importance of individualized treatment strategies when managing compromised ridge sites.

Keywords: ridge defect, T-PRF, esthetics, prosthesis

SS-003 The Effect of Different Restorative Materials on the Efficacy of Intraoral Scanners

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OBJECTIVE: The objective of this study was to examine the impact of various restorative materials on the efficacy of intraoral scanners commonly utilized in dental practice.

MATERIAL-METHOD: In this study, two different intraoral scanners were evaluated across four experimental groups. Each group was established by fabricating three standardized crowns using the material Celta Duo, which exhibits mechanical properties similar to natural dental tissues. The crowns were prepared following standardized Class I cavity preparations on mandibular first molars (tooth #36), ensuring consistency across all specimens. Subsequently, the cavities were restored with three distinct restorative materials using a silicone index to standardize the restoration process.A total of 12 digital impressions were obtained from each group using both intraoral scanners, resulting in 96 STL datasets. Additionally, each specimen was scanned once with a laboratory reference scanner, producing master STL files for each group. The STL datasets acquired from the intraoral scanners were superimposed onto the corresponding master STL files using a best-fit alignment algorithm to assess trueness. All digital registrations and deviation analyses were performed using Geomagic Control X software.The obtained data were statistically analyzed by two-way ANOVA followed with multiple comparisons by *post hoc* Tukey's test ($\alpha = 0.05$).

RESULTS: Statistical analysis revealed that both material ($p<0.001$) and scanner ($p<0.001$) had a significant effect on scan accuracy. However, the interaction between these two factors did not demonstrate a significant effect ($p=0.084$). Regardless of the scanner, the highest deviation was observed in the prep group (148.52–31.15), followed by the composite group (130.78–34.52). Regardless of the material, Primescan demonstrated higher deviation than Trios 5 ($p < 0.001$).

CONCLUSION: The type of restorative material and the intraoral scanner had a significant impact on the accuracy of the digital impressions. These findings highlight the crucial need to select optimal material–scanner combinations to achieve maximum accuracy in digitally fabricated restorations.

Keywords: intraoral scanner, restorative materials, accuracy, precision

SS-004 Smartphone Applications in Digital Smile Design: A Review on Features, Challenges & Future Directions

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OBJECTIVES: Smartphone applications (apps) have become integral to digital smile design (DSD). This study aims to assess the present state of smartphone applications used in DSD, analyze the features and potential of the top mobile DSD platforms, compare their advantages and disadvantages to traditional digital workflows, and discuss the difficulties of integration, future development, and ethical issues.

MATERIALS-METHODS: A literature review was conducted using PubMed, Google Scholar, and ResearchGate, covering studies from January 2019 to March 2025. English-language articles containing keywords such as "digital smile design," "smartphone applications," "aesthetic dentistry," "augmented reality," "AI in dentistry," "virtual smile design," and "mobile phone apps" were included.

RESULTS: Contemporary DSD apps like Smile Designer Pro, DSD App, and Smilefy have enhanced accessibility to digital treatment planning by enabling intuitive facial and dentolabial analysis, real-time smile simulations, and AI-powered tools. Compared to traditional software requiring specialized equipment and training, these apps offer a more user-friendly and cost-effective solution, allowing both clinicians and patients to visualize potential outcomes with ease. However, issues such as limited accuracy, workflow compatibility with the laboratory, and standardization remain. In addition, the steep learning curve for some practitioners and the variable reliability of different apps pose challenges. Ethical concerns regarding data privacy and the authenticity of AI-generated outcomes should also be considered.

CONCLUSION: Smartphone apps have democratized smile design, making it more interactive, patient-centric, and market-driven, but more advancements need to be made to make the process completely seamless. Advancements in artificial intelligence, augmented reality, and cloud-based platforms are expected to refine these tools, making them even more reliable for clinical practice.

Keywords: "digital smile design," "smartphone applications," "aesthetic dentistry," "augmented reality," "AI in dentistry," "virtual smile design

SS-005 Assessment of the Accuracy of Various Impression Methods Using a Digitally Designed Post Space Model

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PURPOSE: This study aimed to compare the accuracy of different post space impression techniques by superimposing them onto a digitally designed post space model.

MATERIALS-METHODS: Digitally designed maxillary first premolar twenty-one models (n=7/per group) with solid root canals were 3D printed. The digitally created post space served as the control. In the first group, intraoral impressions were made on the printed models using the TRIOS 5 (3Shape) intraoral scanner. In the second group, post space impressions were taken using silicone impression material. In the third group, H-type files wrapped with cottons were coated with modeling wax and inserted into the root canals to create wax pattern. Additional wax was added as needed. For all impressions a desktop scanner (3Shape E4) were used. Digital models were superimposed onto the control for comparison. Accuracy was assessed using root mean square (RMS) values. RMS data were analyzed using Kruskal-Wallis and Dunn's *post hoc* tests. Corono-apical deviations were analyzed using Welch ANOVA and Games-Howell *post hoc* tests.

RESULTS: Kruskal-Wallis and Welch ANOVA tests revealed statistically significant differences among the methods ($p<0.05$). According to *post hoc* analyses, wax differed significantly from the scanner in both RMS values and corono-apical measurements ($p<0.05$). No significant difference was found between wax and silicone, nor between silicone and scanner in RMS data ($p>0.05$). Similarly, the difference between wax and silicone in corono-apical measurements was not significant ($p>0.05$).

CONCLUSION: The impression technique has a significant influence on post space reproduction accuracy. The wax pattern method showed the highest accuracy, yielding results closest to the reference model. Silicone impressions performed similarly

to wax, with no statistically significant differences. In contrast, intraoral scanning showed the lowest accuracy. Conventional techniques, particularly wax and silicone, may be more reliable for replicating post space geometry in clinical applications.

Keywords: accuracy of post and core, customized post and core, digital impression, post space

SS-006 Viability of HGF-1 Cells on Titanium Surfaces Coated with Two-Dimensional (2D) Carbon-Based Materials

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OBJECTIVES: For the long-term success of dental implants, the peri-implant soft tissue seal is as important as osseointegration. This study aims to evaluate the viability of human gingival fibroblasts (HGF-1) on titanium surfaces coated with three different 2D carbon-based materials to enhance the soft tissue seal around dental implants.

MATERIALS AND METHODS: Grade 5 (Ti-6Al-4V) titanium rods were machined into 5 mm × 2 mm discs. For the experimental groups, titanium discs were coated with graphene oxide (GO), reduced graphene oxide (rGO), and nitrogen-doped graphene oxide (N-GO), while uncoated titanium discs served as the control group. GO was synthesized using the Hummers method; rGO was obtained by reducing GO with ascorbic acid, and N-GO was synthesized via a chronoamperometric method. Each material was prepared at concentrations of 0.25 mg/ml, 0.5 mg/ml, and 1 mg/ml. The dispersions were homogenized using an ultrasonic cleaner and subsequently applied to the titanium surfaces using a spraying technique. Cell viability was assessed using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay after 72 hours. One-way analysis of variance (ANOVA) followed by Tukey's post-hoc test was used to determine statistically significant differences between groups. Based on the statistical findings, the concentrations that resulted in the highest cell proliferation for each experimental group were identified.

RESULTS: N-GO coatings at 0.5 mg/ml and 1 mg/ml significantly increased HGF-1 cell proliferation compared to the control group ($p < 0.01$). Conversely, rGO at 0.5 mg/ml significantly reduced cell proliferation ($p < 0.05$) compared to the control.

CONCLUSIONS: This study suggests that both the type and concentration of the 2D carbon-based material influence the response of HGF-1 cells. Specifically, N-GO coatings at concentrations of 0.5 mg/ml and 1 mg/ml may enhance HGF-1 cell proliferation and could be used as coatings for the transmucosal components of dental implants in contact with peri-implant connective tissue.

Keywords: dental implant, titanium, human gingival fibroblasts, carbon-based materials

SS-007 Translucency and Color Masking Ability of a Hybrid CAD/CAM Material with Different Thicknesses

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OBJECTIVES: This in vitro study evaluated the effect of material thickness and substrate color of a hybrid nanoceramic CAD/CAM material on its masking ability and translucency.

MATERIALS-METHODS: 40 rectangular-shaped specimens (10 × 12 mm) were obtained from A1 shade Grandio blocks at 1 and 2 mm-thick (n = 12/group). Color parameters of specimens were measured on composite resin substrates [A1 (reference), A2 and A3) and black and white backgrounds using dental spectrophotometer. Color difference (ΔE00) of the specimens were performed on a gray background. Translucency parameter (TP00) of tested materials with 1 and 2 mm thicknesses on white and black backgrounds were calculated with the CIEDE2000 formula. The color difference results were compared with acceptability (1.8) and perceptibility (0.8) thresholds. The color difference indicating masking ability were compared between groups using student t-test. TP00 values were analyzed with Kruskal-Wallis and Dunn's multiple comparison test.

RESULTS: TP00 and ΔE00 significantly decreased as thickness of the tested material increased ($p<.05$). With 2 mm of ceramic thickness, it was obtained that ΔE00 was lower than

the acceptability threshold for substrates A2 (1.33±0.56) and A3 (1.72±0.84). For both substrates, the masking ability was found to be higher at 2 mm thickness. When the translucency of ceramic-substrate combinations was evaluated, the TP00 value of the 1 mm-thick ceramic with A1 substrate was found to be higher than that of the 2 mm-thick ceramic (p=0.0038). No significant difference in TP00 was observed between the other combinations.

CONCLUSIONS: The thickness of ceramic significantly affects both translucency and color change. In the hybrid nanoceramic tested, thinner thicknesses result in lower masking ability but higher translucency. The hybrid nanoceramic at 2 mm thickness is a promising alternative for masking darker discolorations.

Keywords: color difference, masking ability, translucency, substrate

SS-008 Surface Cleaning Enhances Adhesion Between Resin Cement and Translucent Zirconia

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OBJECTIVES: This study evaluated the effect of various cleansing agents and air-borne particle abrasion on the bond strength between saliva-contaminated zirconia and resin-based cement.

MATERIALS-METHODS: Zirconia specimens (N=336) were contaminated with artificial saliva and randomly divided into 24 groups (n=14 per group), according to three variables: surface conditioning (abraded or unabraded), cleaning method, and aging condition. Prior to contamination, half of the specimens were treated with air-borne particle abrasion, while the remaining half received no surface pretreatment. Following contamination, specimens were cleaned using one of five protocols (water spray, Ivoclean, Katana Cleaner, ZirClean, or repeated air-abrasion) or left uncleaned as controls. A resin cement (Panavia V5) was subsequently bonded to each specimen. The specimens were then subjected to one of two aging conditions: dry storage for 24 hours or thermocycling (6,000 cycles). Shear bond strength testing (SBS) was conducted (1 mm/min), and the results were analyzed using two-way ANOVA, Tukey's post-hoc test, and Weibull analysis (α = 0.05).

RESULTS: Both aging and cleaning method significantly affected SBS (MPa) ($p < 0.001$), with no significant interaction (p=0.065). Water spray was ineffective, yielding bond strengths similar to the uncleaned control. In non-abraded specimens, Ivoclean partially restored bond strength after aging (11.0±6.9). Air-borne particle abrasion significantly enhanced initial bond strength, and when combined with Ivoclean or repeated abrasion, preserved the highest values after aging (8.0±3.5 and 7.1±7.5, respectively). Katana Cleaner and ZirClean showed limited recovery. Weibull analysis confirmed greater characteristic strength and reliability in the Ivoclean and air-particle abraded groups.

CONCLUSION: Ivoclean and air-borne particle abrasion were the most effective methods for restoring bond strength to saliva-contaminated zirconia. Proper surface cleaning prior cementation is crucial for achieving durable resin bonding to translucent zirconia.

Keywords: Adhesion, bond strength, cleansing agents, dental materials, saliva contamination, zirconia

SS-009 Impact of Different Designs for Adhesive Restorations and the Intraoral Scanner Trueness of Digital Scans

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OBJECTIVES: To evaluate the scan trueness of three intraoral scanners (IOSs) while digitizing six different preparation designs for adhesive restorations. **METHOD:** Six mandibular first molar typodonts were prepared with different configurations standart 2mm occlusal reduction starting from design A to design F; butt-joint margin (design A), 1mm-wide chamfer margin (design B), 1mm-wide shoulder margin (design C), butt joint with 3mm occlusal box preparation (design D), 1mm-wide chamfer margin with 3mm occlusal box preparation (design E) and 1mm-wide shoulder margin with 3mm occlusal box preparation (design F).The preparations scanned with Trios3 (T3), Trios5 (T5), 3Disc (3D) and control scan made with VinlyHR Lab (Smart Optics). RMS values were obtained by superimposing the data using a 3D image processing software (Geomagic Controlx2022.1), and each preparation was individually analyzed and compared according to deviation values of the scans. Statistical analyses were performed using the Two-way ANOVA (α<0.05).

RESULT: The interaction between the preparation design and IOS affected the scan trueness (P<0.001).Regardless of the scanner used, the lowest deviation was observed in the B and E preparation design. Independent of the preparation design, the lowest deviation was observed with the T5 scanner, followed by 3D. Additionally, a significant difference was found between 3D and T3 (P<0.001).Designs A and B showed the highest deviation in T3. The lowest value for Design C was observed at T5. For Design D, the value at T3 was higher than T5, whereas Design F reached its maximum deviation in 3D. For T5, Design B showed lower deviation values than Designs A and D; whereas at 3D, the lowest value was observed except for Designs A and B.

CONCLUSION: Chamfer margins (Designs B and E) demonstrated the lowest deviations, while T5 provided the highest trueness. These results highlight the importance of selecting suitable preparation designs and scanners for achieving optimal digital impressions.

Keywords: pulp chamber depth,trueness, margin configuration, intraoral scanner

SS-010 Modification of Torque Screw Driver to Release Multiunit Abutment Which Has Broken Screw

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INTRODUCTION: Screw fracture is a rare but clinically significant complication in implant-supported restorations with multi-unit abutments. This complication can make prosthesis removal and retrieval of the fractured screw difficult. This study introduces a novel approach involving a modified multi-unit abutment driver to facilitate more efficient and controlled removal of multiunit abutments.

Problem Description: In multi-unit abutment systems, screw fractures commonly result in the failure of the abutment driver to engage properly with the abutment. This typically occurs when the fracture happens at the interface between the abutment and implant, causing the fractured piece to remain lodged within the connection. The fractured screw can obstruct the abutment entry path, preventing the driver from aligning with the hexagonal interface. This obstruction can hinder the mechanical locking of the driver, making abutment removal impossible. Furthermore, the irregular surface caused by the fractured screw and limited access complicates the correct application of the driver, affecting both alignment and torque.

Methodology: To address this, the contact point between the multi-unit abutment driver and the abutment was pre-determined and milled to a specific diameter, followed by modifications to the driver. In cases of fractured screws, a notch was created using a fissure bur at the designated diameter, enabling precise engagement between the driver and the multiunit abutment. This modification allowed for the controlled application of torque, facilitating the extraction of the multiunit abutment.

CONCLUSION: This study presents an effective technique for retrieving multi-unit abutment systems. By modifying the abutment driver and creating a precise notch on the multiunit abutment, this method enhances engagement and enables the application of controlled torque. The approach simplifies the retrieval process, reduces the need for invasive procedures, and provides clinical benefits for managing readaptation of new abutment.

Keywords: multiunit abutments, failed abutment, broken screw, modified screw driver

SS-011 Evaluation of the Knowledge Level and Clinical use Related to Intraoral Scanners and 3D Printers of Dentists in the Central Anatolian Region of Turkey

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OBJECTIVE: This research has aimed evaluating the knowledge level, clinical use and attitudes of dentists in the central Anatolian region of Turkey about intraoral scanning and 3D printing technologies.

METHODS: A cross-sectional study was conducted with 327 dentists through an online survey. Besides demographic characteristics, knowledge sources related to digital dentistry practices, usage status and attitudes towards technologies were also questioned in the survey. The chi-square test was used in data analysis and the significance level was set at p<0.05.

RESULTS: Among the participants, 57.2% were male. The reported usage rates were 39.8% for IOS and 20.5% for 3D printers. Only 36.1% of the participants had access to IOS and 22.9% had access to 3D printers in their clinics. More than 70% of the participants had not attended any training courses related to these technologies. The most frequently reported advantages of IOS were ease of data transfer (84.4%), reduced

risk of error during impression taking (60.9%), and elimination of physical waste (57.2%). For 3D printers, the most noted advantages were quick access to models (77.7%) and the ability to design patient-specific devices (51.1%). Over 95% of participants supported the routine use of these technologies and anticipated increased usage in the future. Significant relationships were found between demographic factors such as age, gender, experience, and professional title and the use of these technologies ($p<0.05$).

CONCLUSION: Although awareness of digital technologies is high among dentists, clinical usage remains moderate. Participants in the survey are thinking of using the intraoral scanners and 3D printers. Moreover, they want to get informed and trained for these technologies. For more extensive clinical use, educational campaigns and practical training courses on intraoral scanners and 3D printers are required.

Keywords: Intraoral scanner, 3D printing, digital dentistry

SS-012 Evaluation Of Fracture Strength Of The Conventional And Digital Provisional Crowns After Thermal Ageing

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OBJECTIVE: The study aimed to compare the fracture strength of provisional crowns fabricated using conventional techniques and the CAD/CAM technique after thermal ageing.

MATERIAL-METHODS: Totally 48 provisional crowns were handled and divided into four groups: that with the conventional direct technique (fabricated with a dual-cured composite resin –Tempsmart; GC, Japan), those with the conventional indirect technique (fabricated with cold-curing PMMA - Temdent classic; Schütz Dental GmbH, Germany), those with the CAD/CAM 3D-printing technique (fabricated with a UV-curing resin - ResMach Interim; ResMach, Turkey), with the CAD/CAM milling technique (fabricated with CAD/CAM milled PMMA blocks – Acryx; Akrodent, Turkey) (n=12). All cemented provisional crowns onto CoCr dies were thermally aged (±5°C and ±55 °C; 10000 cycles) with a thermal cycling device (Thermocycler SD Mechatronic, Germany). Then, all specimens were mounted on a universal testing device (AGS-X, Shimadzu, Japan) for a fracture strength test. The maximum forces were recorded in Newtons. The fracture types of the crown surfaces were classified after analysis by photography. All data were analysed with one-way ANOVA, and post-hoc comparisons were made using Tamhane's T test using a statistical package program (SPSS V22.0, IBM Corp, USA). Statistical significance was set at a $p = 0.05$.

RESULTS: The maximum fracture strength values were recorded in the Acryx group (1511.67 ± 140.73 N). Acryx provisional crowns were found statistically different from the others ($p < 0.01$) in fracture strength. In the Acryx group, most samples exhibited class II fractures, while class I fractures were observed in the other groups.

CONCLUSION: The Acryx PMMA blocks fabricated using the CAD/CAM milling technique demonstrated superior fracture strength in provisional crowns compared to those produced with conventional and 3D-printing techniques.

Keywords: 3D-printing, CAD/CAM milling, fracture strength, provisional crown, thermal ageing

SS-013 Effect of Denture Cleansing Solutions on Physical Properties of 3D-Printed and Heat-Polymerized Denture Base Resins

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OBJECTIVE: The development of three-dimensional (3D) printing technology has introduced permanent denture base resins into clinical practice. Similar to conventional prostheses, these materials require regular cleaning. However, limited data exist on the interaction between these novel resins and cleansing solutions. This study aimed to evaluate the effects of three denture cleansing solutions—Corega (GlaxoSmithKline, UK), Protefix (Queisser Pharma, Germany), and Aktident (Aktident Healthcare, Turkey)—as well as distilled water (control) on the flexural strength, surface roughness, microhardness, and weight change of denture base materials. The materials tested included heat-polymerized acrylic resin and two 3D-printed resins (Denturetec, Saremco Dental AG, Switzerland; Power Resin, Dentafab, Turkey).

MATERIALS AND METHODS: A total of 120 specimens (2×2×25 mm, n=10) were prepared from the three materials. Specimens were stored in distilled water at 37°C and immersed in the assigned cleansing solution for 45 hours, with renewal every 12 hours. Flexural strength, surface roughness, microhardness, and weight change were measured. Statistical analyses included the Shapiro-Wilk test, Generalized Linear Models, and Tukey's post-hoc test ($\alpha=0.05$).

RESULTS: Significant differences in flexural strength were observed among materials ($p<0.001$), with heat-polymerized acrylic resin showing the highest values. Surface roughness was significantly influenced by both material ($p<0.001$) and solution type ($p=0.018$), with the lowest roughness recorded in the Power Resin–Protefix group. Microhardness differences between materials were not statistically significant ($p=0.332$), but the interaction between cleansing solution and time was significant ($p<0.001$). Weight change was significantly affected by material type ($p<0.001$), while solution and time had no significant effect.

CONCLUSION: The impact of denture cleansing solutions on physical properties varies by material. Power Resin (Dentafab, Turkey) demonstrated favorable interactions with Protefix (Queisser Pharma, Germany), suggesting that material-specific cleaning protocols may improve long-term clinical performance.

Keywords: 3D printing,denture base resin,cleansing solution

SS-014 Shaping the emergence profile using a 3D-printed provisional crown: a soft tissue management approach

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INTRODUCTION: Congenital absence of one or more teeth is a common developmental anomaly. Although the exact etiology remains uncertain, both genetic and environmental factors are implicated. The most frequently missing teeth are the mandibular second premolars and maxillary lateral incisors, while maxillary central incisors, canines, and first premolars are rarely affected. This case report presents the esthetic and functional rehabilitation of a patient with a congenitally missing maxillary left canine, replaced by a retained primary canine.

Case description: A 50-year-old female patient presented with esthetic and functional complaints. Clinical examination revealed the congenital absence of the maxillary left permanent canine and the presence of a retained primary canine in its position. The primary tooth exhibited discoloration, shape disharmony, and increased mobility, leading to both esthetic and functional concerns. Following interdisciplinary consultation with the periodontology department, extraction of the primary tooth and implant placement were planned. After osseointegration, to achieve a proper emergence profile and address esthetic demands during healing, a provisional crown was fabricated using a 3D-printed structure over a titanium base abutment. This provisional restoration guided gingival contouring during the healing phase. The definitive crown was milled from a hybrid ceramic CAD/CAM block and cemented extraorally onto the titanium base abutment. After polishing, the crown was seated intraorally, finalizing the restoration.

DISCUSSION: Three months postoperatively, the soft tissue exhibited an ideal emergence profile suitable for definitive restoration. Additive manufacturing for provisional restorations in single-implant cases offers predictable soft tissue conditioning, reduced clinical time, and cost-effectiveness—making it a valuable option for esthetic and functional implant-supported crowns.

Keywords: 3D Printing, Gingival Contouring, Congenitally Missing Tooth, Provisional Restoration, Single-Tooth Implant

SS-015 Effect of Er:YAG and Nd:YAG laser irradiation on the bond strength of a resin cement

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OBJECTIVES: This study aims to evaluate the effect of Nd:YAG and Er:YAG laser irradiation on to the dentin and dual-cure resin cement bond strength.

MATERIALS-METHODS: The study specimens consisted of 20 extracted third molar teeth, which were sectioned to expose the flat dentin surface. For each specimen, fine-structured feldspathic ceramic blocks overlay restorations were prepared. Specimens were randomly divided into 4 groups according to surface treatment; 1) no surface treatment 2) Er:YAG laser irradiation (20 Hz, 2.4 W, 120 mJ), 3) Nd:YAG 1W laser irradiation (10 Hz, 100 J), 4) Nd:YAG 4W laser irradiation (10 Hz, 300 J). After surface treatments, ceramic restorations were cemented with a dual-cure resin cement. The specimens were stored in distilled water at 37 °C for 24 h. After 10000 thermal cycling, microtensile bond strength (μTBS) test was applied. The failure mode was examined under a stereomicroscope. The surface treatments' effect was examined using a scanning electron microscope (SEM). The μTBS values were statistically analyzed using Kruskal Wallis and Dunns' tests ($\alpha = 0.05$).

RESULTS: No statistically significant difference was found between the control group and the groups treated with laser. The bond strength value of the Er:YAG group was found to be higher compared to the Nd:YAG groups. Stereomicroscope analysis revealed that adhesive-type fractures were the predominant failure mode across all groups. SEM analysis revealed that, compared to the control group, the Er:YAG laser group exhibited a smear layer–free surface characterized by a scale-like pattern. In the Nd:YAG groups, dentinal tubules were found to be occluded, and microcracks were observed, while Nd:YAG 4W caused surface melting.

CONCLUSION: Er:YAG and Nd:YAG laser irradiation had no significant effect on the μTBS between dual-cure resin cement and the dentin surface.

Keywords: laser, microtensile bond strength, resin cement

SS-016 Impact of Dental Education on Shade Matching Skills: A Spectrophotometric Analysis

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OBJECTIVE: Color harmony is fundamental to achieving esthetic success in dentistry. This study aimed to assess how dental students' visual shade-matching skills vary with educational level and to evaluate the effects of theoretical and practical training.

MATERIALS-METHODS: A cross-sectional study was conducted with 120 undergraduate students at the Faculty of Dentistry, Dokuz Eylül University. Under standardized D65 illumination, students determined the shades of five sound maxillary central incisors using the VITA 3D-Master shade guide. Both the reference teeth and the selected shades were measured with a spectrophotometer (Konica Minolta CM-36d), and color differences were calculated using the CIEDE2000 formula (ΔE00). Statistical analyses included the Mann–Whitney U test, Kruskal–Wallis test with Dunn's post-hoc test, and Spearman's correlation (α = 0.05).

RESULTS: Significant differences in shade-matching performance were observed across class levels for tooth-1 ($p = 0.004$), tooth-4 ($p = 0.011$), and tooth-5 ($p = 0.012$). First-year students performed significantly worse than higher-year students ($p < 0.05$), while no significant differences were found for tooth-2 and tooth-3 ($p > 0.05$). Gender and visual impairments did not affect performance ($p > 0.05$). Students with theoretical training achieved significantly better results ($p < 0.001$), whereas practical training alone was not statistically effective ($p > 0.05$).

CONCLUSION: Shade-matching performance improves with educational advancement, and theoretical instruction plays a key role. Integrating comprehensive theoretical courses with structured practical sessions into dental curricula may enhance esthetic outcomes in clinical practice. This study is supported by TUBITAK (project Number:1919B012420598)

Keywords: color selection, dental education, spectrophotometry, visual perception

SS-017 Effect of implant depth, tooth presence and scan strategy on digital impression trueness

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OBJECTIVES: This study aimed to evaluate how implant depth, the presence of an adjacent posterior tooth, and scanning strategy influence intraoral scan trueness in partial edentulism.

MATERIALS AND METHODS: A partially edentulous in vitro model was used with implants at two subgingival depths (1 mm and 3 mm), with or without an adjacent posterior tooth. Each configuration was scanned using an intraoral scanner under two strategies: the manufacturer-recommended occlusal–buccal–palatal scanning strategy and an alternative zigzag scanning strategy. A reference scan was obtained with a lab scanner. Deviations between test and reference scans were analyzed in Geomagic Control X software using RMS, linear and interimplant distance measurements. Statistical analysis (ANOVA) was performed to determine the effects of implant depth, tooth presence, and scanning strategy.

RESULTS: Implant depth significantly affected scan trueness: scans at 3 mm depth showed greater deviations than at 1 mm ($p < 0.05$). The presence of an adjacent posterior tooth significantly improved trueness, leading to higher trueness compared to an edentulous distal extension ($p < 0.05$). Scanning strategy also significantly affected trueness: the standard

occlusal–buccal–palatal scanning strategy resulted in higher trueness than the zigzag scanning strategy ($p < 0.05$). Although deeper implant positioning reduced trueness, deviations at 3 mm depth remained within clinically acceptable limits.

CONCLUSIONS: Within the limitations of this study, intraoral scan trueness in partially edentulous models was significantly affected by implant placement depth, the presence of a distal posterior tooth, and the scanning strategy used. Implant placement at 1 mm subgingival depth, the presence of a distal tooth, and use of the manufacturer-recommended scanning strategy improved trueness. Although increased depth and the absence of a distal tooth reduced trueness, the deviations remained within clinically acceptable limits. The recommended scanning strategy proved consistently effective in enhancing trueness under varying clinical conditions.

Keywords: digital impression, intraoral scanning, partial edentulism, scanning strategy, trueness

SS-018 Effect of restoration thickness and cement color on the translucency of CAD/CAM resin nanoceramic material

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OBJECTIVES: The objective of this study was to investigate the effect of restoration thickness and cement color on the translucency of computer aided design/computer aided manufacturing (CAD/CAM) resin nanoceramic material and to evaluate the ability of minimally invasive restorations to mask underlying abutment color.

MATERIALS-METHODS: Rectangular shaped (12 mm x 14 mm) specimens were prepared using low speed sectioning saw from a CAD/CAM resin nanoceramic material (Lava Ultimate, Shade A1-LT) with 2 different thicknesses of 0,6 mm and 1mm. Specimens within each thickness were further divided into 5 subgroups according to the cement color (n=7): brown, opaque, white, universal, and clear. A self-etch adhesive resin cement (Panavia V5) with relevant color was applied to each specimen and restoration configurations were obtained. After cementation the Commission Internationale de l'Eclairage (CIE) L*, a*, b* values of the restorations were measured using a spectrophotometer (Vita easyshade V) on black and white backgrounds and the translucency parameters (TP00) were calculated. Statistical analyses were conducted using Kolmogorov-Simirnov, 2-way ANOVA, and Tukey Honestly Significant Difference (HSD) tests.

RESULTS: The TP00 was significantly influenced by restoration thickness ($P<.001$), cement color ($P<.001$), and their interaction ($P<.001$). For both thicknesses, clear and universal colored cement resulted in significantly higher TP00, while opaque and white colored cement revealed the lower TP00, compared with other subgroups. Evaluating cement colors regardless of the thicknesses, the mean TP00 values were ordered as follows: clear (TP00=16.01±4.67) > universal (TP00=15.48±5.50) > brown (TP00=10.80±5.08) > white (TP00=5.16±2.94) > opaque (TP00=3.95±2.10). Increased ceramic thickness caused a significant decrease in TP00, for all tested cement colors.

CONCLUSIONS: The restoration thickness and cement color significantly altered the TP00 of the resin nanoceramic. Effective masking can be achieved with using increased ceramic thickness and white or opaque colored resin cement.

Keywords: Cement color, ceramic thickness, masking capacity, resin nanoceramic, translucency.

SS-019 Mechanical Properties of Different Additively Manufactured Definitive Restorations After Thermal Aging

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OBJECTIVES: While additive manufacturing (AM) has advanced the production of resin-based definitive restorations, the impact of artificial aging on their mechanical behavior remains insufficiently understood compared to substractive manufacturing (SM). The aim of this in vitro study was to evaluate the effects of material type and thermal cycling on the flexural strength of AM resins used for definitive restorations.

MATERIALS-METHODS: Bar-shaped specimens were produced with dimensions of 25 mm in length, 2mm in width, 2mm in height (ISO 4049:2020) from 2 different additively manufactured definitive resin materials Saremco (AM-S) and VarseoSmile TriniQ (AM-T) and a polymer composite breCAM.HIPC (SM-B) for SM control group. The specimens were randomly divided into 2 subgroups: non-aged (stored in distilled water at 37 °C for 24 hours) and aged (thermocycled for 10,000 cycles between 5 °C and 55 °C). Flexural strength (σ)

was determined using the three-point bending test and values were statistically analyzed using two-way ANOVA (α<0.05).

RESULTS: The study revealed that the flexural strength was influenced by the material type (p<0.001), but not by thermal aging (p=0.155) or the interaction of these two factors (p=0.462). Group SM-B (221.51 MPa) had significantly higher FS values than both AM groups (p<0.001). Although no significant difference was found between the AM groups (p = 0.209), Group AM-S exhibited the lowest FS value (101.32 MPa).

CONCLUSIONS: While the SM group demonstrated superior mechanical performance, both AM groups showed acceptable mechanical properties for long-term clinical application in accordance with ISO standards. These findings support the potential use of additively manufactured definitive resins in clinical practice.

Keywords: Additive Manufacturing, Definitive resin, Thermal Cycling, Flexural Strength

SS-020 Immediate Loading in Implant Supported Prosthesis by Digital Workflow and Follow Up: Case Report

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INTRODUCTION: One of the most important factors affecting the long-term success of implant-supported prostheses is the adequate and appropriate form of hard and soft tissue. The immediate loading protocol aims to restore the lost aesthetics and function of the patient as quickly as possible. In this case, to limit potential alveolar bone resorption following extraction, implants were placed in the same session. A provisional restoration was performed with an immediate loading protocol to allow soft tissue manipulation and facilitate the process in terms of aesthetics and function.

Case description: The extraction of tooth numbers 12-11-21-22 in a 44-year-old male patient was deemed appropriate due to periodontal issues. Based on the patient´s preferences, three implants (Osstem Implant, Seoul, South Korea) were planned for this area with immediate loading. Free connective tissue graft was placed to enhance the insufficient soft tissue thickness for improved aesthetics. The insertion torque and ISQ values were measured to evaluate the primary stability of the implant. Ti-base abutments were selected and scan bodies were placed. Digital impression was taken with an intraoral scanner(Trios 3Shape, Denmark). Based on these scanned models, a screw-retained temporary restoration was digitally designed (inLab CAD SW, Dentsply Sirona, USA) and milled from PMMA block, delivered on the same day as surgery. Non-functional loading was preferred and occlusal contacts were eliminated. Implant retained zirconia restorations were fabricated after four-month healing period. At the 3-month follow-up, no complications were observed.

DISCUSSION: Immediate provisional prosthesis enhances patient comfort and accelerates the treatment process. Completing restorations with a digital workflow provides a faster, more predictable treatment process. The results support the effectiveness of immediate loading protocols in aesthetic zone tooth loss cases, especially when combined with proper surgical planning and structured follow-up of both provisional and definitive prostheses.

Keywords: Implant, immediate, digital, aesthetic, screw retained

SS-021 Effect of multiple firings on resin bond strength of CAD/CAM ceramics

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OBJECTIVES: The aim of this study was to evaluate the effect of multiple firings on the shear bond strength of two different CAD/CAM materials after thermocycling.

MATERIALS-METHODS: A total of 48 disc specimens were fabricated, consisting of 24 specimens with dimensions of 1.5×12×14mm each from lithium disilicate ceramics (LC) and monolithic zirconia ceramics (ZC): IPS e.max CAD (Ivoclar Vivadent) and monolithic ultra-translucent zirconia ceramic (Katana UTML). Each ceramic group was divided into four subgroups according to the number of firings (0,1,2,4)(n=6). Airborne particle abrasion was implemented on ZC. The surface of LC was treated with 9.5% HF acid. Silane coupling agent was applied to all specimens. An ultrasonic cleaning process was applied to both materials. After the resin cement material (Nova Resin Cement) application, all specimens underwent 5000 thermal cycles. A universal testing machine was used to perform the shear bond strength (SBS) test. The statistical analysis of SBS data was performed by using two-way ANOVA followed by Bonferroni post-hoc tests.

RESULTS: The two-way ANOVA revealed that material type, firing number, and their interaction had significant effects on shear bond strength (FMax)(p<0.001). Post-hoc comparisons

indicated that the ZC and LC groups showed significant differences ($p<0.005$). Among firing protocols, a significant difference was observed between the first and fourth firings ($p=0.010$). While material type and firing protocols influenced shear bond strength independently, the material-firing interaction demonstrated the most pronounced effect ($\eta^2=0.20$).

CONCLUSIONS: In conclusion, shear bond strength was significantly affected by both material type and number of firings and these factors interacted with each other. Indicating that material selection and firing protocols should be considered to optimize bond strength.

Keywords: zirconia, lithium disilicate, multiple firings

S-022 A Bibliometric Analysis of Additive Manufacturing in Dentistry: Historical Overview

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OBJECTIVES: Bibliometric analysis is used to reveal the distribution and trends of literature based on nations, authors, publication years, subjects, languages, and other factors. The aim of this study was to conduct a bibliometric analysis of additive manufacturing in dentistry, from the earliest records to April 2025.

MATERIALS AND METHODS: The Web of Science Core Collection Database was used to review the published research literature from the first records up to 14th April 2025. The data collected from the literature were downloaded as a plain text file in the "full record and cited references" format. Bibliometric analysis and quantitative evaluation were conducted using the software applications VOSviewer, Biblioshiny, and Microsoft Excel.

RESULTS: The bibliometric analysis included 3207 publications. In terms of productivity, the most productive authors are Revilla-León, Marta; Ozcan, Mutlu; and Yilmaz, Burak, respectively. In terms of publication count among universities, Zurich University (n = 115), Washington University (n = 104), and Bern University (n = 97) had the highest number of publications, respectively. The co-occurrence analysis of keywords revealed that "3D printing", "digital dentistry", and "additive manufacturing" were the most used keywords in publications.

CONCLUSIONS: This study focuses on digital workflow, additive manufacturing technologies, and computer-aided design and computer-aided manufacturing (CAD/CAM) methodologies as the primary research fields. This bibliometric analysis describes the current developments and future directions of additive manufacturing in dentistry, enabling dental practitioners and researchers to make informed clinical decisions and promote collaboration.

Keywords: Bibliometric analysis, CAD-CAM, 3D printing.

SS-023 Long-Term Prosthodontic Outcomes After Alveolar Distraction Osteogenesis in the Atrophic Maxilla: A 20-Year Follow-Up

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INTRODUCTION: The severe resorption of the maxillary alveolar ridge presents the significant challenges for prosthodontic rehabilitation. The Alveolar Distraction Osteogenesis (ADO) is an alternative to traditional grafting, offering simultaneous hard and soft tissue regeneration without donor site morbidity. This enhances the long-term success of implant-supported prostheses.

Case description: A 58-year-old female presented with severe anterior maxillary bone resorption, poor mastication, and esthetic concerns. Following extraction of compromised mandibular teeth, the alveolar distraction osteogenesis was performed, and 12 mm of vertical bone gain was achieved. Three months post-distraction, five implants were placed in the maxilla and subsequently restored with screw-retained Fixed Partial Dentures (FPDs) in 2005. Additional implants were placed in the mandible. One implant was lost during osseointegration; the remaining implants were remained stable. Clinical and radiographic follow-ups were conducted in 2015, 2019, and 2025 revealed some discoloration on screw access hole fillings and varying degrees of peri-implant bone loss attributed primarily to inadequate oral hygiene practices. In 2019 and 2025 appointments, maxillary right canine implant screw access hole filling was renewed. Despite these changes, implants remained functional, and the prosthetic restorations maintained esthetic and masticatory satisfaction for the patient throughout the 20-year follow-up period.

DISCUSSION: This case highlights the long-term success and limitations of alveolar distraction osteogenesis for rehabilitating severely atrophic maxillae. Over a 20-year follow-up, ADO proved effectivity in maintaining substantial

vertical augmentation and supporting implant restorations. The use of screw-retained FPDs enabled easier maintenance and retrievability during follow-up care. However, peri-implant bone loss observed at multiple follow-up intervals underscores the importance of rigorous oral hygiene practices and regular professional maintenance for long-term success. Despite these challenges, ADO remains a predictable and minimally invasive technique, especially beneficial in the anterior maxillary region where traditional grafting may be less feasible.

Keywords: Alveolar Ridge Augmentation, Distraction Osteogenesis, Dental Implants, Maxillary Atrophy, Long-term Follow-up

SS-024 Evaluation of the Accuracy of Temporary Laminate Restorations Designed Using Two Different Digital Smile Design Software

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Statement of Problem: Various digital technologies are used in the design and fabrication of temporary restorations; however, the clinical success of these approaches relies on how accurately the physical restorations replicate the initial virtual designs.

PURPOSE: This clinical pilot study aims to evaluate the dimensional accuracy of temporary laminate restorations fabricated using a fully digital workflow. Two different digital smile design software programs: Smile Creator (Exocad) and SmileCloud were used to generate 3D designs, which were subsequently fabricated with SLA 3D printing technology. The objective was to compare the physical restorations with their corresponding virtual 3D designs.

MATERIALS-METHODS: Five participants with non-ideal anterior maxillary esthetics were selected. For each subject, intraoral and extraoral photographs, along with digital scans, were obtained. Smile designs were created using SmileCloud and Smile Creator software. The designs were aligned with STL files and finalized using Exocad DentalCAD. Temporary restorations were fabricated using SLA 3D printing. Dimensional measurements were taken at specific landmarks: incisal edge to gingival margin, mesio-distal widths of central and lateral incisors, and the distance between distal margins of maxillary canines. Two independent examiners performed the measurements using virtual and digital calipers. Intraoral fit was also clinically checked. Statistical analysis was performed using the Shapiro-Wilk test for normality and Wilcoxon signed-ranks test for non-parametric comparisons ($p < 0.05$).

RESULTS: No statistically significant differences were found between the 3D virtual designs and printed restorations for either software ($p > 0.05$). However, a significant reduction in intercanine distance was observed when comparing SmileCloud's 2D designs with their corresponding 3D models and printed restorations ($p < 0.05$).

CONCLUSION: Both software demonstrated acceptable accuracy in producing 3D-designed temporary restorations. However, discrepancies in 2D-based designs highlight the limitations of 2D planning and the importance of 3D evaluation for dimensional accuracy.

Keywords: Digital Smile Design, Digital Workflow, Additive Manufacturing, Temporary Laminate Restorations, Dimensional Accuracy

SS-025 Evaluation of flexural strength of additively manufactured resin materials compared to auto-polymerized provisional resin with and without hydrothermal aging

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PURPOSE: Additive manufacturing (AM) technologies are increasingly used to produce 3D-printed provisional dental restorations. This study aimed to evaluate the flexural strength of various 3D-printed resins and compare their mechanical performance with that of a conventional provisional resin.

MATERIALS-METHODS: Six 3D-printed resins—Nextdent (ND), Temp PRINT (TP), Optiprint temp (OT), 3Delta Etemp (DE), Saremco print | CROWNTEC (SA), and MED690 (ST)—were compared with a conventional resin, Protemp (PT), as the control. A total of 168 specimens ($25 \times 2 \times 2$ mm^3) were fabricated according to ISO 10477:2018 using the Asiga MAX 3D printer. Post-processing was performed per manufacturers' protocols. Half the specimens were tested after 24 hours; the other half underwent thermomechanical aging (1,200,000

cycles; 5 °C and 55 °C) using a chewing simulator. Flexural strength was measured with a Universal Testing Machine. Two-way ANOVA and Tukey's post-hoc tests (α = 0.05) were used for statistical analysis. Weibull modulus was also calculated.

RESULTS: No significant difference in flexural strength was observed after aging in the OT and PT groups ($p > 0.05$). ND, SA, TP, DE, and ST showed significant reductions ($p < 0.05$), ranging from 12.67 to 57.39 MPa. ND showed the greatest strength loss (30%), followed by DE (23.8%), SA (16.2%), TP (12%), and ST (8.6%). All aged groups exhibited lower Weibull shape and scale values, except ST.

CONCLUSION: Thermomechanical aging significantly affected most 3D-printed resins, especially ND and DE. However, SA and TP outperformed the conventional PT in post-aging flexural strength, indicating their potential as reliable provisional materials for both short- and long-term use.

Keywords: 3D Printing, Additive manufacturing, CAD/CAM, Dental materials, Provisional restorations

SS-026 Trueness and internal fit of 3-unit monolithic zirconia restorations: A comparison of additive and subtractive manufacturing methods

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OBJECTIVES: This study aimed to evaluate the trueness and internal fit of 3-unit monolithic zirconia restorations fabricated using stereolithography (SLA), digital light processing (DLP), lithography-based ceramic manufacturing (LCM), and computer numerical control (CNC) techniques. Methods; A total of 32 three-unit posterior fixed partial dentures (FPDs) were fabricated using three different additive manufacturing methods—SLA, DLP, and LCM—and CNC as the control. All restorations were made from 3 mol% yttria-stabilized tetragonal zirconia polycrystal (Y-TZP). The restorations, their corresponding models, and the seated restorations were digitized using an intraoral scanner. For trueness and internal fit analysis, all STL files were imported into a metrology-grade 3D analysis software (Geomagic Control X 2022; 3D Systems) and virtually sectioned into four regions: intaglio, occlusal, axial, and marginal. Surface deviations were assessed using the root mean square (RMS) method, while the internal fit was analyzed using the triple-scan technique. Data were statistically evaluated using one-way ANOVA and Tukey *post hoc* tests at a significance level of α =.05.

RESULTS: SLA, CNC, and LCM provided similar and clinically acceptable marginal and internal trueness ($p>.05$). Conversely, the DLP method exhibited a significantly higher discrepancy in all regions, particularly in the marginal and intaglio surfaces ($p\leq0.001$). The lowest overall RMS deviation was observed in the SLA group (39.88 ± 4.84 µm), while the highest internal gap was found in the DLP group (218.29 ± 11.88 µm).

CONCLUSIONS: Manufacturing accuracy and internal fit of the 3-unit zirconia FPDs were affected by the additive production method. Restorations fabricated using the DLP technique exhibited greater deviations, indicating the need for clinical adjustment prior to clinical use.

Keywords: Additive manufacturing, Internal fit, Monolithic zirconia, Subtractive manufacturing, Trueness

SS-027 The mandibular overdenture with custom-made subperiosteal implant (A case report)

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Subperiosteal implants, once abandoned due to complication risks, are experiencing renewed interest thanks to advancements in digital dentistry, making them a viable option for cases of severe mandibular atrophy. Conventional dentures often struggle with stability and retention in such situations, frequently requiring extensive regenerative interventions. This paper details the case of a 54-year-old male with pronounced mandibular atrophy who was treated with a custom-designed subperiosteal implant. The implant was meticulously crafted using computed tomography (CT) imaging, a 3D-printed anatomical model, and fabricated by the selective laser melting (SLM) method with biocompatible Ti6Al4V alloy. This modern digital workflow provided an effective alternative, leading to excellent functional outcomes and patient satisfaction, with no complications reported during one year of follow-up.

Keywords: case report, overdenture, subperiosteal implant

SS-028 Laminate Veneers on Premolars: The Role of Preparation Designs and Ceramic Materials

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OBJECTIVES: To investigate the effects of different preparation designs and ceramic materials on marginal adaptation and fracture strength of laminate veneer restorations (LVRs) on premolars.

MATERIALS-METHODS: Feather-edge (F) and butt-joint (B) preparation designs were applied to premolars, and epoxy resin die models were fabricated (N=80). LVRs (0.4 mm thickness) were designed in the software (ExoCad). Each preparation design was divided into four ceramic groups; Cerec Tessera (CT), Vita Enamic (VE), IPS e.max CAD (EmC), and IPS e.max Press (EmP) (n=10). Marginal gap (MG) values were measured using the silicone replica technique. After cementation (Variolink Esthetic DC) and 5000 thermal-cycles, fracture strength (FS) test was performed (TestControlSystems, 0.5 mm/min) at the buccal cusp. Data were statistically analyzed in SPSS26 (two-way ANOVA, Tukey, t-test, $p<0.05$), and fracture types were classified.

RESULTS: The main effects of both preparation design and ceramic material on MG (μm) and FS (N) values were found to be statistically significant ($p<0.001$). B design exhibited significantly higher marginal adaptation and fracture strength compared to F design across all ceramic groups ($p<0.05$). VE exhibited the lowest MG values for both B (75.15±1.03) and F (82.17±1.08) designs, whereas EmP showed the highest MG values for B (84.67±2.11) design, and EmP (89.10±1.45) and CT (87.65±1.65) for F design ($p<0.05$). In the FS test, CT (461.40±58.15 and 368.90±52.40) exhibited significantly higher FS values than EmP (375.20±36.28 and 304.00±34.61) for B and F preparations, respectively ($p<0.05$), whereas no statistically significant differences were observed among EmC, VE and EmP materials for both preparations ($p>0.05$). All failures were catastrophic fractures.

CONCLUSIONS: Different preparation designs and ceramic materials affect the marginal adaptation and fracture strength of premolar LVRs. Butt-joint preparation design demonstrated superior marginal adaptation and fracture strength than feather-edge preparation. Pressed ceramics exhibited lower performance than the CAD/CAM ceramics, regardless of the preparation design.

Keywords: Premolar tooth, Laminate veneer, Cerec tessera, Marginal fit, Fracture strength

SS-029 Effects of restoration thickness and cement shade on the prediction of the final color of the 3D-printed photopolymer restorations

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PURPOSE: The purpose of this study was to evaluate the effects of restoration thickness and cement shade on the final color of the 3D-printed photopolymer restorations by assessing color match between try-in pastes and resin cements, and color match between before and after polymerization of resin cements.

MATERIALS-METHODS: A total of 160 specimens were prepared from a 3D-printed photopolymer resin according to restoration thicknesses (0.3, 0.5, 0.7, and 1 mm) and cement shades (universal-A2, clear, white, and opaque) (n=10). The color parameters were measured under D65 lighting, and color match values were calculated using the CIEDE2000 formula. Statistical analysis was performed using two-way ANOVA and Tukey HSD tests ($\alpha=0.05$).

RESULTS: A significant interaction was found between restoration thickness and cement shade for the color match between try-in pastes and polymerized cements ($P<0.05$). At thinner thicknesses, clear and A2-universal cements showed better color match. At 0.7 mm and 1 mm, color match improved for all groups, especially clear and white cements, falling below the perceptibility threshold (0.8). No interaction was found between restoration thickness and cement shade on the color match before and after cement polymerization ($P>0.05$). All groups showed values below the perceptibility threshold (0.8).

CONCLUSIONS: Try-in pastes may not always be ideally used to predict the final color outcome of 3D-printed photopolymer restorations. Shade matching should be verified using the resin cement before the polymerization to improve esthetic predictability.

Keywords: 3D printing, resin cement, color match, dental esthetics, try-in paste

SS-030 Effect of Post-Processing Alcohol Washing Time on the Hardness and Flexural Strength of 3D-Printed Permanent Dental Resins

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OBJECTIVES: This study aimed to evaluate the influence of different alcohol washing durations on the hardness and flexural strength of a 3D-printed permanent dental resin, considering their critical role in clinical longevity.

MATERIALS-METHODS: Fifty bar-shaped specimens (25×25×2 mm) were fabricated using VarseoSmile TriniQ (BEGO, Bremen, Germany) permanent dental resin. The specimens were divided into five groups (n=10) according to alcohol washing times: 3, 5, 10, 15, and 20 minutes. Following washing in 99.5% ethanol, all specimens underwent standardized light postcuring. Hardness was measured using a Shimadzu microhardness tester, and flexural strength was assessed using an Instron universal testing machine through a three-point bending test. Data were analyzed using one-way ANOVA, with the significance level set at $p<0.05$.

RESULTS: Alcohol washing time had a statistically significant effect on both hardness and flexural strength ($p<0.001$). Specimens washed for 3 minutes (21.64±3.69) and 5 minutes (18.27±2.51) exhibited significantly higher hardness values compared to those washed for 10, 15, and 20 minutes. Flexural strength showed a similar trend, with the highest strength recorded in the 3-minute group (23.19±1.02) and a progressive decrease observed with longer washing times, reaching the lowest values in the 20-minute group (17.71±1.16).

CONCLUSIONS: Prolonged alcohol washing times negatively affected the mechanical properties of the 3D-printed permanent dental resin. Shorter washing durations (3–5 minutes) better preserved surface hardness and flexural strength, indicating that excessive alcohol exposure may compromise material integrity. These findings emphasize the necessity of optimizing post-processing protocols to ensure the long-term mechanical performance and clinical durability of 3D-printed permanent restorations.

Keywords: 3-D printing, flexural strength, hardness

SS-031 Investigation of the Bond Strength of Dentin Subjected to Different Contaminants with Self-Adhesive Resin Cements

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In the oral environment, teeth are exposed to various factors such as beverages, temperature changes, and mechanical forces, which can influence their bonding to dental cements. This study aimed to investigate changes in the bond strength of dentin contaminated by nicotine and caffeine when bonded with three different self-adhesive resin cements. Molar teeth extracted for periodontal reasons were used in this study. Dentin surfaces were exposed using a microcut device, and the samples were divided into three groups: control, caffeine-exposed, and nicotine-exposed. The nicotine group was exposed to smoke from 100 cigarettes (Tekel 2001) using a smoke chamber for 10-minute sessions to simulate one year of smoking. The caffeine group was immersed in a coffee solution prepared by dissolving 2 g of instant coffee (NESCAFÉ Classic) in 200 ml of hot water. Samples were placed in a glass container and stirred in the solution at 55°C and 100 rpm for 10 hours to simulate long-term exposure.Each main group was subdivided into three subgroups (n=10) based on the resin cement used: RelyX™ U200 Automix, RelyX™ U200 Clicker, and RelyX™ U200 Veneer (3M Deutschland GmbH). The cements were applied in Teflon molds (2.3 mm diameter, 3 mm height), then polymerized for 40 seconds as per the manufacturer's instructions. Following light-curing (VOCO Celalux), molds were removed, and bond strengths were statistically analyzed. The highest bond strength was recorded in the control group using RelyX™ Veneer resin cement (9.67 ± 4.33 N), while the lowest was observed in the nicotine group with RelyX U200 resin cement (2.43 ± 0.74 N). In both the control and nicotine groups, RelyX Veneer resin cement exhibited the best performance.Nicotine and caffeine contamination reduce the bond strength of dentin to self-adhesive resin cements. Among all tested materials, the light-cure resin cement demonstrated the highest bond strength.

Keywords: dentine, resin cements, bond strength, nicotine, caffeine

SS-032 Evaluation of the color change of CAD/CAM ceramics subjected to different surface finishing procedures

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AIM: Advances in CAD/CAM technologies have enabled the rapid and efficient production of esthetic restorations. However, preserving the esthetic properties of ceramic materials developed to improve durability remains a concern. This study aimed to compare the color stability of three different CAD/CAM ceramic materials subjected to various surface treatments after coffee exposure.

MATERIALS AND METHODS: Three CAD/CAM ceramics were evaluated: feldspathic glass-ceramic (CEREC Blocs; Dentsply Sirona, USA), lithium disilicate glass-ceramic (IPS e.max CAD; Ivoclar Vivadent, Liechtenstein), and zirconia-reinforced lithium silicate glass-ceramic (Vita Suprinity; VITA Zahnfabrik, Germany). A total of 108 samples were prepared and divided into three subgroups for each material (n = 12) based on surface treatment: Group 1 – mechanical polishing only, Group 2 – glazing only, Group 3 – polishing followed by glazing. After baseline color measurements, samples were stored in a coffee solution at 37°C for two months, simulating 2 years of clinical aging. Color measurements were repeated at 1 week, 2 weeks, 1 month, and 2 months. At the end of the immersion period, the initial polishing procedure was re-applied, and final color measurements were taken. L*, a*, and b* values were recorded in Excel. Statistical analysis was performed using SPSS v20.0 with repeated-measures Two-Way ANOVA. The significance level was set at $p = 0.05$.

RESULTS: Statistically significant differences were found ($p < 0.01$). The highest ΔE_{00} value was observed in the Vita Suprinity polishing group between the 1st and 2nd months (2.62 ± 0.48). The lowest values were in the E.max polishing + glazing group between baseline–1st week (0.44 ± 0.21) and 1st–2nd week (0.44 ± 0.79).

CONCLUSION: Mechanical polishing combined with glazing effectively preserves color stability in CAD/CAM ceramics. Re-polishing after staining exposure may improve surface quality and prolong esthetic longevity.

Keywords: CAD/CAM ceramics, color stability, surface finishing procedures, coffee staining

SS-033 Perception of Artificial Intelligence–Assisted Smile Designs Across Educational Levels: A Questionnaire Study

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AIM: This study aimed to evaluate the impact of artificial intelligence (AI)–assisted digital smile designs on aesthetic perception and to investigate how this perception varies among individuals with different educational and clinical experience levels. The increasing use of AI in dental treatment planning demands a comprehensive understanding of its acceptance and perceived value across diverse practitioner groups.

MATERIALS-METHODS: Four digital clinical scenarios representing common aesthetic dental concerns—gummy smile, dental crowding, diastema, and age-related attrition—were created using SmileCloud software. The images were presented to three participant groups: first-year preclinical dental students, fourth- and fifth-year clinical dental students, and general dentists/specialist dentists. Each participant evaluated the cases based on five specific criteria: aesthetic success, perceived naturalness, individual suitability, the influence of AI, and preferred designer. The number of cases was intentionally limited to avoid participant fatigue, and scenarios were designed to ensure morphological and functional variety for accurate comparison across groups.

RESULTS: Data from 60 participants were analyzed using SPSS (Version 28, IBM Corp., Armonk, NY). Results showed that first-year students consistently assigned higher aesthetic scores, while specialists were more selective and critical, especially regarding aesthetic and naturalness evaluations. In Case 1, significant intergroup differences were detected for both aesthetic and naturalness ratings ($p < 0.001$). Case 2 showed no statistically significant differences ($p > 0.05$). In Case 3, significant differences were observed only in aesthetic perception ($p = 0.006$), while Case 4 revealed no differences across groups ($p > 0.05$).

CONCLUSION: AI-assisted smile designs are generally well-received by all groups. However, clinical experience appears to influence the level of critical evaluation. These findings provide valuable insights into the integration of AI technologies in future digital dental aesthetics and clinical treatment planning

Keywords: Artificial intelligence, digital smile design, aesthetic perception, dental education, visual assessment, SmileCloud

SS-034 Trueness of Digital Scans Obtained with Different Scanning Strategies

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OBJECTIVES: This in-vitro study aims to investigate the effect of different intraoral scanning strategies on the 3D trueness of digital scans of implant-supported restorations with different span lengths.

MATERIALS-METHODS: Four multi-unit no-hex multi-unit analogs were placed in a maxillary typodont model (master model) with different span lengths. A total of 30 scans were acquired with an intraoral scanner by altering the scanning strategy: (1) Scanning occlusal, buccal, and palatal aspects, respectively in a straight motion, (2) Scanning occlusal, buccal, and palatal aspects, respectively in a zig-zag motion, and (3) Scanning buccal, occlusal, and palatal aspects, respectively in a straight motion (n=10 for each strategy). The master model was rescanned by a highly accurate extraoral scanner to acquire the standard tessellation language (STL) file to serve as the reference STL. All experimental STLs along with reference STL were imported to a 3D analysis programme and superimposed to assess 3D trueness. Obtained data were statistically analyzed by using One-Way ANOVA and pairwise comparisons were done with Tukey Post Hoc test.

RESULTS: Although all test groups demonstrated acceptable angular and linear deviation values; Group 2 outperformed other groups in terms of 3D trueness (Angular deviation: 0.14 degrees, Linear deviation: 2.30 micrometers) ($P<0.05$). Higher deviation values were obtained in the region where the edentulous area was longer.

CONCLUSIONS: Scanning the occlusal, buccal, and palatal surfaces in a zig-zag pattern can be recommended as a reliable approach for implant-supported restorations. Since trueness improved as the length of the edentulous span decreased, the zig-zag scan pattern is more suitable for clinical situations involving shorter edentulous spans.

Keywords: Prosthodontics, CAD-CAM, Intraoral Scanning

SS-035 Complete-Arch Implant-Supported Monolithic Zirconia Fixed Dental Prostheses: A Case Series

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OBJECTIVE: Implant-supported prostheses are widely used for the rehabilitation of missing teeth. The use of monolithic zirconia fixed dental prostheses has increased in completely edentulous cases due to their durability and esthetics. This study presents three clinical cases in which full-arch fixed prosthetic rehabilitation was performed using multi-unit abutments and digital workflows.

MATERIALS-METHODS: Three edentulous patients were rehabilitated with full-arch implant-supported monolithic zirconia prostheses using JDentalcare implants. In all cases, digital impressions were taken using the Trios 5 intraoral scanner (3Shape Trios A/S, Copenhagen, Denmark). To achieve passive fit of the prostheses, dental photogrammetry was performed using the Icam4d System (İmetric).

Case Presentations:

• Case 1: The patient received four implants in the mandible and six in the maxilla. Both arches were restored using titanium-bar-supported monolithic zirconia prostheses.

• Case 2: Six implants were placed in both jaws. Full-arch, implant-supported monolithic zirconia prostheses were fabricated.

• Case 3: Similarly, six implants were placed in each arch. The patient was rehabilitated with full-arch zirconia fixed prostheses in both the maxilla and mandible.

RESULTS: All three cases demonstrated successful passive fit, functional stability, and patient satisfaction. The use of CAD/CAM technologies and photogrammetry contributed to efficient workflows and precise prosthetic outcomes.

CONCLUSION: Implant-supported monolithic zirconia prostheses are a promising option for the rehabilitation of completely edentulous patients. Their mechanical strength, esthetics, and biocompatibility make them a reliable short-term solution. However, long-term clinical and in vitro studies are needed to further validate their effectiveness and longevity.

Keywords: Full-arch prosthesis, Monolithic zirconia, Dental implants, Edentulism, Digital workflow, Photogrammetry

SS-037 Effect of Hexagonal Boron Nitride Addition on Mechanical Properties of Maxillofacial Silicone Elastomers

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PURPOSE: The aim of this study was to evaluate the effect of the addition of hexagonal boron nitride (h-BN) on the mechanical properties of maxillofacial silicone elastomers.

MATERIALS-METHODS: M511 (HTV) and VST-50 (RTV) silicones were used in our study. A total of 8 groups were formed for the two silicones, including a control group without nanoparticles and study groups containing 1, 2 and 3 wt% h-BN nanoparticles. A total of 160 samples were prepared, 10 samples (n=10) for each group and test method. Tear strength, tensile strength and elongation percentages of the specimens were evaluated. Data were analysed using Shapiro Wilk's, Kolmogorov Simirnov, Kruskal Wallis, Mann Witney U and Post-hoc pair-wise tests.

RESULTS: In terms of tensile strength, the highest average among the M511 groups belonged to the 2% h-BN group, while no statistically significant difference was found between groups; among the VST50 groups, the control group and the 1% h-BN group gave significantly higher results than the other groups. In the tear strength test, there was no significant difference between the groups for both silicones, while the highest average belongs to the control group for M511 and the group with 2% h-BN addition for VST-50. In the elongation percentage test, the highest average among the M511 groups belongs to the 1% h-BN group and the highest average among the VST-50 groups belongs to the control group; however, no statistically significant difference was found between groups for both silicones.

CONCLUSION: The combination of VST-50 silicone with nanoparticle did not significantly affect the tear strength and elongation percentage values, while the addition of 2% and 3% h-BN decreased the tensile strength. The addition of h-BN nanoparticle to M511 silicone did not significantly change mechanical properties. VST-50 silicone showed significantly higher results than M511 silicone in all mechanical tests.

Keywords: Maxillofacial silicone elastomer, hexagonal boron nitride nanoparticle, elongation percentage, tear strength, tensile strength.

SS-038 Determination of the Incidence of Patients with Missing Teeth According to the Kennedy Classification

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OBJECTIVES: The aim of this study is to examine the distribution of partial edentulism types according to the Kennedy classification in patients with missing teeth and to evaluate the prosthetic treatment needs of the community. Additionally, the relationship between Kennedy classes and age and gender is analyzed to provide guiding data for prosthetic planning.

MATERIALS-METHODS: The panoramic radiographs of 1200 patients who referred to the Department of Prosthodontics at Atatürk University Faculty of Dentistry in the past two years were examined, and 500 patients were retrospectively included in the study. Patients' age and gender information were recorded, and partial edentulism status was evaluated according to the Kennedy classification for both the upper and lower jaws. Data were analyzed using SPSS 27 software. The relationships between categorical variables were evaluated using Pearson Chi-Square and Fisher's Exact tests, with $p<0.05$ considered statistically significant.

RESULTS: 54.4% of the patients were female, and 45.6% were male. The most common classification in the maxillar was Kennedy Class 3, observed in 57% of cases. In the mandibular, Kennedy Class 3 was also the most common, seen in 44.7% of cases. No significant difference was found between Kennedy classification and gender ($p>0.05$). However, a significant relationship was observed between age groups and Kennedy classification for both arches ($p<0.001$). In younger age groups, Class 3 was dominant, whereas in older age groups, Classes 1 and 2 were more prevalent. Furthermore, a significant correlation was found between the classifications of the maxilla and mandibular arches ($p<0.001$).

CONCLUSION: The Kennedy classification is an important tool in evaluating partial edentulism and in prosthetic treatment planning. The significant relationship with age highlights the need for early diagnosis and treatment planning.

Keywords: Gender, denture, partial classification

SS-039 The Effect Of Different Surface Finishing Procedures On The Color And Translucency Of Monolithic Zirconia After Low Temperature Degradation

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AIM: This study aimed to evaluate the in vitro effects of different surface finishing procedures and hydrothermal aging on the color and translucency of two types of monolithic zirconia materials.

MATERIALS-METHODS: Specimens were prepared from 4Y-TZP and 5Y-TZP zirconia blocks (Vita YZ ST and Vita YZ XT, Vita Zahnfabrik, Germany) with dimensions of 15 mm in diameter and 1.2 mm in thickness (n=120). After sintering, the samples were divided into three subgroups based on the applied surface treatments: polishing, glazing, and polishing followed by glazing. Half of the specimens underwent hydrothermal aging at 134°C and 0.2 MPa for 10 hours. Color measurements were recorded in white and translucency measurements were recorded on white and black backgrounds using the CIEDE2000 formula and the difference between color and translucency was calculated. Data were analyzed using three-way ANOVA, robust ANOVA, and Bonferroni-adjusted multiple comparisons ($p<0.05$).

RESULTS: Surface finishing and hydrothermal aging significantly influenced the color values of monolithic zirconia specimens ($p<0.05$). The type of zirconia material significantly affected translucency ($p<0.05$), while surface treatments and hydrothermal aging had no significant impact on translucency values ($p>0.05$). The glazed groups demonstrated color stability below the clinically perceptible threshold ($\Delta E<0.8$), whereas polishing and polishing+glazing groups exhibited differences within clinically acceptable ranges ($0.8<\Delta E<1.8$). All changes remained within clinically acceptable limits.

CONCLUSION: Glazing after hydrothermal aging resulted in better color and translucency properties compared to polishing alone. Thus, glazing can be recommended as the preferred surface finishing procedure for monolithic zirconia restorations, although polishing and polishing+glazing also produced clinically acceptable outcomes.

Keywords: Monolithic Zirconia, Surface Finishing Process, Color Differences, Translucency, Hydrothermal Aging.

SS-040 Assessing the Permanence of 3D-Printed Resin Composite Posterior Fixed Dental Prostheses: A 3-Year Prospective Clinical Trial

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OBJECTIVES: This clinical trial aimed to assess the clinical performance of 3D-printed resin composite fixed dental prostheses (FDPs) for posterior restorations.

MATERIALS-METHODS: From October 10, 2020, to August 5, 2022, a total of 49 patients (33 females and 16 males), aged 19 to 60, were treated with 68 three-unit 3D-printed resin composite posterior FDPs (ELS Even Stronger, Saremco, Switzerland). Two weeks after placement, the FDPs were evaluated by two independent observers using modified FDI criteria. Parameters assessed included anatomical form, secondary caries, marginal adaptation, surface roughness, color match, material fracture, surface staining, margin staining, anatomical form, retention, gingival health, and patient satisfaction. The mean observation period was 22.36 months. Failures were classified as either mechanical or biological.

RESULTS: Of the 40 failed FDPs, 36 exhibited mechanical failures, while 6 exhibited biological failures (2 cases exhibited both and were counted in both categories). Thirty-four FDPs showed cohesive fractures. Two FDPs were re-bonded due to retention failure. Four abutment teeth required endodontic treatment, and two exhibited periodontal issues. Additionally, 2 FDPs exhibited a loss of surface luster, 4 exhibited color mismatches, and 4 exhibited surface staining (all scored 4). Kaplan-Meier analysis revealed a 40.7% survival rate for mechanical failures and a 36.2% survival rate when biological complications were included.

CONCLUSIONS: The results of a three-year follow-up study indicated that 3D-printed resin composite FDPs present failures mainly in the connector region, suggesting the need for further design improvements.

Keywords: additive technologies, clinical trial, dental materials, composite 3-unit posterior FDPs, survival, 3D-printed restorations

SS-042 In vitro evaluation of bond strength, sorption, and solubility of the cleanser's effects on 3D-printed prosthesis bases

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OBJECTIVES: The aim of this study was to investigate the tensile bond strength and weight characteristics of hard- and soft-liner materials applied to 3D printed denture bases, as well as to evaluate the effects of various cleaning solutions on these properties.

MATERIALS-METHODS: In this study, 3D printed denture base models were fabricated and treated with both hard- and soft-liner materials. Different cleaning solutions (sodium hypochlorite, hydrogen peroxide, distilled water, acetic acid, and chemical denture cleanser) were applied to the samples. The tensile bond strength between the liner materials was measured using a pull test, and the water absorption and solubility of the materials were also assessed. Tensile strength, water absorption, and solubility tests were performed, and the obtained data were analyzed by two-way ANOVA ($p<0.05$).

RESULTS: The hard-liner material (364.48 ± 124.16 MPa) exhibited a significantly higher tensile bond strength than the soft-liner material (49.45 ± 9.75 MPa). Among the cleaning solutions, the chemical denture cleanser (248.99 ± 206.82 MPa) provided the highest tensile bond strength, while sodium hypochlorite (172.00 ± 168.12 MPa) resulted in the lowest tensile bond strength. In the water absorption and solubility tests, the soft-liner material demonstrated higher water absorption (0.77 ± 0.07) and solubility (2.83 ± 2.75) values. Distilled water had the highest water absorption values (1.58 ± 1.04), whereas sodium hypochlorite (3.89 ± 3.72) increased solubility.

CONCLUSIONS: The selection of appropriate cleaning solutions for 3D-printed denture bases and liner materials significantly impacts prosthesis durability, with hard-liner materials offering higher bond strength and different cleaning solutions affecting water absorption and solubility.

Keywords: Hard Liner, Soft Liner, Cleaning Solutions, Tensile Bond Strength, Water Absorption, Water Solubility

SS-043 Effect of Finishing Procedures and Adhesive Cement Shades on the Optical Properties of Monolithic Zirconia

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OBJECTIVES: The aim of this study was to evaluate the effects of different surface finishing procedures and resin cement shades on the optical properties of monolithic zirconia blocks with varying levels of translucency.

MATERIALS-METHODS: A total of 120 disc-shaped specimens (15 × 1.2 mm) were fabricated from two monolithic zirconia materials (5Y-TZP(Vita YZ XT, Vita Zahnfabrik) and 4Y-TZP(Vita YZ ST, Vita Zahnfabrik)). After the sintering process, the samples were subjected to 3 different surface treatments: glaze, polishing and polishing after glaze.Initial color was measured with a dental spectrophotometer (VITA Easyshade V; VITA Zahnfabrik), and recorded based on the CIE Lab* system. Two resin cement shades, Universal A2 and Translucent TR (RelyX U200, 3M ESPE), were standardized to 0.2 mm thickness. Secondary color measurements were taken by placing cement samples under the untreated surfaces of the zirconia specimens. The data were statistically analyzed using three-way ANOVA and Tukey's *post hoc* tests ($p<0.05$).

RESULTS: The mean color difference values (ΔE_{00}) showed statistically significant differences with zirconia type, surface treatment, and resin cement shade ($p<0.05$).Polishing after glazing exhibited significantly higher ΔE_{00} values (1.60 ± 0.27) compared to the other surface treatment groups. ST blocks demonstrated higher ΔE_{00} values (1.56 ± 0.30) than the XT blocks (1.44 ± 0.25).The translucent cements resulted in higher ΔE_{00} values (1.57 ± 0.33) than the universal cements (1.42 ± 0.20). A significant interaction was observed between block type and surface treatment ($p<0.05$),whereas other interactions were not statistically significant ($p>0.05$).

CONCLUSIONS: This study demonstrated that the optical stability of monolithic zirconia is significantly affected by the zirconia block type, surface treatment and resin cement shade. All values were within the 1.8 acceptability threshold (clinical perceptibility: 0,8) except for the ST block,polishing and translucent cement combination (1.82 ± 0.36). Thus, proper choice of zirconia, surface treatment, and cement shade ensures optimal esthetics. "This study was supported by the Scientific Research Projects Coordination Unit of Ordu University."

Keywords: monolithic zirconia, resin cement, surface finishing, color

SS-044 Advanced Prosthetic Rehabilitation with Maxillary Subperiosteal Implants: Clinical Application of Monolithic Zirconia and Titanium Bars

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INTRODUCTION: Maxillary subperiosteal implants are a valuable treatment option for patients with severe alveolar ridge atrophy who have contraindications to conventional endosseous implants. Recent advances in digital planning and modern materials have significantly improved the predictability and longevity of these treatments, making them more reliable for complex rehabilitations.

Case description: Two elderly patients (male: 67 years; female: 77 years) presenting with severe maxillary atrophy and contraindications to bone grafting were managed using custom-made subperiosteal implants. In both cases, digital workflows were employed for the precise design and custom manufacturing of patient-specific titanium frameworks, ensuring optimal implant placement and fit. During surgery, immediate loading was performed by placing a screw-retained temporary prosthesis. Following a healing period, definitive prostheses were fabricated using monolithic zirconia supported by a titanium substructure. The prosthetic design was individualized to optimize occlusion, aesthetics, and patient comfort. Both patients showed stable clinical outcomes and high satisfaction during follow-up visits.

DISCUSSION: These cases highlight the prosthetic considerations and advantages of subperiosteal implants in challenging maxillary rehabilitations. The fully digital workflow facilitated precise implant adaptation, accurate prosthetic fit, and reduced treatment time. Immediate loading with temporary prostheses enabled early function and guided soft tissue healing. The combination of a titanium framework and monolithic zirconia provided a durable, hygienic, and aesthetically superior definitive restoration, minimizing complications such as chipping or fracture. Careful prosthetic planning, including occlusal scheme, passive fit, and hygienic design, was essential for long-term success. These findings support subperiosteal implants as a viable solution for selected cases where conventional approaches may be limited.

Keywords: Subperiosteal Implants, Dental Prosthesis, Implant-Supported, Computer-Aided Design

SS-045 The knowledge performance of Chatgpt and Abacus AI applications in the dental specialty examination

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OBJECTIVES: This study investigates the applicability of artificial intelligence (AI) in dentistry by evaluating the performance and accuracy of two different AI-based conversational agents in answering Dentistry Specialization Examination (DUS) questions.

MATERIALS-METHODS: Chat Generative Pre-trained Transformer (ChatGPT) artificial intelligence robot was accessed via Scholar GPT-4 Plus version at https://chatgpt.com and Abacus AI artificial intelligence robot was accessed via https://apps.abacus.ai/chatllm and a total of 120 multiple-choice DUS questions were asked to both on April 20, 2025. To minimize access to external answer sources, the questions were asked on the same day the examination was conducted, before official answer keys were publicly released. Each response was recorded and, if incorrect, categorized into one of three error types: logical error (available information misinterpreted), knowledge error (lack of essential or contextual knowledge), or statistical error (numerical or computational inaccuracy). The data were analyzed using McNemar's and Kappa tests, with significance at $p<0.05$.

RESULTS: ChatGPT correctly answered 104 out of 120 questions, achieving an accuracy rate of 86.7%. Abacus AI answered 102 questions correctly, and reached an accuracy rate of 85%. Based on the DUS score calculator (https://dus-puan.hesaplama.net) and the 2024 Autumn Term DUS, scores for ChatGPT were 77.74871 for basic sciences and 74.97373 for clinical sciences. For Abacus AI, scores were 76.34584 and 73.69612, respectively. There was a statistically significant difference between the correct answer rates of both artificial intelligence robots (McNemar's test value=0.185, Kappa coefficient=0.833, and p=0.0001). For both artificial intelligence applications, it was observed that the incorrect answers were mostly due to knowledge errors and both applications tended to choose option E for incorrect answers.

CONCLUSIONS: The high correct information statistics indicate that ChatGPT and Abacus AI can be tools that can be used for accessing information in the field of dentistry, though their limitations in misinformation must be addressed.

Keywords: artificial ıntelligence, clinical competence, dental education, natural language processing, evidence-based dentistry

SS-046 Glass fiber incorporation and toothbrushing effect on the color stability of 3D -printed crown material

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PURPOSE: In recent years, the use of 3D printing technologies, which offers simpler, faster and more precise production opportunities compared to traditional dental restoration production processes, has increased in dentistry. The aim of this study was to evaluate the effect of glass fiber incorporation and toothbrushing on the color stability of 3D-printed permanent crown material reinforced with different glass fiber ratios by weight.

MATERIALS-METHODS: Forty disc-shaped (10x2 mm) specimens were 3D-printed using a ceramic filled hybrid permanent crown material reinforced with glass fibers ratios of none (Cnt), 1%, 1.5% and 2% by weight, respectively (n=10). The specimens were polished with a two-stage finishing and polishing system, then the color parameters (L0, a0, b0) were measured. After 3, 6, and 12 months of simulated toothbrushing cycle procedures, the color parameters of specimens were measured again. The color differences (ΔE_{00}) between values measured at pre- and post-toothbrushing procedures were calculated. ΔE_{00} values were statistically analyzed using repeated-measure ANOVA and Tamhane T2 post-hoc tests (α=0.05).

RESULTS: According to ANOVA results, glass fiber reinforcement and simulated toothbrushing cycle variables were significant on ΔE_{00} values ($p<0.05$). In most of the test groups, ΔE_{00} values were found to be within the perceptibility and acceptability threshold ranges ($0.8< \Delta E00 \leq 1.8$). According to the pooled ΔE_{00} value comparisons, 1% glass fiber reinforced (0.91 ± 0.29) and 1.5% glass fiber reinforced (1.10 ± 0.23) groups were statistically different ($p<0.05$). Also, significant differences were determined between all pooled toothbrushing cycle groups ($p<0.05$).

CONCLUSION: As the duration of toothbrushing application increases, the color difference of the glass fiber reinforced 3D-printed crown materials may increase but this effect is lower than the clinically unacceptable level. Color difference values may rise with higher ratios of glass fiber reinforcement.

Keywords: 3D Printing, Color, Dental Crown, Glass Fiber, Toothbrushing

SS-047 Mechanical Comparison of CAD/CAM Restoratives and Abutments: Cercon xt ML, E.max CAD, VITA Enamic

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OBJECTIVE: This study aimed to compare the mechanical performance of three CAD/CAM restorative materials—Cercon xt ML, E.max CAD, and VITA Enamic—in combination with two abutment types (tibase and cement-retained) using finite element analysis (FEA). The goal was to evaluate stress distribution and structural resistance under functional loads and provide clinical recommendations.

METHODS: A maxillary jawbone was modeled in SolidWorks, and a single implant (3.7 mm × 12 mm) was placed in the site of tooth #16 using data from Bilimplant. The prosthesis was designed with Exocad software, and STL files were converted to STP files in SolidWorks. The final models were transferred to ABAQUS for FEA. Three restorative materials were combined with both abutment types and analyzed under a simulated vertical chewing force of 600 N. Stress distribution was measured using Von Mises Stress (VMS) values.

RESULTS: Cercon demonstrated the lowest stress values in implant, abutment, and screw components, indicating superior mechanical protection. Vita Enamic showed the highest stress in all regions. Ti-base connections significantly reduced stress in the cement layer compared to cement-retained abutments. Among crown materials, Cercon exhibited the highest internal tensile stress, followed by E.max and then Vita. The Cercon and Ti-base combination provided the most balanced biomechanical performance.

CONCLUSION: Materials with high elastic modulus, such as Cercon and E.max, enhance stress distribution in implant-supported systems. Ti-base abutments reduce stress in the cement layer, improving long-term stability. The Cercon-Ti-base combination was the most favorable in terms of mechanical performance and failure resistance

Keywords: Cercon xt ML, E.max CAD, VITA Enamic, Finite element analysis (FEA), CAD/CAM restorative materials

SS-048 The Influence of Different Scan Body Heights and Intraoral Scanners on the Accuracy of Digital Implant Impressions

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OBJECTIVES: This in vitro study assessed the impact of scan body height and intraoral scanner type on the trueness of digital implant impressions in partial fixed implant-supported prostheses.

MATERIALS-METHODS: Polyurethane models replicating a partially edentulous maxillary arch were fabricated with surgical guides to standardize implant placement. Tall scan bodies (TSB) and short scan bodies (SSB) were torque-mounted onto implants. Abutment-level scan bodies were attached at sites 16 and 14, while implant level scan bodies were placed at sites 24 and 26. A laboratory reference scan was acquired using the industrial scanner. Each model underwent 15 digital impressions with two intraoral scanners (3S and MD). All STL-files were imported in 3D analysis software to quantify angular and linear deviations of SB's, RMS values, and both linear and angular inter-implant distances. Statistical analyses comprised one-way and robust ANOVA with Bonferroni *post hoc* tests, setting significance at $p < 0.05$.

RESULTS: The 16 SB, scanner type had a significant effect on both angular and linear deviation values. 3S demonstrated higher accuracy than MD. For the other SB's, neither SB height nor intraoral scanner type had a significant effect ($p > 0.05$). For RMS values, only in the "model RMS" regions did 3S show higher accuracy than MD. Inter-implant linear deviation values were affected only at the abutment level by both scanner type and SB height, with accuracy ranked as TSB > SSB and 3S> MD. Inter-implant angular deviation values at the abutment level for TSB >SSB. Scanner effect was not significant.

CONCLUSIONS: Scanner type, scan body height, and SB level partially affect measurement accuracy. At the implant level, SBs located in the free-end posterior region exhibit lower accuracy. The effect of the scanner is not significant.

Keywords: Trueness, Accuracy, Scan body deviation, IOS, Scan body height

SS-049 Evolving Aesthetic Perception in Dental Students Across Academic Years

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OBJECTIVES: This study aimed to assess changes in aesthetic perception among dental students from different academic years. It investigated how dental education influences students' ability to evaluate specific facial and dental aesthetic parameters.

MATERIALS-METHODS: A total of 250 participants were included, with 50 students from each academic year. Sample images obtained from male and female models were modified according to predetermined aesthetic parameters and were presented to the participants. In order to objectively assess the evolving aesthetic perception based on their education level, no information about the photographs was provided to the participants. The participants were asked to evaluate these photographs using the Visual Analog Scale (VAS). The data were analyzed using IBM SPSS V23 software. The normality of the data distribution was assessed using the Kolmogorov-Smirnov test. VAS scores that did not meet the normal distribution criteria across different academic years were compared using the Kruskal-Wallis test, and pairwise comparisons were performed using Dunn's test. Within each academic year, the VAS scores of photographs that did not meet normal distribution criteria were compared using the Friedman test, followed by pairwise comparisons with Dunn's test.

RESULTS: Diastema was the most readily recognized aesthetic discrepancy across all years. Midline deviations were not perceived as significantly different by first- and fifth-year students. Fifth-year students more frequently identified increased buccal corridor ratios. Gummy smiles were consistently evaluated as aesthetically unfavorable by students in all academic years.

CONCLUSIONS: The findings show that aesthetic perception improves during dental education. However, it was observed that negative perception towards some aesthetic features such as gingival smile continued consistently at all grade levels. The results obtained reveal that contemporary dental education plays an important role in the development of aesthetic perception.

Keywords: Dental Esthetics, Dental Education, Visual Perception, Dental Students

SS-050 A Comparative Evaluation of TMJ Vibration Analysis and DC/TMD-Forms In The Diagnosis of Temporomandibular Disorders

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OBJECTIVES: The aim of this study is to comparatively evaluate the diagnostic effectiveness of two different methods used in the assessment of temporomandibular disorders (TMD): temporomandibular joint (TMJ) vibration analysis and the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) forms.

MATERIALS-METHODS: This cross-sectional study was conducted at the Dental Clinic of Gazi University, Department of Prosthodontics, and included 50 randomly selected patients. DC/TMD Axis I criteria were used to assess pain and TMJ disorders clinically. Joint sounds were evaluated using Joint Vibration Analysis (BIO-JVA). Categorical variables were compared using Chi-square analysis (Fisher's Exact Test). Statistical analyses were performed with IBM SPSS v.21, using a significance level of $\alpha = 0.05$. Ethical approval was obtained from the Gazi University Ethics Committee.

RESULTS; In this study involving 50 patients with a mean age of 50.82 ± 10.58 years, 13 (26%) were female and 37 (74%) were male. No statistically significant difference was observed between the DC/TMD Axis I diagnoses and the TMJ Vibration Analysis (BIO-JVA) results for either the right or left TMJ ($p > 0.05$).According to DC/TMD Axis I, most patients were classified as "normal" or diagnosed with disc displacement with reduction (DDR). Consistently, the BIO-JVA results most commonly revealed Class 3a vibrations, indicative of mild to moderate joint dysfunction.

CONCLUSIONS: Although both diagnostic tools individually provide valuable insights into the clinical and functional evaluation of temporomandibular disorders, the absence of statistical association suggests they may assess different aspects of TMJ pathology. Therefore, combining DC/TMD clinical forms with TMJ vibration analysis could offer a more comprehensive diagnostic approach, improving clinical decision-making in TMD assessment and management.

Keywords: Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), Vibration Analysis, Temporomandibular Joint, Cross-Sectional Studies

SS-051 Evaluation of Canine and Molar Occlusal Contact on Maxillomandibular Relationship Accuracy in 3D-Printed Model

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OBJECTIVE: The aim of this study is to evaluate the effect of the presence or absence of occlusal contact in the canine and molar regions on the accuracy of the maxillo-mandibular relationship in additively manufactured resin models.

MATERIALS AND METHODS: This study was conducted through the analysis of digital data obtained under in vivo conditions. In total, records of 52 patients undergoing fixed partial prosthetic treatment in the posterior regions of both the maxilla and mandible were included. Digital scans of the upper and lower jaws, along with maximum intercuspal position (MIP) bite registrations, were obtained using two different intraoral scanners. Standard 3D-printed resin models were fabricated based on the scan data Each model was re-scanned using the same intraoral scanner initially used, and both intraoral and model STL data were transferred to a metrology analysis software. The STL datasets were categorized based on the presence or absence of tooth preparation in the canine and molar regions. The deepest anatomical points on the buccal surfaces of the upper and lower canines and molars were digitally marked as reference points. The distances and deviations between these points were measured. Statistical analysis was performed using the Kruskal–Wallis test and the post-hoc DSCF test. **RESULTS:** The presence of tooth preparation had a statistically significant effect on occlusal accuracy regardless of tooth region (canine/molar) or scanner type ($p<0.01$). Neither scanner type nor tooth region had a statistically significant impact ($p>0.23$).

The mean deviation was recorded as 79 microns in prepared areas, while it was 56 microns in non-prepared regions.

CONCLUSION: Regardless of whether the contact occurred in the canine or molar regions, the presence of occlusal contact significantly affected the accuracy of maxillo-mandibular bite registration. This finding should be clinically considered, especially in full-arch restoration planning, where a stable occlusal relationship is critical.

Keywords: Bite Registration, Intraoral Scanner, Maxillomandibular Relationship, Occlusal Contact, Additive Manufacturing

SS-053 This study aimed to evaluate the impact of different scanning methods on the accuracy of interocclusal records using the intraoral scanner

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This in vivo study included 20 participants (10 males, 10 females) with normal occlusion and no signs of periodontal or temporomandibular dysfunction. Each participant received two bite scans using the same number of scanned teeth: Group 1 involved a bite scan captured at the moment the snap sound was heard, while in Group 2, the bite scan was captured with three times the number of images after the snap sound. As a clinical reference, conventional impressions of the upper and lower jaws were taken with addition silicone material. A centric occlusion record was obtained to articulate the casts on a semi-adjustable articulator. The mounted casts were scanned using a high-accuracy desktop scanner to generate a reference STL model representing the natural occlusion. All TRIOS and reference models were analyzed in Geomagic Control X (3D Systems, USA). Superimposition was performed based on clinically relevant contact points such as incisal edges, canines, and molar cusps. Root Mean Square (RMS) values were calculated to evaluate dimensional accuracy. Statistical analysis was conducted using SPSS version 27.0 (IBM Corp., Armonk, NY, USA). Repeated Measures ANOVA was used to compare RMS values among the three conditions. Mauchly's test of sphericity and Greenhouse-Geisser corrections were applied as needed. Post-hoc comparisons were performed using the Bonferroni method with a significance threshold of $p < 0.05$. As a result, Group 2, which involved three times the number of images after the snap sound, showed increased RMS deviations. This suggests that excessive image acquisition may reduce accuracy, likely due to mandibular movement or misalignment. Increasing the number of images after the snap sound did not improve and may even reduce the accuracy of digital bite registration.

Keywords: Intraoral scanner, Bite registration, Interocclusal record, 3D superimposition

SS-054 Effect of different brushing forces on optical and surface properties of multilayered monolithic zirconia materials

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PURPOSE: The purpose of this in vitro study was to evaluate the effects of different toothbrushing forces (2.5 N, 3.5 N, and 4.5 N) on the surface roughness, translucency, color stability, and metamerism of polychromatic multilayered monolithic zirconia materials with varying yttrium content.

MATERIAL-METHODS: A total of sixty square-shaped (14×14×1 mm, A2 shade) specimens were prepared from two different multilayered monolithic zirconia materials; Perfit Zr STML [P] (M4Y, polychromic multilayer and uniform composition) and Upcera Explore Functional [U] (M3Y-4Y, polychromic multilayer and hybrid composition). All specimen surfaces were glazed and specimen groups were divided into three subgroups according to different toothbrushing forces [(P2 (2.5 N), P3 (3.5 N), P4 (4.5 N), U2 (2.5 N), U3 (3.5 N), and U4 (4.5 N)] (n=10). Surface roughness (Ra), translucency parameter (TP), color change (ΔE_{00}), and metamerism were evaluated before and after 10,000 cycles of simulated toothbrushing based on specimen values. Data were statistically analyzed by two-way analysis of variance (ANOVA) and Tukey's HSD tests.

RESULTS: No statistically significant difference was observed between the specimen groups in terms of surface roughness before and after toothbrushing. All ΔE_{00} values remained within clinically acceptable limits (≤1.8). Although ΔE_{00} values increased with brushing force in both material groups, the difference between all Perfit material groups and U3 and U4 test groups were statistically significant ($p<0.05$). The P3 group showed the highest translucency after toothbrushing (TP1=7.033). After brushing, the U3 specimen group presented

the highest metamerism values and the difference between this group and the other test groups was statistically significant ($p<0.05$).

CONCLUSIONS: Toothbrushing with increased application load reduced translucency and caused limited discoloration and metamerism on both zirconia materials. The polychromic multilayer and uniform composition monolithic zirconia may provide better long-term esthetic performance in clinical conditions.

Keywords: Monolithic Zirconia, Toothbrushing, Color, Translucency, Surface Roughness

SS-055 Benchmarking of Different Natural Language Processing Models for the Implant-Supported Prostheses Regarding Accuracy

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OBJECTIVES: Currently, artificial intelligence tools are prevalent in many disciplines, including prosthodontics. The aim of this study was to compare the accuracy of responses generated by four natural language processing (NLP) models in both their Large Reasoning Model (LRM) and Large Language Model (LLM) software programs in response to questions regarding implant-supported prostheses.

MATERIALS AND METHODS: A total of 12 open-ended questions in Turkish related to implant-supported prostheses were created and posed to 8 different NLPs: OpenAI o4-mini-high (OO), OpenAI GPT 4.5 (OG), Google Gemini 2.5 Pro (GP), Google Gemini 2.5 Flash (GF), DeepSeek R1 (DR), DeepSeek V3 (DV), Kimi-VL (KV), and Kimi-72B (KB) with pre-prompt. The responses were evaluated by two prosthodontists with a holistic rubric; the concordance between the graders' responses was calculated using Kendall's Tau-b and Spearman's rho correlation analysis. The Mann-Whitney U and the Kruskal-Wallis tests were performed to evaluate the data ($p <.05$).

RESULTS: The results indicated no statistically significant differences in response accuracy between the LLM and LRM versions of OpenAI ($p =.688$), Google Gemini ($p =.418$), and DeepSeek ($p =.680$). Nevertheless, a statistically significant difference was observed between the LLM and LRM versions of Kimi ($p =.001$). According to multiple comparisons between the LLM and LRM groups, significant differences were found within both the LLM group ($p =.016$) and the LRM group ($p =.001$). The highest accuracy was found in GF (66.7%), whereas KV (0%) showed the lowest accuracy.

CONCLUSIONS: Within the limitations of this study, the performance regarding implant-supported prostheses that OpenAI, Google Gemini, and DeepSeek showed similar accuracy in both their LLMs and LRMs. In contrast, Kimi demonstrated lower accuracy in both versions. These findings highlight the need for updates to chatbot software programs, and clinicians should remain aware of their current limitations.

Keywords: Artificial intelligence, large language models, prostheses and implant.

SS-056 The effect of thermal aging on the hardness of cleaned polymethyl methacrylate

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OBJECTIVES: Cleaning removable dentures, commonly used by elderly patients, is essential for preserving their structural properties. Denture cleaning tablets have been introduced to simplify and speed up this process. However, the duration of tablet use may impact the physical characteristics of the denture base material. One common issue is the increase in material hardness over time, which can lead to brittleness and fracture. This study aims to compare the hardness of denture base materials treated with cleaning tablets for varying durations and subjected to thermal cycling to simulate clinical conditions.

MATERIALS-METHODS: Twenty rectangular polymethyl methacrylate (PMMA) specimens (3 mm thick) were fabricated using the flasking method. After finishing and polishing, initial hardness measurements were taken. The specimens were divided into four groups (n=5) based on immersion medium (distilled water or cleaning tablet) and exposure time (3 minutes, 15 minutes, 8 hours). All specimens were then subjected to 5000 thermal cycles, simulating oral temperature changes. Post-treatment hardness values were measured. One-way ANOVA and Bonferroni tests were used for group comparisons, and paired t-tests were used for within-group comparisons.

RESULTS: No significant differences in hardness were observed between groups before thermal cycling (p = 0.594). However, after thermal cycling, a significant difference was found among the groups (p = 0.007). The group exposed to denture cleaning tablets for 8 hours showed significantly higher hardness than the distilled water group (p = 0.005).

CONCLUSIONS: Prolonged exposure to denture cleaning tablets can increase the hardness of denture base materials, potentially affecting their long-term durability. Clinicians should inform patients about appropriate usage durations and consider these effects when recommending cleaning products and routines.

Keywords: hardness, acrylic resins, thermal cycling, denture cleanser

SS-057 Clinical survival of lithium disilicate cantilever resin-bonded fixed dental prosthesis

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INTRODUCTION: The lack of maxillary incisors can be an aesthetic concern for patients, resulting in social and psychological suffering. A minimally invasive treatment option is an adhesively luted lithium disilicate cantilever resin-bonded fixed dental prosthesis (RBFDP). The purpose of this study was to investigate whether this treatment option is durable in different cantilever configurations: veneer wing (VC), palatal wing (PC), contact-point (CC).

MATERIALS-METHODS: This retrospective observational study evaluated 35 patients with 49 restorations divided into three groups: VC (n = 17), PC (n = 12) and CC (n = 20) cantilever RBFDPs. Survival was visually assessed and the influence of static and dynamic occlusion on survival was examined with 40 µm articulation paper. Quality of survival was assessed according to modified United States Public Health Service (USPHS) criteria. Impact on the Oral Health Related Quality of Life (OHRQoL) was measured before and after treatment and at the time of evaluation with an OHIP-14 questionnaire.

RESULTS: Survival rates for VC, PC and CC groups were 88.2%, 100.0% and 100.0% after a mean evaluation period of 47.7 months, respectively, with no significant difference (p =.17). Involvement in static and/or dynamic occlusion had no significant impact on survival (p =.16). Quality assessment according to USPHS criteria showed changes, but no significant difference between the three groups (p =.83). OHIP-14 scores significantly decreased after treatment (p <.001) and at evaluation (p <.001).

CONCLUSION: The three configurations of cantilever RBFDPs appear to be a good treatment option to restore a missing maxillary incisor. Treatment with the cantilever RBFDPs improved the OHRQoL of the patients.

Keywords: cantilever, RBFDP, veneer wing, palatal wing, contact point, clinical research

SS-058 Evalution of Bond Strength Between Reline Materials and Denture Bases Manufactured by Different Techniques

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This study aimed to compare the tensile bond strength of various reline materials applied to denture base resins fabricated by three techniques: conventional heat-polymerized polymethyl methacrylate (PMMA), CAD-CAM milled PMMA and 3D-printed resin. The impact of liner type and manufacturing method on bond performance was investigated. Nine groups were formed by combining three denture base manufacturing techniques with three reline materials: a laboratory-processed silicone-based soft liner (Molloplast B), a chairside-applied silicone soft liner (GC Reline Soft II) and a chairside hard liner (Ufi Gel Hard C). The denture base materials were a conventional heat-polymerized PMMA (Megacryl Hot, Vertex-Dental), a CAD-CAM milled PMMA (Voco Ceditec) and a 3D-printed resin (Arma Print Resin, Arma Dental). A total of 90 specimens were subjected to tensile bond strength testing using a universal testing machine. Failure modes were analyzed and classified. Statistical analysis was conducted with SPSS 28.0 using ANOVA, Kruskal-Wallis, and *post hoc* tests. Significant differences were found among the groups (p<0.001). The highest bond strength was observed in the Ufi Gel Hard C–conventional PMMA group (12.56 ± 2.21 MPa), while the lowest was in the GC Reline Soft II–3D printed group (1.28 ± 0.16 MPa). All values exceeded

the clinically acceptable threshold of 0.44 MPa. Laboratory-processed liners showed superior bonding. Adhesive failures predominated in the 3D-printed groups, whereas cohesive or mixed failures were more common in the conventional and milled groups. Reline material type and manufacturing technique both had a significant effect on bond strength. Among the relining materials, GC Reline Soft II consistently showed the lowest bond strength values. Hard chairside liners exhibited stronger bonding than soft liners, especially when combined with conventionally polymerized PMMA. Among denture bases, 3D-printed bases demonstrated the weakest bonding performance, highlighting the need for optimized surface treatments to ensure long-term clinical success.

Keywords: Denture Bases, Denture Liners, 3D Printing, CAD-CAM, Additive Manufacturing, Subtractive Manufacturing

SS-059 Micro-computed tomography evaluation of canal adaptation of 3D posts fabricated using canal dimensions obtained from different digital measurement devices

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PURPOSE: The objective of this study is to evaluate the internal canal adaptation of posts fabricated using 3D printing techniques, based on canal dimensions acquired through various digital measurement methods. Micro-computed tomography (micro-CT) analysis was employed to assess the internal fit.

MATERIAL-METHODS: Following root canal shaping, 7 mm deep post space preparations were performed on 35 extracted human mandibular premolar teeth. Based on the digital measurement technique employed, the specimens were divided into five groups (n = 7): direct impression using iTero Element 2, direct impression using Trios 3, indirect impression using iTero Element 2, indirect impression using Trios 3 and indirect impression using Vinyl UXD. Post designs for all specimens were created using the Exocad DentalCAD virtual design software. The posts were fabricated using the Asiga Max UV 3D printer. For the printing process, a resin-based material, Saremco Print Crowntec, was used. The cementation of the posts was performed using Panavia SA Cement Plus. All samples were scanned with a high-resolution micro-computed tomography device operating at 85 kV and 118 µA, with a voxel size of 13.68 µm, 180° rotation, and an exposure time of 2600 ms. The internal canal adaptation of the posts was analyzed using the resulting micro-CT data.

RESULTS: Posts fabricated based on indirect measurements obtained through conventional impressions scanned with the Vinyl UXD extraoral scanner demonstrated superior internal adaptation to the post cavity. Micro-computed tomography analysis revealed that this group showed statistically significant differences in canal adaptation when compared with the groups that utilized direct digital impressions and other indirect digital methods ($p = 0.028$, $p = 0.043$; $p < 0.05$).

CONCLUSIONS: Among the evaluated measurement techniques, the method based on scanning conventional resin impressions with an extraoral scanner resulted in the highest internal canal adaptation of the 3D-printed posts.

Keywords: 3D Post, Digital Measurement, Micro-Computed Tomography

SS-060 Rehabilitation of a patient with gummy smile and polydiastema using digitally fabricated monolithic zirconia restorations

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INTRODUCTION: This case report presents the prosthetic rehabilitation of a 26-year-old female patient with a deep bite, excessive gingival display and polydiastema. Monolithic zirconia restorations were fabricated using a fully digital workflow, integrating esthetic and functional planning.

Case description: The patient reported dissatisfaction with excessive gingival exposure, spacing between multiple anterior teeth and shortened maxillary anterior teeth. She had no systemic diseases and declined orthodontic treatment. Clinical examination revealed a deep bite, bruxism-related parafunctional habits, polydiastema and a gummy smile. It was planned to rehabilitate all teeth in the maxillary arch with zirconia restorations, and the patient's consent was obtained. To establish gingival harmony, crown lengthening via gingivectomy was performed on maxillary incisors and canines. The prosthetic plan included fixed partial dentures in regions 13–23, 24–26, and 14–16, and single crowns on 17 and 27.

Digital impressions were obtained with a TRIOS intraoral scanner (3Shape, Denmark). Restorations were designed with CAD software and milled from zirconia blocks (Labcera, Turkey). A cut-back technique was applied for improved esthetics. Provisional restorations replicating the final design were fabricated from PMMA using a Primeprint 3D printer (Dentsply Sirona, Germany) and temporarily cemented (Prime Dental Template, India). They were monitored over a 4–6 week period. After a one-month follow-up, definitive restorations were tried in and evaluated for occlusion and gingival contours. Final cementation was performed using polycarboxylate cement (Adhesor, SpofaDental, Czech Republic), and a stabilization splint was provided to maintain occlusal balance and protect against bruxism.

DISCUSSION: Digital workflows offer enhanced accuracy, efficiency, and patient comfort. This case illustrates how fully digital protocols combined with soft tissue management can deliver predictable, esthetic, and functional outcomes in complex anterior rehabilitations.

Keywords: gingivectomy, bruxism, diastema, deep bite, CAD/CAM

SS-061 The Effect of Diamond-Like Carbon (DLC) Nanosurface Coating on the Mechanical Performance of PEEK Abutments

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OBJECTIVES: Polyetheretherketone (PEEK) abutments are favoured for their biocompatibility, bone-mimicking elastic modulus and aesthetic benefits, yet their limited mechanical strength remains a drawback. This study evaluated whether an external DLC nanosurface coating improves the resistance of PEEK abutments to mechanical deformation.

MATERIALS AND METHODS: Two groups of PEEK abutments were prepared: (1) specimens externally coated with DLC and (2) an uncoated control group. Baseline surface topography was documented at 5 × magnification using a ZEISS Smartproof 5 Digital Widefield Confocal Microscope. Each abutment was then subjected to a static compressive load of 100 N for 5 s at a 45° angle in a Shimadzu Universal Testing Machine. Loading steps complied with ISO 14801:2016. Surface roughness (Sq, Sa), shape parameters (Ssk, Sku) and maximum height values (Sp, Sz) were quantified before and after loading.

RESULTS: In the control group, Ssk increased significantly after loading ($p < 0.05$) and modest rises were observed in Sku, Sv and Sz, indicating surface deformation. The DLC-coated group showed no significant pre- to post-loading differences in any parameter ($p > 0.05$). Inter-group comparison confirmed that DLC coating significantly reduced changes in Ssk, Sp and Sz, reflecting superior preservation of surface integrity.

CONCLUSION: An external DLC nanosurface coating enhances the mechanical performance of PEEK abutments, maintaining surface characteristics under ISO 14801 static compressive stress. These findings support the clinical potential of protective DLC coatings to enhance the mechanical performance of PEEK abutments.

Keywords: PEEK abutment, Diamond-Like Carbon (DLC) coating, nanosurface coating, static compressive load (ISO 14801)

SS-062 Effects of different curing light units and glaze materials on surface roughness of 3D-printed resins

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OBJECTIVE: The aim of this study was to investigate the effects of different curing light units and glaze materials on the surface roughness of different 3D-printed resins.

MATERIALS-METHODS: A total of 100 rectangular specimens (10×10×1 mm) were 3D-printed (SolFlex 350®) using a resin infiltrated with salinised glass and pyrogenic silica (Saremco Crowntec) (n=50) and a (meth)acrylate resin (SolFlex Prov) (n=50), precleaned, and post-polymerized (Otoflash G171). Following standardization of surfaces with silicon carbide paper (600-, 800-, and 1200-grit), the specimens were ultrasonically cleaned. Baseline surface roughness (Ra) values of each specimen were measured using a contact profilometer (Mitutoyo SJ301). Each material group was then divided into five subgroups according to the polishing protocols: Labolight DUO + Optiglaze (L-O), Labolight DUO + Vita Akzent LC (L-VA), Valo X + Optiglaze (V-O), Valo X + Vita Akzent LC (V-VA), and mechanical polishing (control; Vita Enamic polishing set and Ultradent Diamond Polish) (n=10/subgroup). After polishing, Ra values were remeasured. Ra of materials within before or after polishing (independent sample t-test), Ra among subgroups within after polishing (one-way ANOVA), the main effects (two-way ANOVA) after polishing, and Ra of the same

subgroup between before and after polishing (paired sample t-test) were statistically analyzed in SPSS26 ($p<0.05$).

RESULTS: The main effects of 3D-printed materials and polishing methods were found statistically significant after polishing. SolFlex exhibited significantly higher Ra value than Saremco before polishing and after polishing for the L-O and L-VA groups. Among Saremco, V-VA (0.23±0.04µm) showed statistically lowest Ra, whereas no statistically differences were found among polishing methods in SolFlex, except for L-O and V-VA. All groups showed a statistically significant reduction in Ra values after polishing ($p<0.05$).

CONCLUSION: Polishing, regardless of the method, reduced surface roughness in both materials. V-VA may be recommended due to its superiority in achieving a smoother surface.

Keywords: 3D-Printed Resins,Curing Light Units, Glaze Materials, Mechanical Polishing, Surface Roughness

SS-063 TMD assessment in dental students during exam period

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OBJECTIVES: Both physiological and psychological factors contribute to the development of temporomandibular disorders (TMD). Particularly, stress is an important psychological factor associated with TMD and bruxism. This study aimed to investigate the impact of exam-related stress on TMD symptoms among dental students.

MATERIALS-METHODS: A 24-item questionnaire was developed based on recent literature about bruxism and temporomandibular disorders. Artificial intelligence (ChatGPT) was used to help formulate questions according to this literature. The questionnaire included items on bruxism, TMD symptoms, and perceived stress levels, and was administered to dental students at İstanbul Medeniyet University before and after an examination period. Data were analyzed using descriptive and inferential statistics (paired samples t-test).

RESULTS: A total of 64 dental students completed the questionnaire before and after examination period. Before the exam period, 32.81% of participants reported clenching or grinding teeth "frequently" or "always," which increased to 37.5% after this period. In terms of stress levels, the mean stress score was 3.75 ± 0.68 and rising to 3.97 ± 0.71 after this period. This increase in perceived stress was statistically significant according to the paired samples t-test ($p = 0.026$, $p<0.05$).

CONCLUSIONS: These findings suggest that exam-related stress has a measurable effect on perceived stress and may influence parafunctional oral behaviors among dental students. Therefore, it is necessary to integrate stress management strategies into dental education.

Keywords: Artificial intelligence, bruxism, dental student, stress, temporomandibular disorders

SS-064 Clinical management of increased vertical dimension in zygomatic implant supported hybrid prostheses using a contemporary substructure material and technique: a case report

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INTRODUCTION: A 62-year-old female patient presented to Ankara University Faculty of Dentistry with complete edentulism in the maxilla and partial edentulism in the posterior mandible. Clinical and radiographic evaluations revealed four zygomatic implants (Straumann®) in the maxilla and three implants (Medentika®) in the posterior mandible one on the right and two on the left. Excessive alveolar ridge resorption was noted in the maxilla.

CASE REPORT: Multi-unit abutments were placed on the maxillary implants, and a hybrid implant-supported prosthesis was planned. An abutment-level impression was made using the closed-tray technique, and a study model was obtained. Open-tray impression posts were splinted with pattern resin and sectioned; a custom tray was fabricated on the same model. The sectioned parts were reassembled intraorally, and the final impression was taken using the open-tray technique. Vertical and horizontal jaw relations were recorded with temporary baseplates. The final restoration was digitally designed using CAD software (Exocad GmbH) based on the impressions and interarch records. A 3D-printed resin prototype was fabricated and used as a reference for completing the mandibular restorations. During fabrication of the maxillary zirconia hybrid prosthesis with a contemporary substructure material (Trilor® Pink Disc), the vertical dimension exceeded the zirconia block height, resulting in partial exposure of the framework in the vestibular area. A resin try-in showing the exposed region was evaluated and confirmed to be outside from the smile line. The definitive PMMA prosthesis was fabricated accordingly. Final

occlusal adjustments were performed, and the prosthesis was torqued onto the abutments at 15 N/cm. A custom zirconia coping was fabricated to close the buccal screw access in number 22.

CONCLUSION: This case demonstrates that increased vertical dimension and severe resorption can be successfully managed through digital planning and proper material selection. Esthetic limitations were addressed effectively using a patient specific approach.

Keywords: fiber bar framework, hybrid prosthesis, zygomatic implants

SS-065 The effect of scanning time and number of images on the accuracy of intraoral digital scans

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OBJECTİVES: The accuracy of digital impressions is a critical parameter that directly influences the success of prosthetic treatments in digital dentistry. However, the effect of scanning time and the number of images on the scanning accuracy of intraoral scanners remains unclear.This study aimed to evaluate the effect of scanning time and number of images on the accuracy of digital scans.

MATERIALS AND METHODS: Tooth preparations were completed on the reference model to receive a single crown on tooth #16 and a three-unit fixed partial denture #24 to #26. The reference model was digitized using a high-precision industrial scanner (Solutionix C500). Digital impressions were then obtained using three intraoral scanners: TRIOS 5 (3Shape), Medit i900 (Medit), and Aoralscan Elite (Shining 3D). Each group was scanned according to the manufacturer's recommended protocol, and the scanning time and number of images were recorded for each scan.The STL data were aligned with the reference model using Geomagic Control X for 3D superimposition and Root Mean Square (RMS) analysis. The comparisons of RMS values, number of images, and scanning times were performed using the One-Way ANOVA test. The relationship between RMS values and both the number of images and scanning times was analyzed using correlation analysis.

RESULTS: The Aoralscan Elite showed the lowest RMS value among the scanners tested.No statistically significant relationship was found between RMS values and either scanning time or image count ($p > 0.05$).However, a positive correlation was found between scanning time and the number of images ($p < 0.05$, $r > 0.7$).

CONCLUSION: Under the conditions of this study, it was observed that the type of intraoral scanner affects scanning accuracy, whereas scanning time and the number of images do not have a significant impact.Aoralscan Elite demonstrated the highest scanning accuracy while also being the fastest device.

Funding: This project was supported by the Research Universities Support Program (ADEP) with project number TSA-2024-40536.

Keywords: digital impression, intraoral scanner, scanning time, number of images, accuracy

SS-066 Influence of polishing procedures on surface roughness of additively manufactured resin-based crown materials

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AIM: The objective of this study was to evaluate and compare the surface texture following from different polishing procedures applied to three additively manufactured definitive resin-based crown materials.

MATERIALS-METHODS: Three resin-based materials fabricated with 3D printer were investigated: Saremco (AA), Crowntec (BA), and TRINIQ (CB). Four surface treatments were evaluated: (1) unpolished (control), (2) mechanical polishing with Shofu Super-Snap discs, (3) application of a light-cured surface coating (GC Optiglaze), and (4) a combination of mechanical polishing followed by surface coating. Surface roughness (Ra, μm) was measured using a contact profilometer. Statistical analysis was conducted using two-way ANOVA to assess the main and interaction effects of material type and surface treatment on surface texture ($\alpha = 0.05$).

RESULTS: Statistical analysis revealed significant effects of material type ($p < 0.001$), polishing procedure ($p < 0.001$), and their interaction ($p < 0.001$). The unpolished and surface-coated-only groups demonstrated the highest roughness values, particularly for Saremco (0.474 ± 0.112 μm and 0.49 ± 0.092 μm, respectively). Mechanical polishing, either alone or followed by surface coating, resulted in significantly smoother surfaces across all materials, with TRINIQ exhibiting the lowest values (0.194 ± 0.046 μm and 0.254 ± 0.090 μm, respectively).

CONCLUSION: Polishing procedures significantly affect the surface texture of additively manufactured crown resins. Mechanical polishing alone or in combination with surface coating effectively reduces surface roughness, whereas surface coating alone does not provide sufficient smoothness. Selection of both material and surface treatment modality is critical in optimizing surface quality for clinical performance.

Keywords: Dental Polishing, Surface Roughness, Additive Manufacturing, 3D Printing in Dentistry

SS-067 Rehabilitation Of A Partial Maxillectomy Patient With An Implant-Supported Obturator Prosthesis: Case Report

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INTRODUCTION: Maxillary resections frequently lead to functional, phonetic and esthetic impairments. Conventional obturator prostheses often fail to meet patient expectations due to inadequate retention and stability, particularly in extensive defects. Implant-supported obturators represent an alternative treatment modality for such cases. This case report presents the prosthetic rehabilitation of a patient who has maxillary defect due to surgical resection of squamous cell carcinoma (SCC).

Case description: A 54-year-old male patient who had undergone surgical resection for (SCC) 20 years earlier, presented to our clinic for prosthetic rehabilitation. Patient has used an obturator prosthesis with buccal extension before. Due to periodontal disease, remaining teeth were lost. After clinical examination implant-supported prosthesis was planned. A titanium bar with low-profile attachments and locators were selected for removable prosthesis. Five implants were placed in the maxilla corresponding to teeth 11,13,15,17,27. Three months after osteointegration, impressions were taken. The titanium bar was obtained by scanning the model. Passive fit of the bar was verified using one-screw test and periapical radiographs. The acrylic obturator prosthesis was then completed. To prevent irritation of the soft tissues soft relining material was applied. Occlusal contacts were adjusted to prevent premature contacts. After 12-months control no complication was observed.

DISCUSSION: Retention, stability and inadequate soft tissue support are major challenges associated with obturators in maxillectomy patients. Usage osseointegrated implants has been recommended to overcome these limitations. When fabricating implant-supported prostheses for patients with maxillary defects, trauma to soft tissues should be minimized. Low-profile attachment systems in combination with titanium bars, locator abutments are advised in cases of large defects. These systems not only provide sufficient retention but also allow limited movement around the bar, enhancing patient comfort and tissue compatibility

Keywords: Obturator, Maxillary Defect, Low-profile Attachments

SS-069 Marginal and internal fit of table-top restorations produced by subtractive and additive CAD-CAM methods

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OBJECTIVES: This study aimed to evaluate the marginal and internal fit of table-top restorations fabricated using subtractive and additive CAD-CAM methods.

MATERIALS-METHODS: Occlusal veneer preparation with 2 mm anatomical occlusal reduction and no margin preparation was performed on a right mandibular first molar. Forty epoxy resin dies were then produced (N=40), and the die was scanned using a laboratory scanner (3Shape Lab Scanner D700). A table-top restoration was digitally designed, and the restorations were divided into four material subgroups: three substractive groups [lithium disilicate glass ceramic (IPS e.max CAD) (EM), hybrid ceramic (Vita Enamic) (VE), nanohybrid ceramic (Cerasmart 270) (C)], and one additive group using ceramic-dominant resin (Sprintray Ceramic Crown) (S) (n=10/subgroups). After the milling (Sirona MCXL) and 3D-printing (Sprintray Pro2) processes, the restorations were manufactured and glazed (Optiglaze) according to the manufacturers's instructions. Marginal and internal fit were evaluated using the silicone replica technique. Light-body silicone (Elite HD) was applied under a 40 N load. For each specimen, two replicas were obtained, and sectioned in both the mesiodistal and buccolingual directions. Measurements (μm) were taken at the margins, cusps, and central fossae using an optical microscope (Olympus BX4M-LED), with three measurements per site. Data were statistically analyzed in SPSS26 (one-way ANOVA, Tukey post-hoc test, $p<0.05$).

RESULTS: The S group exhibited statistically significantly larger marginal gaps (176.04±69.05 μm) and fossa gaps (235.09±102.81 μm) compared to the VE, C, and EM groups ($p<0.05$). Moreover, no statistically significant differences were observed among the VE, C and EM groups ($p>0.05$). In the cusp regions, significant differences were found only between EM (129.55±37.97 μm) and the S group (187.34±68.75 μm) ($p=0.035$).

CONCLUSION: The CAD-CAM fabrication methods affect on the marginal and internal fit of table-top restorations. Additive manufacturing resulted in lower marginal and internal accuracy compared to the substractive method.

Keywords: table-top, CAD/CAM, substractive method, additive method, marginal fit, internal fit

SS-070 In Vivo Evaluation of the Accuracy and Repeatability of Different Tooth Shade Determination Methods

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OBJECTIVE: The aim of this study was to compare the accuracy and consistency of four different tooth shade determination methods used in aesthetic dentistry.

MATERIALS-METHODS: The study was conducted with 40 adult participants who had healthy maxillary central incisors. Shade measurements were obtained from the middle third of the labial surface of each tooth. All measurements were performed under similar lighting conditions, in a fixed position, and by the same experienced clinician. Using a spectrophotometer as the reference, the accuracy and agreement of observer-based visual assessment, intraoral scanner, and artificial intelligence (AI)-assisted shade analysis systems were statistically evaluated. The color values obtained from each method were compared to those of the spectrophotometer. ΔE values were calculated and analyzed using one-way ANOVA and Bonferroni post-hoc tests. The agreement of L*, a*, b* values between methods was assessed using Kendall's tau-b correlation analysis, and the agreement of shade code matching was evaluated using Cohen's Kappa statistics.

RESULTS: Compared to the spectrophotometer, the intraoral scanner showed the lowest ΔE values and the highest agreement. This was followed by the AI-assisted system and the observer-based visual assessment. Correlation analyses revealed that the intraoral scanner demonstrated higher consistency in both L*, a*, b* values and shade code matching. The visual assessment method, influenced by subjective factors, exhibited the lowest accuracy.

CONCLUSION: Although all shade determination methods were clinically applicable, intraoral scanners showed the highest agreement with spectrophotometry. These findings also highlight the potential of AI-assisted systems in clinical dentistry and their room for further development.

Keywords: tooth color, spectrophotometer, artificial intelligence, digital dentistry, reproducibility.

SS-071 Accuracy of Maxillo-Mandibular Relationship Records with Digital Ti-base Monolithic Zirconia Restorations in Premolar/Molar Regions

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OBJECTIVE: This study aimed to evaluate the accuracy of maxillo-mandibular relationship records for digitally manufactured implant-supported single crown restorations in premolar and molar regions.

MATERIALS AND METHODS: Clinical data were gathered from 17 patients free from temporomandibular disorders (TMD) or any osseorheumatic conditions. All participants received Ti-base monolithic zirconia restorations in both molar and premolar sites. Digital impressions and initial bite registrations (MM-1) for all cases were acquired using a single intraoral scanner to ensure consistency. All restorations were fabricated following a standardized CAD/CAM protocol. Subsequently, in the final session, maxillo-mandibular relationship records were obtained again (MM-2). Both sets of bite registration STL files were imported into 3D analysis software for comparative analysis. To quantify the differences between the initial and final sessions, six distinct CMM points were designated on maxillary and mandibular arches. From these points, five deviation measurements were obtained: three vertical distances (distal and mesial to restoration, and restoration area) and two cross-arch distances (upper-mesial to lower-distal, and vice-versa). The absolute and true values of these five deviations were subjected to statistical analysis using the Student's t-test, with a significance level set at $\alpha=0.05$.

RESULTS: No statistically significant difference was observed between premolar and molar regions for any of the evaluated parameters($p>0.429$). However, individuals with premolar restorations exhibited higher vertical distance deviation values compared to those with molar restorations. Regarding the true values, negative deviations were recorded for premolar restorations, whereas positive deviations were observed for molar restorations.

CONCLUSION: To our knowledge, this study is the first to clinically investigate the influence of restorations on the maxillo-mandibular relationship. The differing directions of deviation values observed for restorations in various regions may be attributed to the maxillo-mandibular registration process, which typically commences from the most posterior aspect of the oral cavity.

Keywords: accuracy, trueness, maxillo-mandibular relationship, intraoral scanner, bite registration

SS-073 Flexural Strength and Weibull Analysis of Boron Oxide-Modified Dental Feldspathic Ceramics

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OBJECTIVES: Although several studies have shown that adding boron oxide improves the aesthetic properties of ceramics, data on the effects of this additive on mechanical strength are limited. This study evaluated the effects of boron oxide, which is known for its aesthetic potential, on flexural strength and structural reliability by adding different ratios (2%, 3%, 5%, 7% and 10%) by weight to feldspathic ceramics.

MATERIALS-METHODS: Boron oxide was added to commercial feldspathic ceramic powder at the specified ratios, and each mixture was homogenised in a magnetic stirrer. The prepared powders were sintered under appropriate conditions; the group without additives was the control, and the others were the experimental groups. A total of 54 specimens, nine specimens from each group, were subjected to a three-point bending test. A one-way ANOVA test evaluated the data obtained, and structural reliability was analysed using Weibull distribution analysis.

RESULTS: The highest mean flexural strength was observed in the control group (62.72 MPa) and the group modified with 10% boron oxide (61.94 MPa). A considerable strength decrease occurred in the group modified with 3% boron oxide (49.82 MPa). ANOVA analysis showed no statistically significant difference between the groups ($p > 0.05$). According to the results of Weibull analysis, the control and 10% additive groups had the highest shape (β) and scale (η) values and showed the highest structural reliability.

CONCLUSIONS: The results reveal that modification with 10% boron oxide offers flexural strength close to the mechanical performance of the non-modified group and provides positive effects in terms of structural reliability. However, a decrease in strength was observed at low modification levels, indicating that the amount of boron oxide used should be carefully determined. Therefore, it is important to carefully optimise boron oxide additive ratios to maintain mechanical integrity while providing aesthetic benefits.

Keywords: Boron Oxide, Mechanical Tests, Ceramics

SS-074 Effect of CAD Software on Cement Gap and Intaglio Surface Morphology in Overlay Restorations: An In Vitro Study

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PURPOSE: This in vitro study investigates how different CAD software influence cement gap thickness and intaglio surface morphology in overlay restorations designed on an identical tooth preparation.

MATERIALS-METHODS: A maxillary molar was prepared using a standardized protocol and scanned with a 3Shape Trios extraoral scanner. The resulting STL file was imported into four CAD software programs: 3Shape, Exocad, Dentbird, and Blender for Dental. Five overlay restorations were designed using each software (n = 20). These restorations were luted with a dual-cure resin cement containing Safranine O dye for enhanced visibility. After cementation, specimens were embedded in clear acrylic resin and sectioned mesiodistally. Cement thickness and intaglio morphology were evaluated using confocal microscopy at five points per sample, yielding 100 measurements.

RESULTS: Mean cement gap values (± SD) were: 3Shape: 35.80 ± 19.19 µm; Exocad: 31.47 ± 8.60 µm; Dentbird: 32.88 ± 8.94 µm; Dental Wings: 36.33 ± 13.27 µm. No statistically significant difference was observed between

groups (p = 0.0536). However, greater variability in internal adaptation was noted in 3Shape and Dental Wings designs.

CONCLUSIONS: While average cement thickness did not significantly differ among software, variations in intaglio surface quality suggest that the choice of CAD software may influence internal fit. These findings highlight the potential clinical relevance of software selection in achieving optimal restoration adaptation and long-term performance.

Keywords: overlay restorations, intaglio surface, CAD software

SS-075 Selective laser melting yields superior metal-ceramic bond strength over conventional casting regardless of firing cycles

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OBJECTIVES: Porcelain-fused-to-metal (PFM) restorations have been widely used in fixed prosthodontics. To achieve clinical longevity of PFM restorations, it is essential to have adequate metal-ceramic bond strength. The aim of this study was to evaluate the combined effects of repeated firing and two different fabrication techniques, selective laser melting (SLM) and conventional lost-wax casting, on the metal-ceramic bond strength of cobalt-chromium (Co-Cr) alloys.

MATERIALS AND METHODS: A total of eighty-four Co-Cr metal bars (25 × 3 × 0.5 mm) were fabricated using either SLM (Group SLM) or conventional lost-wax casting (Group Cast) (n=42 per group) in accordance with ISO 9693:2012. A low-fusing porcelain (G-Ceram, Gülsa Dental, Turkey) was layered with a thickness of 1.1 mm onto an 8 × 3 mm rectangular area on each bar. Each group was divided into three subgroups according to the firing cycles (3, 5, 7) (n=14). Metal-ceramic bond strength was assessed using a three-point bending test. Fracture mode analysis was performed using scanning electron microscopy (SEM). Statistical tests used were Shapiro-Wilk, Levene's, and two-way ANOVA (α=.05).

RESULTS: In the Cast Group, mean bond strength values for 3, 5, and 7 firing cycles were 51.54 ± 9.38 MPa, 55.14 ± 7.41 MPa, and 49.52 ± 7.63 MPa, respectively. Corresponding values in the SLM Group were 58.22 ± 12.53 MPa, 58.24 ± 12.24 MPa, and 53.47 ± 12.65 MPa. SLM Group demonstrated higher bond strength than Cast Group (p = 0.048). The number of firing cycles (p = 0.181) and interaction between fabrication technique and firing cycles (p = 0.804) were not statistically significant. Predominantly mixed fracture modes were observed in both groups, regardless of firing cycles.

CONCLUSION: SLM fabricated Co-Cr alloys demonstrated higher metal-ceramic bond strength than conventionally cast alloys. The number of porcelain firing cycles did not significantly affect bond strength in either group.

Keywords: bond strength, selective laser melting, 3-point bending test, porcelain firing cycle

SS-076 The effect of digital implant analog systems on the accuracy of 3d-printed implant models

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OBJECTIVE: This study aimed to evaluate the effect of different digital implant analog systems on the accuracy of analog position in 3D-printed implant models. Material **METHOD:** In this study, three identical reference plaster models with two implants were prepared for three different digital implant analog systems (Oxy-Fixo, Screw-Retained (SR); Dentis Friction Fit, FF; Implance Side Screw-Retained, SSR). These models were then scanned using a laboratory scanner (E4, 3Shape) to obtain three reference data sets. Using the reference data, digital models were designed for each digital implant analog system (Exocad). Digital models were manufactured with a 3D printer (Anycubic Photon M3 Plus) (n=10). Digital analogs were inserted on the models according to manufacturer recommendations. Then test models were scanned using the laboratory scanner. The test data were superimposed with reference models using a reverse engineering program (Geomagic Control X). Positional accuracy was calculated at the centroid points; X, Y, Z axes, and 3D deviations (ΔD). The data were statistically analyzed using one-way ANOVA and Tukey HSD tests (α=0.05).

RESULTS: Positive deviations in the X axis were observed in the SSR group (21.54± 8.71 µm), while SR and FF groups had negative deviations (-0.8± 7.57 µm and -7.69± 8.39 µm, respectively) which were significantly different (p<0.05). No significant difference was found between the groups in the Y axis (p>0.05). In the Z axis, the mean deviation of the SR group (2.08± 1.42 µm) was significantly different from the other

groups (p<0.05). The ΔD values of FF (56.19± 26.96 µm) and SSR groups (44.75± 16.31µm) were lower than the SR group (95.49± 36.35 µm) (p<0.05).

CONCLUSION: Digital implant analog systems affect the accuracy of 3D-printed implant models. The mean 3D deviation of SR system was the highest. These findings can guide clinicians in choosing between conventional and digital workflows for implant model fabrication.

Keywords: Digital implant analog systems, Friction Fit, Side Screw-Retained, Screw-Retained,Digital Dentistry

SS-078 Evaluation of Monolayered and Multilayered Monolithic Zirconia Crowns Fabricated with Different Milling Depths

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Objectives: This study investigated the effects of monolithic zirconia type (monolayered vs. multilayered) and different milling depths in multilayered zirconia on the marginal adaptation and fracture strength of zirconia crowns.

MATERIALS AND METHODS: Eighty-four epoxy resin die models of prepared premolar teeth were fabricated. Crowns were designed in software (Exocad) and milled from two monolayered zirconia materials [3-YTZP (VITA YZ HT)(3-VYZ) and 4-YTZP (Priti®multidisc ZrO_2 Extra Translucent)(4-ET)], three multilayered zirconia materials [3/5-YTZP (IPS e.max ZirCAD Prime)(3/5-ZP), 4/5-YTZP (IPS e.max ZirCAD Prime Esthetic) (4/5-ZPE), and 4/5-YTZP (Priti®multidisc ZrO_2 Multi Translucent Plus) (4/5-MTP)] at three milling depths [above (A), center (C), below (B)], and a zirconia-reinforced lithium silicate glass ceramic (VITA Suprinity) (VS) (n=7). After sintering and glazing, marginal gaps (MG) were measured using the silicone replica technique. Crowns were then cemented onto epoxy resin dies and subjected to 5000 thermal cycles. Fracture strength (FS) was performed under occlusal loading at 1 mm/min. Failure types were analyzed, and representative specimens were examined under scanning electron microscopy.

RESULTS: MG values showed insignificant differences among the groups (P>0.05). After FS tests, the highest values were observed in the 3-VYZ (1587.14 ±228.26 N), 3/5 ZP-B (1537.28 ±268.81 N) and 4-ET (1364.86 ±196.98 N) groups (P<0.05), whereas the lowest values were found in the VS group (483.86 ± 47.10 N) (P<0.05). Among multilayered zirconia groups, crowns milled from the B layer exhibited numerically higher FS values compared to crowns from C and A layers.

CONCLUSIONS: Zirconia type did not affect marginal adaptation of monolithic crowns, whereas significantly influenced fracture strength. Monolayered zirconia crowns demonstrated superior fracture strength compared to multilayered zirconia. In multilayered monolithic zirconia, crowns milled from the below position showed superior fracture strength compared to transition and upper layers.

Keywords: Monolayered zirconia, Multilayered zirconia, Milling depth, Marginal adaptation, Fracture strength.

SS-080 Investigation of color change of temporary crowns produced with 3D printers after thermal aging

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PURPOSE: Investigation of the changes in color parameters of temporary crown resins and crowns produced with composite resins used in production with 3D printers after 1 year of thermal aging

MATERIAL-METHOD: Temporary crowns that were produced with the same 3D printer from two different 3D production-compatible resins, with the same production parameters and 3 minutes of post-washing and 20 minutes of post-polymerization after production to mimic the upper left central tooth were subjected to 10,000 cycles of thermal aging after production and to mimic 1 year. Their colors were measured 3 times each in the CIELAB color space under sunlight under the same environmental conditions with a spectrophotometer, and ΔE values were calculated with the CIEDE2000 formula. In the statistical analysis, paired t-test was applied for before-after comparisons within groups, and independent t-test was applied for comparisons between groups (α=0.05).

RESULTS: Statistically significant changes were observed in the color parameters of both materials after thermal aging (p<0.001). Although both values were below the clinically acceptable threshold value of ~3.3, the ΔE value of Group 2 was quite close to this limit value. No statistically significant

difference was found between the two groups in terms of color difference (ΔE) after aging (p=0.100). However, when the color parameters were compared individually, Group 2 showed lower color change values compared to Group 1.

CONCLUSION: Statistically significant color change was detected in both groups after thermal aging. However, this change was within clinically acceptable limits. The resin used in Group 2 underwent less color change compared to Group 1, and there was a difference between the groups.

Keywords: Color stability, 3D printing, Thermal aging, Provisional restoration, CIELAB, CIEDE2000

SS-081 The effect of pH level of artificial saliva on adhesion of soft relining materials to 3D printed denture base

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OBJECTIVES: Soft relining materials contribute to the healing process. However, the adhesion of soft relining materials to denture base fabricated by additive manufacturing and the effect of salivary pH on this adhesion are unclear.

MATERIALS AND METHODS: Square shaped sample with dimensions of 10x10x3 mm was designed digitally and specimens fabricated by additive manufacturing with LCD printer and conventional dewaxing and acrylic packing. Soft lining material was applied to single surfaces of the samples. The obtained samples were kept in artificial saliva at different pH levels (5.7, 7.0, and 8.3) for 16 hours and in distilled water for 8 hours for 90 days (n=12). The separation of the soft lining material from the denture base was checked on Day 7, Day 30 and Day 90 and categorized according to separation percentages (0%, 0-25%, 25-50%, and 100%). In testing the relationship between categorical variables, Pearson Chi-Square test was applied in cases where the sample size assumption (expected value >5) was met, and Fisher's Exact test was applied in cases where the sample size assumption was not met. McNemar test was used to test the relationship between dependent categorical variables ($p<0.05$).

RESULTS: The evaluation of the 90th day, while 0-25% separation was observed in conventional specimens in artificial saliva at 7 pH, 25-50% separation or complete separation was observed in specimens fabricated by additive manufacturing ($p=0.025$). While complete adhesion or 0-25% separation was observed in conventional specimens in artificial saliva at 8.3 pH, 25-50% separation or complete separation was observed in in specimens fabricated by additive manufacturing ($p=0.039$).

CONCLUSIONS: The increase in salivary pH values negatively affected the adhesion of the soft lining material to the denture base and increased the separation of the material. The soft lining material bonded better to conventional samples compared to samples fabricated by additive manufacturing.

Keywords: denture base, artificial saliva, adhesion

SS-082 Prosthetic rehabilitation with custom made subperiosteal implant in atrophic posterior mandible: a case report

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INTRODUCTION: Subperiosteal implants were first introduced in the early 1940s for the treatment of atrophic maxillary and mandibular bone deficiencies, and they were used for several years. However, the surgical technique faced challenges with proper positioning and high complication rates. In the last two decades, digital technology has dramatically changed the field of implant dentistry. These advancements have allowed for a reevaluation of the concepts and surgical protocols of subperiosteal implants, making them a viable solution for the rehabilitation of atrophic maxillary and mandibular bone deficiencies.

Case description: Endosseous implants could not be placed in the partially edentulous 39 years old female patient without applying advanced surgical techniques. Therefore, it was planned to place subperiosteal implant. The patient's left posterior mandible was treated with a custom-made subperiosteal implant. The implant was precisely designed using computed tomography (CT) scans, a 3D-printed model, and the selective laser melting (SLM) technique, and it was constructed from biocompatible titanium material. The implant featured two multiunit abutments that opened into the oral cavity, allowing the patient to have two screw-retained implant-supported prosthesis.

DISCUSSION: Subperiosteal implants are a viable alternative when appropriately indicated for patients with atrophy and extensive bone loss in partial edentulism. The combination of computerized analysis and 3-dimensional printing results in greater precision, biocompatibility, and rigidity. The absence

of postoperative complications was noted, with high success rates in both the procedure and patient reports. Importantly, periodic follow-up is needed to assess the longevity and effectiveness of the technique used.

Keywords: Subperiosteal Implant, Atrophic Posterior Mandible, Implant-Supported Dental Prosthesis

SS-083 Evaluating the Conversion Degree of 3D-printed Occlusal Splint Resin Produced by Different Printing Technologies

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OBJECTIVES: To evaluate the degree of conversion (DC) of three-dimensionally (3D)-printed occlusal splint materials produced using stereolithography (SLA) and masked SLA (MSLA) printing technologies and compare them with the conventional (C) method using heat-polymerized acrylics

MATERIALS-METHODS: Bar-shaped (10 × 4 × 2.5 mm3) splint resin specimens (Dental LT Clear V2) were fabricated using SLA (Form 3B+) and MSLA (Form 4B+) 3D printers (n=20 per printing technology). C specimens (SR Triplex Hot) served as the control (n=10). 3D-printed specimens were designed using a computer-aided design software (SolidWorks) and printed. Fourier transform infrared spectroscopy (FTIR) was used to assess DC at three stages for printed specimens (liquid state of the resins, after print & wash, and after post-curing), and at two stages for C specimens (immediately after mixing the liquid and powder and after polymerization). DC values reported refer to the final polymerization stage. Statistical analysis was performed using one-way ANOVA followed by Tukey *post hoc* test ($\alpha = 0.05$).

RESULTS: The final DC values of SLA and MSLA specimens did not differ significantly ($p = 0.828$). However, the C group showed a significantly higher DC than both 3D-printed groups ($p < 0.001$). No significant differences were observed between SLA and MSLA in initial polymerization (DC Print) ($p = 0.064$) or ΔDC values ($p = 0.179$).

CONCLUSIONS: SLA and MSLA printing technologies demonstrated similar DC outcomes, indicating that increased printing speed with MSLA does not compromise polymerization. However, heat-polymerized acrylic resin remains superior in achieving a higher degree of conversion.

Keywords: Three-dimensional printing, occlusal splints, degree of conversion, Fourier Transform Infrared, photopolymer resin, acrylic resin

SS-084 Title: Full-Mouth Rehabilitation Using Lithium Disilicate Crowns in a Patient with Amelogenesis Imperfecta: A Clinical Case Report

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INTRODUCTION: Amelogenesis Imperfecta (AI) is a hereditary enamel disorder characterized by hypomineralization, enamel loss, hypersensitivity, discoloration, and morphological abnormalities. This clinical case report describes a full-mouth prosthetic rehabilitation on an 18-year-old patient diagnosed with hypoplastic AI, focusing on a step-by-step prosthetic rehabilitation using lithium disilicate (IPS E.max Empress LT) crowns.

Case description: Initial records, including digital intraoral scans (Medit i700) and photographs, were obtained for diagnosis. A mock-up was fabricated to visualize the treatment result and guide patient communication. Guided gingivectomy was planned digitally in all four quadrants using CAD/CAM-produced surgical guides to arrange crown length and gingival contours. After the healing period, 24 teeth were prepared. Digital impressions were taken, and Polymethyl methacrylate crowns were temporarily cemented for esthetic and functional trial purposes. Final restorations were designed digitally, digital wax-up was approved and crowns were pressed using IPS E.max Empress LT material. Cementation was performed with light-cure resin cement (GC Bleach). Crowns produced with the press method were adapted occlusally.

DISCUSSION: The treatment was completed successfully, with excellent adaptation and esthetic integration of the restorations with patients satisfaction. At the one-month follow-up, no complications such as debonding, chipping, or gingival inflammation were observed. However, increased intraoperative sensitivity during tooth preparation was detected in patient. While the short-term outcome is positive, long-term follow-up is necessary to assess biomechanical performance of the restorations.

Keywords: Ameligenesis imperfecta, lithium disilicate, full mouth prosthetic rehabilitation

SS-085 Impact of Different Splinting Materials on Accuracy in Open Tray Impressions for All-on-Four Implant Protocol

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This in vitro study aimed to compare the impression accuracy of different splinting materials and techniques used in the All-on-Four prosthetic protocol. The accuracy was measured in the form of linear and angular deviations from a control model. Four implant analogs were placed in a mandibular reference model. Five different splinting techniques were employed to fabricate a total of 50 experimental models (n = 10 per group).

• Group 1: Impression copings were splinted using Teflon tape, and a layer of pattern resin (GC Corp., Tokyo, Japan) was applied over the joints.

• Group 2: Copings were splinted using Teflon tape and light-cured Motif resin (Dokuz Kimya, İzmir, Turkey).

• Group 3: Copings were splinted using Type IV dental stone.

• Group 4: Copings were initially splinted with pattern resin (GC Corp., Tokyo, Japan), then sectioned and rejoined with Motif resin (Dokuz Kimya, İzmir, Turkey).

• Group 5: Copings were splinted with pattern resin (GC Corp., Tokyo, Japan), sectioned, and rejoined with additional pattern resin.

All impressions were taken using the open-tray technique. The splinted impression copings were scanned using an extraoral laboratory scanner to obtain digital models. Linear and angular measurements were recorded at three regions on each model. Deviations were calculated by superimposing each digital test model onto the reference model. To reduce variability, all splinting procedures were performed with standardized thickness across all groups. Repeated Measures ANOVA revealed significant differences in linear deviations between groups ($p < 0.05$). Post-hoc tests showed that Groups 3 and 5 had significantly lower deviation values. Angular deviations varied significantly by region, but not by group. Type IV dental stone and copings were splinted with pattern resin demonstrated superior accuracy and may enhance reliability in full-arch implant impressions

Keywords: open-tray impressions, splinting techniques, pattern resin, linear deviation, angular deviation, impression accuracy

SS-086 Gender effect on the threshold values for perceptibility and acceptability of color difference

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OBJECTIVES: To evaluate color differences in dental studies, color difference formulas and the perceptibility and acceptability threshold are presented. Gender is an important factor for the thresholds. The CIELAB (ΔEab) and CIEDE2000 (ΔE_{00}) formulas are commonly used. This study aims to determine the perceptibility and acceptability threshold values calculated with these formulas.

MATERIALS-METHODS: In this study, 105 pairs of ceramics were evaluated, prepared as 15 ceramic specimens (18 mm diameter, 3 mm thickness), matched in pairs. Color values of the ceramic discs were obtained using image processing techniques. A total of 110 participants, equally male and female, were included from five professional groups: dentists, dental technicians, prosthodontists, dental students, and non-professionals. Participants were shown ceramic pairs and asked about the perceptibility and acceptability of color differences. The correlation between color differences and measurements was analyzed using S-shaped curves and data points were fitted with nonlinear regression models. Based on the resulting curves, the 50:50 threshold value (50% positive, 50% negative responses) for each measurement was calculated, and 95% confidence intervals estimated. Comparisons of perceptibility and acceptability were made using paired t-tests for dependent groups.

RESULTS: The acceptibility/ perceptability threshold values of women participants obtained for ΔEab and ΔE_{00} color difference formulas were 1.35/ 0.64 and 0.76/ 0.51. The acceptibility / perceptability threshold threshold values of men participants for ΔEab and ΔE_{00} formulas were found to be 2.64/0.83 and 1.57/0.66. No significant differences were found between

female and male participants in terms of perceptibility and acceptability threshold values (p>0.05).

CONCLUSIONS: Image processing technique can detect ceramic color parameters. The ΔE_{00} formula showed better threshold values than ΔEab in terms of human visual sensitivity for both genders. This study was supported by TÜBİTAK under the 1002-A Rapid Support Program as Project No. 124S385.

Keywords: perceptibility, acceptability, threshold value, color difference, gender

SS-087 Evaluation of Surface Roughness and Gloss Changes in Occlusal Splint Materials Fabricated by Conventional and Digital Methods

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OBJECTIVES: To investigate surface roughness and gloss changes of occlusal splint materials fabricated with conventional and digital methods after surface treatments and immersion in cleaning solutions.

MATERIALS-METHODS: Conventionally manufactured heat-polymerized acrylic resin and vinyl acrylic plaque; digitally manufactured SLA disc-shaped (10x2mm) samples (n=10) were prepared according to ISO 21920-2:2021. The samples were divided into 3 main groups based on surface treatment and production **METHODS:** Group PP1 (Polishing Pad, conventional), group PP2 (Water Jet Cutting, conventional) and group SLA (Optiglaze,3D printed). Each main group was further subdivided according to the type of cleaning solution used: tap water and cleaning tablets. Daily-use simulation procedures were performed over a one-month period and included brushing (using a custom-designed apparatus that allowed a rechargeable electric toothbrush to perform circular brushing with constant vibration), immersion in protein-rich liquid foods, and exposure to denture cleaning agents. Surface roughness and gloss measurements were recorded at three time points: baseline (Day 0), after one week, and after one month, using optical profilometry and scanning electron microscopy (SEM).

RESULTS: Over time, all groups exhibited statistically significant increases in roughness between and within the groups (p <0,001, baseline and 1st month). The SLA group exhibited the highest surface roughness, with mean values of 202.3 ± 44.1 nm at baseline, 231.4 ± 36 nm at week 1, and 263 ± 48.7 nm at month 1 (P<0.001). In contrast, the conventional Group PP2 demonstrated the lowest surface roughness, with corresponding values of 67.6 ± 13.3 nm at baseline, 81.2 ± 10.2 nm at week 1, and 87.1 ± 14 nm at month 1 (P<0.001). There were not seen significant differences in gloss values over time of the experiment procedures between and within the groups (P>0.05).

CONCLUSION: All splint materials used in the management of temporomandibular joint (TMJ) disorders become roughened over time. Patients should be clearly made aware of the importance of proper cleaning and maintenance of their oral splints.

Keywords: TMJ disorders, occlusal splint materials, surface roughness, surface gloss, digital fabrication, cleaning solution.

SS-088 Comparison of 3D Facial Scanning and Direct Anthropometry in Determining Occlusal Vertical Dimension: A Pilot Study

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OBJECTIVES: Determining the occlusal vertical dimension (OVD) is one of the most crucial stages in prosthetic rehabilitation. The physiological rest position and closest speaking space are commonly used methods for this purpose. Additionally, anthropometric facial measurements have been widely discussed in the literature as alternative approaches for determining OVD, with various studies demonstrating correlations between specific facial landmarks and OVD. Although direct anthropometry is still regarded as the gold standard, the use of three-dimensional (3D) face scanners has gained increasing popularity. The aim of this study was to evaluate the correlation between direct anthropometric facial measurements and digital measurements obtained from a 3D face scanner and to assess the reliability of the 3D scanner in determining OVD.

MATERIALS-METHODS: The study was conducted on 25 volunteers (15 females, 10 males) aged between 18 and 29 years, all with Class I jaw relationships. Four commonly evaluated OVD measurements (tip of the nose to pogonion, tip of the nose to base of the chin, subnasale to pogonion, and subnasale to base of the chin) were assessed. Seven anthropometric facial distances previously reported to have strong correlations with these OVD measurements were included: exocanthion-to-cheilion, pupil-to-cheilion, pupil-to-pupil, stomion-to-pogonion, sellion-to-stomion, sellion-to-labiale inferius, and meatus-to-

exocanthion. Direct measurements were obtained from soft tissue landmarks using three calibrated digital calipers. Digital measurements were performed on 3D facial models obtained with the Shining 3D MetiSmile scanner. Correlation was assessed using the Intraclass Correlation Coefficient (ICC), and differences were analyzed with Paired Samples t-test ($p < .05$).

RESULTS: Except for the distances between meatus-to-exocanthion, subnasale-to-pogonion, and stomion-to-pogonion, all measurements demonstrated a strong correlation ($ICC > 0.6$) between digital and direct methods ($p = .001$, $p < .05$).

CONCLUSIONS: Anthropometric facial measurements obtained with the Shining 3D MetiSmile scanner appear to be a reliable alternative for determining OVD

Keywords: Vertical Dimension, Anthropometry, Three-Dimensional Imaging, Prosthodontics, Dental Occlusion

SS-089 The impact of scanning procedures on the trueness of digital impressions across different intraoral scanners: an in vitro study

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Statement of problem: Intraoral scanners offer capabilities such as trimming, re-scanning, and overscanning, but the influence of these features on the trueness of digital impressions across different scanner models is not well understood. Purpose. This study aimed to evaluate the impact of varied scanning procedures on the trueness of digital impressions generated by different intraoral scanners.

Material and methods. A typodont model, with a prepared maxillary right first molar and left second premolar, was used. Reference data were acquired via an industrial scanner (Atos II TripleScan). A moderately experienced operator scanned the model using three intraoral scanners (Trios 5, Trios 4, Medit i500) (n=10).). Scans were performed in five groups: first group involved a single full-arch scan at normal resolution (NR); second group conducted three scans (NR3); third group involved ten scans (NR10); fourth group conducted a full-arch scan followed by a re-scan of the prepared teeth after cut-out (NR-Re); fifth group included a high resolution rescan post cut-out (NR-ReHD). Trueness was assessed using Geomagic Control X software, and statistical analysis was performed with the Friedman non-parametric test in R software (version 4.1.2), with significance set at $P<0.05$.

RESULTS: Trios 5 and Trios 4 displayed no significant differences in trueness across groups, whereas Medit i500 showed substantial variability. Regional inconsistencies were observed in both Trios 5 and Medit i500.

CONCLUSIONS: Scanning features notably affected the trueness of digital impressions produced by Medit i500 but not Trios 5 or Trios 4. Regional differences were scanner dependent

Keywords: intraoral scanner,digital impression,trueness

SS-090 Comparison of Motor Skills and Technological Adaptation Using a Virtual Reality Dental Simulator

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OBJECTIVES: Dental education involves complex clinical procedures requiring motor skills and manual dexterity. Beyond traditional training methods, virtual reality (VR)-based dental simulators offer controlled, realistic environments through haptic feedback, potentially enhancing learning efficiency. This study aimed to compare the motor performance of dental doctoral students and dental technicians through VR-based haptic exercises and to evaluate their technological adaptation and integration capabilities into digital systems.

MATERIALS-METHODS: This study was approved by the Lokman Hekim University Scientific Research Ethics Committee [Approval No: (28.03.24, 2024/93)]. Nineteen participants, including doctoral students from the Department of Prosthodontics and dental laboratory technicians, were enrolled.Each participant performed haptic exercises on a dental simulator by tracing plus, minus, circle, and ring shapes. Performance parameters, including accuracy, drilling time, target volume, task completion rate, and efficiency, were assessed and compared between the two groups. Statistical evaluation was performed using the Student's t-test for datasets exhibiting normal distribution, while the Mann-Whitney U test was employed for those not conforming to a normal distribution.

RESULTS: Doctoral students demonstrated significantly higher accuracy in plus and ring shapes compared to dental technicians ($p=0.032$; $p=0.043$). There was no statistically significant variation in accuracy between the minus and circle-shapes ($p>0.05$). Other parameters (target volume, efficiency,

drilling, and surgical times) showed no significant differences between the groups (p>0.05). Among the shapes, the circle showed significantly lower drilling and surgical times and higher efficiency compared to others (p<0.001). Technicians exhibited longer surgical times for plus and minus shapes compared to the circle (p<0.05).Both groups achieved a 96.1% overall task completion rate across all shapes.

CONCLUSIONS: This study highlights the potential of VR dental simulators as valid tools for evaluating professional adaptation to digital systems.Moreover, the influence of shape design and morphology on task efficiency underscores the importance of exercise customization in optimizing motor skill training and assessment.

Keywords: Virtual Reality, Motor Skills, Dental Education, Dental Technicians, Prosthodontics

SS-091 Effect of Coffee Immersion on Color Stability and Surface Roughness of Denture Base and Liners

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OBJECTIVE: The aim of this in vitro study was to evaluate the effects of coffee immersion on the color stability and surface roughness of three dental materials (heat-activated polymethyl methacrylate, chemically activated polymethyl methacrylate and PEMA based hard direct denture liner) and to investigate the clinical durability of these materials.

MATERIALS-METHOD: Thirty-six disc-shaped specimens (18 × 3 mm) from each type of test material were prepared: heat-activated polymethyl methacrylate (HA), chemically activated polymethyl methacrylate (CA) and hard denture liner (DL) n=12. Following processing, initial surface roughness (Ra) was measured using a non-contact profilometer and initial color parameters (CIE Lab*) were obtained with a spectrophotometer. All specimens were immersed in coffee at 37°C for 14 days. All measurements were repeated to evaluate changes in surface roughness and color stability.

RESULTS: The DL group exhibited a significantly greater color change (DeltaE) compared to the HA and CA groups (p<0.001). No significant difference in color change was observed between the HA and CA groups. The DL group exhibited a significant increase in surface roughness compared to HC (p < 0.05), while no significant roughness difference was found between CA and DL.

CONCLUSION: Hard denture lining materials were more susceptible to staining and roughening from coffee compared to heat-activated and chemically activated polymethyl methacrylate resins. Moreover, their comparatively increased surface roughness may promote bacterial adhesion, thus compromising the hygiene and durability of the prosthesis. These findings emphasize the need of selecting suitable materials for chairside relining operations and the importance of educating patients on prosthesis care and hygiene practices.

Keywords: Polymethyl methacrylate,Hard denture liner,Color stability, Surface roughness, Coffee staining

SS-092 Full Mouth Monotic Zirconia Rehabilitation of a Patient with Decreased Occlusal Vertical Dimension with Digital Workflow: Oral Presentation

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INTRODUCTION: Tooth loss causes many phonetic, aesthetic and functional deficiencies. Especially in cases where posterior teeth are missing, jaw movements and chewing beyond physiological limits result in pathological wear and occlusal vertical dimension loss, and in this case, a complex treatment protocol must be applied. To rehabilitate these complicated problems, tooth-implant supported fixed partial denture and removable partial denture options can be preferred. In this case report, the oral rehabilitation of a complicated case with advanced wear and vertical dimension loss with incompatible FDPs in the upper jaw and posterior tooth deficiencies in the lower jaw is explained using a digital workflow.

Case description: A 55-year-old female patient applied to our clinic with functional and aesthetic complaints. As a result of clinical and radiographic examination, it was planned to perform tooth/implant-supported full arch fixed prosthetic restorations in the lower jaw and tooth-supported in the upper jaw to replace the damaged tooth tissue, increase the vertical dimension and eliminate tooth deficiencies. After the osseointegration of dental implants placed in place of teeth 35, 36, 44 and 46, the preparation was planned with the guidance of intraoral digital measurements and photo records, tooth preparations were made, and digital measurement records were taken using an intraoral scanner at the planned occlusal height. The restorations designed on virtual models were

manufactured and applied using polychromatic-layered and hybrid content monolithic zirconia.

RESULT: Digital workflow applications with additional scanning and image guidance are highly successful in achieving predictable esthetic and functional results in complicated full-mouth restorations with worn, discolored teeth and incompatible FDPs. Polychromatic-layered and hybrid-containing monolithic zirconia is a restorative material with easy and predictable results in terms of esthetic and functional success in the rehabilitation of complicated cases. In this case, the patient's vertical dimension deficiency, chewing dysfunction and esthetic concerns were resolved.

Keywords: digital workflow, occlusal vertical dimension, monolithic zirconia

SS-093 Investigation of Microhardness, Surface Roughness Values of Current Removable Partial Denture Frameworks Before and After Brushing Simulator

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OBJECTIVES: The aim of this in vitro study was to compare the effects of current materials used in removable partial denture frameworks on surface hardness and surface roughness after brushing.

MATERIALS-METHODS: Five different materials were used in the study: conventional PMMA (Imıcryl), 3D printing resins (Saremco and Power-Resins), PEEK (BioHPP), and Acetal (Bilkim). A total of 100 samples were produced by preparing 20 samples from each group. The samples were 10×10×1 mm in size and were prepared by conventional polymerization, 3D printing, or CAD/CAM milling, according to the production methods. The brushing process was simulated once a year with a brushing simulator, and 3,650 cycles were applied. Thermal cycle simulation was performed with 10,000 cycles. Surface roughness was measured with a profilometer and microhardness was measured with a Vickers microhardness tester. The data obtained were statistically analysed by Repeated Measures ANOVA test ($p<0.05$ significance level).

RESULTS: The highest values in terms of microhardness were recorded in the PEEK group, while the lowest values were recorded in the Saremco and Acetal groups. A significant decrease in hardness values was observed in all groups after brushing ($p<0.001$). In surface roughness measurements, PEEK and acetal groups had the highest values, and a significant increase was observed in all groups after brushing ($p=0.045$). The effects and interactions of the materials were not statistically significant ($p>0.05$).

CONCLUSIONS: Brushing negatively affected the surface properties of all materials. PEEK material showed the most successful results in terms of high microhardness and resistance to brushing. This material can be recommended for use in prosthetic frameworks.

Keywords: Brushing Simulator, Denture Framework, Surface Roughness, Thermal Cycle, 3D printed

SS-094 Comparison of the effect of bleaching agent application on adhesive system bonding efficacy depending on immediate or delayed cementation procedures

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OBJECTIVES: The aim of this study was to make a comparative evaluation of the bond strength of resin composite to dentin through a dual-cure adhesive system, in groups where the cementation processes were applied immediately or after waiting for a certain period of time after the bleaching procedure.

MATERIALS-METHODS: Twenty four flattened occlusal surfaces were divided into two groups after the standart bleaching protocol (37.5% hydrogen peroxide) applied in advance. The prepared composite blocks were bonded immediately to the first twelve teeth after bleaching (Group 1), while in the other group, the adhesive bonding was implemented at the end of a 2-week waiting period. Bonded specimens were then subjected to μTBS testing. The data were analyzed using Shapiro-Wilk and Mann-Whitney U-tests at $\alpha = 0.05$.

RESULTS: There was a significant difference in the μTBS of resin composite blocks to dentin in two groups regarding immediate and delayed bonding protocols in parametric (t-test) and non-parametric (Mann-Whitney U test) ($P = 0.05$) tests. The group subjected to a 2-week waiting period before adhesive bonding procedure exhibited significantly higher statistical values in terms of bond strength distribution (N).

CONCLUSIONS: It can be stated that immediate adhesive cementation after bleaching agent application adversely affects the efficacy of the adhesive bonding system, and a waiting period of 2 weeks is crucial for the release of oxidation products and a reliable bond strength.

Keywords: Bleaching agent, dentin, dental adhesives, tensile strength

SS-095 Effect of curing cycles and coffee thermocycling on the color stability of 3D printed definitive restoration materials

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OBJECTIVE: This in vitro study aimed to investigate the effects of different post-curing cycles and coffee thermocycling on the color stability of two additively manufactured resin-based ceramic materials.

MATERIALS AND METHODS: A total of 120 disc-shaped specimens (ø:10 mm, thickness: 2 mm) were fabricated using VarseoSmile TriniQ (VST; BEGO) and Crowntec (CT; Saremco Dental AG) materials in the A1 shade with a 3D printer. These disks were divided into four subgroups (n=... each) based on flash-curing cycles (0, 2000, 4000, and 6000). The lightness (L*), red-green (a*), and yellow-blue (b*) parameters of each specimen were measured using a spectrophotometer before and after 10,000 cycles coffee thermocycling (CTC). Color changes (ΔE_{00}) were calculated according to the CIEDE2000 formula, and whiteness index (WID) values were also determined to evaluate the impact of staining. Data were analyzed using two-way ANOVA followed by Bonferroni-adjusted post-hoc tests ($\alpha = 0.05$).

RESULTS: In Crowntec, ΔE_{00} values increased with extended post-curing duration, with only the 0-cycle group remaining below the clinical acceptability threshold. Conversely, VarseoSmile TriniQ exhibited the greatest discoloration at 0 cycles and the least at 2000 cycles, with all post-cured groups maintaining ΔE_{00} values within clinically acceptable limits. Crowntec consistently exhibited higher ΔWID values than TriniQ across all cycles. The lowest whiteness was observed in TriniQ at 0 cycles, whereas the highest whiteness was recorded for Crowntec at 4000 cycles. Pearson correlation analysis revealed strong to very strong positive correlations between ΔE_{00} and ΔWID for both materials, particularly after post-curing.

CONCLUSION: Post-curing duration significantly influenced the color stability and whiteness of the tested 3D-printed materials. Adequate post-curing cycle, particularly at 2000 and 4000 cycles, enhanced resistance to discoloration following coffee thermocycling.

Keywords: 3D printing, additive manufacturing, post-curing, color stability

SS-096 Comparison of Trueness of Digital and Conventional Impression Pathways

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Objectives: The aim of this study was to evaluate the trueness of digital and conventional impression pathways compared with the reference model at the preparation, marginal and occlusal/incisal surfaces.

Materials and methods: The teeth numbers 14 and 16 were prepared on a typodont model. This model was scanned 10 times using an extraoral/desktop scanner to obtain a reference model. Four different data were prepared to compare with the reference data. For the first group 5 impressions were taken from the typodont model and were scanned with desktop scanner. For the second group, impressions were poured with dental stone and then the models were scanned with the same desktop scanner. For the third group 5 intraoral scan data were obtained from the typodont model. To obtain the last group resin models were fabricated using a DLP printer from the third group scan data. Then models were also scanned with an extraoral scanner. All data were exported as standard triangulation language files (STL). To evaluate the trueness of four data each was superimposed to reference data using 3-D analysis method.

RESULTS: The highest mean deviation in all the preparation, marginal and occlusal/incisal surfaces were observed at impression material. The lowest mean deviation in preparation and marginal surfaces were observed at 3-D model and IOS respectively which were significantly different from impression and dental stone ($p=0,01<0,05$). IOS exhibited the lowest mean deviation at occlusal/incisal surfaces. While negative deviations were determined in both conventional

and gypsum models on the preparation and marginal surfaces, less deviations were observed in the IOS and 3-D models. The highest deviations were observed in the 3-D model on the occlusal/incisal surfaces other than the prepared teeth.

CONCLUSION: All pathways showed deviations compared to the reference data. When all surfaces were evaluated commonly, the digital pathway gives quite satisfactory results.

Keywords: Digital impression, conventional impression,extra-oral scanner, intra-oral scanner, 3D model

SS-097 From design to plaque: evaluating hygienic efficiency of pontic types with artificial plaque simulation

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OBJECTIVES: This study compares the cleanability of three commonly used pontic designs in fixed partial dentures: ridge lap, modified ridge lap, and conical. The absence of a clear consensus in the literature and the frequent preference for designs with potential hygienic disadvantages in clinical practice emphasize the relevance of this research.

MATERIALS AND METHODS: Fixed partial dentures with three different pontic designs were applied to a standardized model produced using 3D printing technology. An artificial plaque material prepared by mixing a dental adhesive stabilizing agent with chalk at a 1:2 dry-weight ratio was placed underneath the pontics on both buccal and lingual sides for each pontic type. Standard brushing was performed with a medium-bristled toothbrush on both surfaces. This was followed by cleaning procedures using an appropriately sized interdental brush and super floss. High-resolution digital photographs were taken before and after each cleaning phase, and the amount of remaining or removed plaque was evaluated using image overlay analysis.

RESULTS: Among the three designs, the conical pontic demonstrated the highest level of cleanability, followed by the modified ridge lap. The ridge lap design showed the least effective plaque removal. The conical design maintained statistically significant superiority in cleaning performance even after using adjunctive hygiene tools.

CONCLUSION: This study highlights the significant impact of pontic design on hygiene in fixed partial dentures. The conical design showed superior cleanability and should be preferred in hygiene-sensitive cases. Despite this, the continued use of ridge lap designs reflects a gap between aesthetic demands and hygienic outcomes. Promoting awareness of the conical form's benefits may improve patient care. These findings have practical implications for clinical decision-making and warrant further validation through comprehensive clinical studies.

Keywords: Pontic design, Fixed prosthesis hygiene, Artificial plaque analysis

SS-098 Effect of Different Surface Treatments on Bond Strength to Monolithic Zirconia: An In Vitro Study

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OBJECTIVES: To evaluate the effects of different surface treatments and tooth substrates on the bond strength of monolithic zirconia restorations.

MATERIALS-METHODS: A total of 120 extracted human maxillary incisors were prepared to expose the enamel (E) surface on one half and the dentin (D) surface on the other half. Monolithic zirconia specimens containing 5 mol% yttrium oxide and measuring 0.7 mm in thickness were fabricated and randomly assigned to four surface treatment groups: MDP-containing primer (P), sandblasting+primer (SP), silane (S), and tribochemical silica coating+silane (TS). Then, eight groups were formed by applying each surface treatment to both enamel and dentin (n = 15). After cementing the specimens using a dual-cure adhesive resin cement (Panavia F 2.0) and 5000 thermal cycles, shear bond strength (SBS) test (Universal testing machine, 0.5 mm/min) was performed. Failure types were examined under a stereomicroscope and classified. Data were statistically analyzed in SPSS 29.0 (Shapiro Wilk, T test, two-way ANOVA and Bonferroni tests).

RESULTS: Tooth substrate, surface treatment, and the interaction between these were found to have a statistically significant effect on SBS ($p < 0.001$). SBS values were significantly higher on enamel surfaces compared to dentin ($p < 0.001$). Regardless of the tooth substrate, the highest SBS values were

obtained in the SP groups (13.29 ± 2.34 MPa in SP-M and 8.57 ± 1.87 MPa in SP-D) and there was no significant difference between them and the TS groups (12.45 ± 2.12 MPa in TS-M and 7.90 ± 1.52 MPa in TS-D) ($p>0.05$).

CONCLUSIONS: Among the surface treatments applied to monolithic zirconia ceramics, sandblasting with MDP-primer application and tribochemical silica coating with silane application provided the highest SBS to both enamel and dentin. The bond strength of monolithic zirconia to enamel surfaces was significantly greater than to dentin surfaces

Keywords: Zirconia, Surface treatments, Shear bond strength

SS-099 Stress Distribution in Angled Multi-Unit Abutment Prosthetic Screws: A Finite Element Analysis

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Fixed prostheses are preferred more frequently due to it more comfort compared to removable prostheses. However, to avoid advanced surgical requirements imposed by anatomical limitations in edentulous areas tilted placement of implants is commonly practiced. Twelve screw retained implant-supported fixed partial denture (FPD) models simulating the posterior mandible were created. Implants were positioned at the 44, 45, and 47 tooth regions in all models. The models were categorized into four groups based on the angulation of the multi-unit abutments (0°, 15°, 30°, 45°) with implant axes aligned accordingly. In each model, a four-unit Cr-Co FPD was designed and connected to the abutments with prosthetic screws. Three different prosthetic screw diameters were designed: M1.6, M1.8 and M2 as one diameter per model.

A total load of 500N was applied uniformly to the FPD's buccal cusps both vertically and oblique. Stress distributions on the multi-unit abutment prothesis screws were evaluated and the average maximum von Mises stress values were recorded for each screw diameter.

Results showed that implant position, angulation and the distance between screw hole to the pontic in the prothesis significantly influenced stress levels and optimal screw diameter selection. The highest stress values were found in the following configurations: 15° angled abutment with M1.8 and M1.6 screws, 30° abutment with M1.6 and M1.8 screws. Overall, prosthetic screws in abutments with 15° and 30° angle exhibited higher stress compared to the 0° and 45° angled screws. Screws located in the 45tooth region showed higher stress values. Additionally, 0° and 45° angled abutments showed high stress.

These findings highlight the importance of considering implant angulation and screw design parameters to minimize stress on prosthetic screw components in implant-supported restorations.

Keywords: Prosthetic screw, Multi-Unit Abutment, Finite Element

SS-100 Evaluation of surface roughness of zirconia blocks with different yttria contents before and after aging after applying different sintering temperatures

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Zirconia-based ceramic materials are widely used in clinical applications due to their tooth-like appearance, biofunctionality, biocompatibility and affordable prices. In this study, the change in surface roughness of monolithic zirconia with different yttria contents was investigated before and after hydrothermal aging after applying different sintering temperatures. Three types of zirconium with different yttria contents were evaluated: VITA YZ HT (3 Y-TZP), VITA YZ ST (4 Y-TZP), VITA YZ XT (5 Y-TZP). Ninety plate-shaped samples (30 for one material) with dimensions of 10 mm x 10 mm x 2 mm were cut with a precision disc. VITA YZ HT (3 Y-TZP) and VITA YZ XT (5 Y-TZP) were sintered at three different temperatures as 1400 °C, 1450 °C and 1500 °C, while VITA YZ ST (4 Y-TZP) was sintered at three different temperatures as 1480 °C, 1530 °C and 1580 °C. The surface roughness of the sintered samples was measured by atomic force microscope (AFM) before and after autoclave aging (5 h, 134 °C, 0.2 MPa). The distribution of variables was measured by Kolmogorov-Smirnov, Shapiro-Wilk tests. ANOVA (Tukey test) was used in the analysis of quantitative independent data with normal distribution. Kruskal-Wallis, Mann-Whitney u tests were used in the analysis of quantitative independent data with non-normal distribution. Paired sample t test, wilcoxon test was used in the analysis of dependent quantitative data. SPSS 28.0 program was used in the analyses. There was no significant

difference between the sintering temperatures in the surface roughness values of the three zirconiums with different yttria contents before and after autoclave aging ($p > 0.05$). However, the surface roughness values of the three zirconia between before and after autoclave aging showed a significant increase at each sintering temperature ($p < 0.05$)

Keywords: zirconia,yttria, surface roughness, autoclave aging

SS-101 Is ChatGPT a reliable instrument for prosthetic dentistry?

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OBJECTIVES: This study aims to evaluate the information accuracy and reliability of ChatGPT's answers to frequently asked questions about prosthetic dentistry by patients and prosthodontists.

METHODS: A total of 40 questions (20 from patients and 20 from prosthodontists) were submitted to ChatGPT-3.5. The responses were independently evaluated by two academic prosthodontists and two clinical prosthodontists using a 5-point Likert scale (1 = very poor to 5 = very good). Inter-rater agreement was assessed using Fleiss's and Cohen's Kappa statistics. Differences between evaluator groups and question types were analyzed using Mann–Whitney U and Wilcoxon signed-rank tests.

RESULTS: According to the mean score of all specialists, the responses to patient questions were significantly higher than the responses to prosthodontist questions ($p<0.001$). There was no significant difference ($p=0.876$) between academics and clinicians in terms of patient-based questions.For prosthodontist-based questions, the mean scores evaluated by academics were significantly higher than those of clinicians. ($p<0.01$).

CONCLUSIONS: ChatGPT indicates promising reliability in answering common patient researches and prosthodontics questions. However, for advanced clinical questions, its performance is limited and should be supplemented by expert consultation. ChatGPT can be a useful tool for patient education but is not yet a substitute for professional expertise in prosthodontics.

Keywords: Chatgpt, Artificial intelligence, Prosthodontics, Reliability.

SS-103 The Effect of Aluminum Oxide and Zirconium Oxide Additions on the Mechanical Properties of a Flowable Composite Resin

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INTRODUCTION: Flowable composite resins are widely preferred in restorative dentistry due to their favorable handling and esthetic features. However, their relatively low mechanical strength compared to conventional composites limits their broader clinical applications. Reinforcement with inorganic nanoparticles has emerged as a potential strategy to improve their performance.

OBJECTIVE: This study aimed to evaluate the effects of aluminum oxide (Al_2O_3) and zirconium oxide (ZrO_2) nanoparticle additions at 1%, 3%, and 5% concentrations on the flexural strength and elastic modulus of a commercially available flowable composite resin.

MATERIALS-METHODS: Seven groups were prepared using a flowable composite resin (Nova Compo HF, IMICRYL, Turkey): one control group (no additives), three Al_2O_3 groups (1%, 3%, 5%), and three ZrO_2 groups (1%, 3%, 5%). All specimens underwent a three-point bending test. Maximum load, flexural strength, Young's modulus, and toughness were recorded. Statistical analysis was performed using one-way ANOVA and Tukey's post-hoc test ($p<0.05$).

RESULTS: The control group exhibited the highest flexural strength (109.23 MPa). ZrO_2 groups showed a statistically significant reduction in flexural strength, especially at 5% concentration (76.97 MPa). In contrast, Al_2O_3 groups maintained higher strength values, with GAMMA 1% reaching 102.32 MPa. The highest Young's modulus was observed in the Al_2O_3 5% group (18,888 MPa). Statistically significant differences were found between groups ($p = 0.019$), particularly between ZrO_2 groups and the control.

CONCLUSION: Zirconium oxide addition negatively affected flexural strength, while aluminum oxide enhanced the stiffness of the flowable composite without compromising strength. These results suggest that aluminum oxide may serve as a more suitable filler for improving the mechanical properties of flowable composite resins.

Keywords: Nanoparticle reinforcement, Flexural strength, Flowable composite resin

SS-104 Pull Out Bond Strength Of Different Cements Used In Implant-Supported Fixed Restorations

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OBJECTIVE: This study aimed to compare the pull out bond strengths of various luting cements used in implant-supported fixed prostheses.

MATERIALS AND METHODS: Ten abutment-analog complexes were used (n=10, N=50) in each group. Fifty standard abutments in 2 mm gingival height (Nucleoss, Şanlılar Ltd. Şti.) and analogs in 3.8 mm diameter and 12 mm height were torqued to 30 N. Screw access holes were sealed with teflon and light-cured composite (G-Aenial Achord, GC). Analogs were embedded in auto-polymerizing acrylic (Integra; BG Dental, Türkiye). Abutments were scanned (Medit T510), and CoCr crowns fitting to the abutments, with rings on the occlusal surface for pull-out tests and a 50 µm cement space, were designed using CAD software (Exocad GmbH) Crowns were fabricated additively via laser melting (Mysint 100 Dual Laser, Sisma). Five different types of cements were used for cementation: zinc polycarboxylate (Adhesor Carbofine, PENTRON, Czech Republic), glass ionomer (Kavitan CEM, PENTRON, Czech Republic), zinc phosphate (Adhesor, PENTRON, Czech Republic), self-adhesive resin (G-CEM ONE, GC Corporation, Japan), and resin-reinforced glass ionomer (Meron Plus QM, VOCO, Germany). Specimens were stored in 37°C water for 24 h. Pull-out tests were conducted using a universal testing machine (SHIMADZU AGS-X). Data were analyzed using one-way ANOVA and Tamhane's T2 *post hoc* test (SPSS).

RESULTS: Self-adhesive resin cement exhibited significantly higher pull out bond strength than all other groups ($P < 0.001$). While glass ionomer cement had the lowest values overall, there were no significantly difference to zinc polycarboxylate ($P > 0.05$).

CONCLUSION: Self-adhesive resin cement demonstrated superior pull out bond strength, suggesting enhanced long-term retention and clinical performance compared to other cements tested.

Keywords: Implant-Supported Fixed Prostheses, Cement, Pull out, Cementation

SS-105 The effect of gastric acid on the properties of 3D-printed temporary resin materials

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OBJECTIVES: This study investigated the effects of simulated gastric acid on the fracture load, surface roughness, and optical properties of different 3D-printed temporary crown materials (TCMs) produced using two different manufacturing methods (DLP and LCD).

MATERIALS-METHODS: In this study, three different 3D-printed TCM produced using were used; Primeprint Temp, PowerResins Temp, and Alias C&B Temp. Ninety specimens were produced to match the morphology of the maxillary first premolar tooth (n=30). The specimens were randomly divided into 2 groups as control and simulated gastric acid. Fracture load was measured using a universal testing machine and values were recorded in Newtons. Additionally, 30 disks with a thickness of 2 mm and a diameter of 10 mm were prepared (n=10). Surface roughness and colour measurements were performed on specimens before and after simulated gastric acid exposure. Results were analyzed by Kruskal-Wallis, Mann-Whitney U and Dunn's tests ($p=0.05$).

RESULTS: There is a statistically significant difference between the fracture loads of 3D-printed TCMs ($p<0.5$), but the application of simulated gastric acid does not affect the fracture load of the materials. These values are highest in the Alias C&B Temp group and lowest in the PowerResins Temp group. The Ra and Rz values of the PowerResins Temp group were found to be higher than those of the other groups ($p<0.5$). While the application of simulated gastric acid did not cause a statistically significant difference in the colour stability of the groups ($p>0.05$), it was found to statistically significantly affect the translucency values ($p<0.05$).

CONCLUSIONS: The data showed that simulated gastric acid application did not affect the fracture load and colour stability of the materials, but it could affect the surface roughness and translucency of some 3D-printed TCMs, regardless of the production method.

Keywords: 3D-printed temporary crown, gastric acid, fracture load, surface roughness.

SS-106 Comparative Evaluation of Additive and Subtractive Dental Materials: Stainability and Surface Roughness After Thermocyclin

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OBJECTIVE: The aim of this in vitro study was to evaluate color stainability surface roughness of restorations fabricated using additively manufactured resin composites (AM-RC), additively manufactured zirconia (AM-Z), and subtractively manufactured (SM) CAD/CAM materials after coffee thermocycling.

MATERIALS AND METHODS: Sixty disk-shaped specimens (Ø10 × 2 mm) were prepared from six CAD/CAM materials: AM-RC (Crowntec [C], NextDent [ND]), AM-Z (Lithoz [LI], INNI-Cera [IN]), and SM (CEREC Tessera [ALD], Vita Enamic [EN]). Each material was divided into two subgroups (n = 10) based on surface finishing (polished or unpolished). All specimens underwent thermocycling in a coffee solution (10,000 cycles between 5 °C and 55 °C) to simulate extrinsic aging. Color measurements were taken before and after aging, and color stainability (ΔE_{00}) were calculated. Surface roughness (Ra, μm) was also measured before and after coffee thermocycling using a non-contact optical profilometer. Data were analyzed using one-way ANOVA and *post hoc* tests (α =.05).

RESULTS: After coffee thermocycling, significant differences in ΔE_{00} values were found among IN, C, and ND ($P < 0.05$), with ALD showing the least color change ($P < 0.05$). No significant color change was observed between LI and EN ($P = 0.75$). In terms of surface roughness (Ra), AM-Z materials (LI and IN) exhibited the lowest values both before and after aging, indicating superior surface stability. SM materials (ALD and EN) showed moderate Ra values, with polished subgroups performing better. AM-RC materials (C and ND) had the highest Ra values, especially post-thermocycling ($P < 0.05$). Overall, thermocycling significantly increased Ra in AM-RC, while AM-Z remained stable.

CONCLUSION: CEREC Tessera exhibited best Color stainability after thermocycling, whereas INNI-Cera showed greatest discoloration. While AM-Z materials maintained superior surface integrity, AM-RC materials were most affected by aging. These results suggest that SM ceramics, particularly ALD, may offer favorable long-term esthetic and surface performance.

Keywords: Additive Manufacturing, Subtractive Manufacturing, Color Stability, Prosthodontic Materials

SS-107 Color Stability of Conventional and 3D-Printed Restorative Materials in Staining Media: An In Vitro Comparison

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OBJECTIVE: This in vitro study evaluated the color stability of temporary and permanent restorative materials fabricated using conventional and additive manufacturing techniques when exposed to different staining media.

MATERIALS-METHODS: Ninety-six disc-shaped specimens (10×2 mm) were fabricated from four materials: heat-polymerized PMMA, auto-polymerized PMMA (Integra), 3D-printed temporary resin (VarseoSmile Temp), and 3D-printed permanent resin (VarseoSmile Crown Plus) (n=24 per group). Digital designs were created in Blender 4.4 and printed with an ASIGA printer. After polishing, specimens were immersed in distilled water at 37°C for 24 hours. Each group was then divided into subgroups (n=6) and immersed in distilled water, tea, coffee and a tomato paste-based staining solution for 7 days, with daily solution renewal. Color measurements were recorded on days 0, 4, and 7 using a VITA Easyshade V spectrophotometer. Color changes (ΔE_{00}) were calculated using the CIEDE2000 formula.

Statistical Analysis: Data normality was assessed using the Shapiro-Wilk test. The Kruskal-Wallis H test and Bonferroni-corrected Mann-Whitney U tests were used for group comparisons. Time-based changes were analyzed using the Friedman and Wilcoxon signed-rank tests ($p < 0.05$).

RESULTS: All materials showed increasing discoloration over time. Both material type and staining medium significantly affected ΔE_{00} values ($p < 0.001$). Heat-polymerized PMMA exhibited minimal color change ($\Delta E_{00} < 1.0$), remaining within clinically acceptable limits. In contrast, the 3D-printed temporary resin showed the highest discoloration, particularly in coffee and tomatopaste-based solutions ($\Delta E_{00} > 5.0$).

CONCLUSION: The color stability of restorative materials is influenced by both fabrication technique and staining exposure. 3D-printed temporary resins demonstrated clinically unacceptable discoloration, underlining the need for careful material selection in esthetically demanding areas.

Keywords: 3D-printed resin, Temporary restorations, Color stability, Esthetic dentistry

SS-108 Er:YAG laser debonding of lithium disilicate and lecuite laminate veneers: effect of laser power setting on the debonding time and pulpal temperature

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Objectives: Removing all-ceramic restorations used with adhesive cements is extremely difficult due to strong bonding. Laser transmitted into the ceramic is used for debonding. This study is conducted to evaluate the debonding time and pulpal temperature caused by the Er:YAG laser.

MATERIALS AND METHODS: 120 extracted maxillary central teeth were prepared at the enamel level. Leucite and lithium disilicate CAD-CAM ceramic blocks were fabricated with size of 5 mm x 12 mm and a thickness of 1 mm (60 specimens from each leucite and lithium disilicate). Ceramic blocks were cemented on the enamel surface using adhesive cement. Each group was divided into 3 subgroups according to laser parameters (n = 20). Thus, 6 groups were obtained with different ceramic and laser parameters. Pulpal temperature was measured with a thermocouple during debonding. Data were analyzed using Kruskal Wallis and Dunn multiple comparison tests.

RESULTS: Debonding time was found in 3W groups the shortest. There was no debonding in 15 minutes in 1W groups. Pulpal temperature difference was found in the groups of maximum 1W and the lowest 2W. When the same output power was used, it was observed that different ceramic types did not statistically affect the removal time and pulpal temperature difference ($p < 0.05$).

Conclusions: The 2W and 3W group parameters can be used safely in the removal of the restoration. In the 1W group, it was concluded that it would not be appropriate to remove it with these parameters since the temperature exceeded 5.5 °C in more samples.

Keywords: CAD-CAM, Debonding, Dental ceramics, Er:YAG laser, Pulpal temperature

SS-109 Evaluation of the Accuracy of Metal Crown Frameworks Fabricated via Selective Laser Sintering at Varying Build Angles and Different Alloys

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OBJECTIVES: This study aimed to evaluate the trueness of the intaglio surfaces and marginal areas of metal crown frameworks fabricated via selective laser sintering (SLS) at different build angles using three metal alloys.

MATERIALS-METHODS: A standardized crown framework was designed and exported as an STL file. Frameworks were fabricated using CoCr, NiCr, and Ti alloys at build angles of 0°, 45°, and 90° (n = 5 per group). Post-fabrication, intaglio surfaces were sandblasted with 110 µm aluminum oxide. Crowns were scanned using an intraoral scanner (Trios 5, 3Shape, Denmark), and STL data were superimposed onto the reference design. Root mean square (RMS) deviation values for marginal and intaglio surfaces were calculated using Geomagic Control X software. Statistical analysis included one-way ANOVA with Tukey's HSD and two-way ANOVA ($\alpha = 0.05$).

RESULTS: Marginal trueness did not differ significantly among materials ($p = 0.935$), although build angle approached significance ($p = 0.058$). Both material ($p = 0.009$) and build angle ($p = 0.018$) had significant effects on intaglio surface accuracy. Titanium showed the highest intaglio trueness across all angles. NiCr demonstrated superior marginal accuracy at 0° and 45°. CoCr exhibited the greatest deviations in both marginal and intaglio regions, indicating lower accuracy overall.

CONCLUSION: Build angle significantly influences the accuracy of SLS-fabricated metal crowns, with 90° orientations showing the greatest deviations. Alloy type also affects intaglio surface trueness and its interaction with build angle further impacts overall precision.

Keywords: Selective laser sintering, intaglio surface accuracy, build angle

SS-110 A New Approach in Digital Impression: Evaluation of the Accuracy of Precision Scan Bodies in Full-Arch Implant Restorations

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OBJECTIVES: With the advancement of the digital era in the treatment of full-arch implant-supported restorations, new digital impression components are being developed. However, due to certain limitations of these components, accurate impressions cannot always be achieved, potentially affecting treatment outcomes. This study aims to evaluate the accuracy between two digital components—standard scanbody and scanbody pro—produced by the same implant manufacturer.

MATERIALS-METHODS: A fully edentulous mandibular model was used in this study. Four Dentis brand scanbodies were placed on the four implants in the model. The model was scanned using a model scanner with 4µ scanning precision and exported as an STL file, which served as the reference data. Then, precision scan bodies were placed on the same model and scanbodies, and the model was scanned 10 times using an intraoral scanner. STL files were exported accordingly. The obtained data were imported into the Geomagic Control X software to be superimposed with the reference data. Statistical differences between RMS and angular values were recorded.

RESULTS: In the Scanbody1 group, a statistically significant angular difference was observed ($p<0.001$). No statistically significant angular differences were found in the other scanbody groups. Regarding RMS values, no statistical difference was noted ($p>0.05$).

CONCLUSIONS: The absence of a significant difference in RMS values suggests that the angular difference observed in the Scanbody1 group is within a tolerable range. As a result, scanbody pros created with the addition of precision scan bodies demonstrated similar accuracy. This outcome may be attributed to the perfect and parallel positioning of the implants and scanbodies in the model used.

Keywords: scanbody, scanbody pro, implant-supported, digital impression

SS-111 Evaluation of dental and prosthetic status on nutrition and life quality in geriatric patients

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OBJECTIVES: The impact of current dental status and type of prosthesis, if any, on the diet and quality of life of geriatric patients with missing teeth, whether using removable prostheses or not evaluated in this study.

MATERIALS-METHODS: Voluntary participants aged 65 and older who applied to Pamukkale University Faculty of Dentistry, Prosthodontics Clinic, were included. They were divided into six groups (n=15) according to dental status and prosthesis type: without tooth loss (≥26 teeth), with tooth loss not using prostheses, using removable partial dentures (RPD) in one jaw, using RPD in both jaws, using total dentures (TD) in one jaw, and using TD in both jaws. Socio-demographic data and functions including chewing, swallowing, and breathing were assessed via questionnaire. Relationships between categorical variables were analyzed by chi-square test, with significance defined at $p<0.05$.

RESULTS: A total of 97 geriatric patients (50 males, 51.5%; 47 females, 48.5%) were included. It was determined that 15 of the patients had no tooth loss (15.5%), 16 did not use prosthesis despite tooth loss (16.5%), 16 used RPD in one jaw (16.5%), 18 used RPD in both jaws (18.6%), 15 used TP in one jaw (15.5%), and 17 used TP in both jaws (17.5%). Gender showed no significant association with the evaluated parameters ($p>0.05$). Intraoral condition was significantly associated with inability to consume food, reduced chewing, preference for soft foods, difficulty breaking food into smaller pieces (all $p<0.0001$), and nasal breathing ($p<0.003$). Duration of edentulism significantly affected food consumption ($p<0.004$), chewing ($p<0.038$), food breakdown ($p<0.024$), and nasal breathing ($p<0.002$). No significant correlation was found between smoking and breathing difficulty or nasal breathing ($p>0.55$).

CONCLUSIONS: Dental status and edentulism duration significantly affect diet and quality of life in geriatric patients; therefore, regular follow-ups and solution-oriented treatments should be prioritized to enhance outcomes.

Keywords: geriatric dentistry, dental prosthesis design, masticatory force, nutrition status, quality of life.

SS-113 Clinical Evaluation of Photogrammetry vs. Intraoral Scanning for Passive Fit in Edentulous Jaws

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INTRODUCTION: Achieving passive fit is a fundamental requirement in full-arch implant prosthodontics, particularly in edentulous cases where tissue-supported scanning poses challenges. Misfit of frameworks may result in biomechanical complications, including screw loosening, prosthesis fracture, or peri-implant bone loss. Digital impression techniques such as intraoral scanning and photogrammetry are increasingly used to improve accuracy and reduce clinical chair time. This case report presents a clinical comparison of TRIOS 5 (3 Shape, Denmark) intraoral scanning and ICAM 4D (Imetric, Switzerland) photogrammetry based on passive fit using the Sheffield one-screw test.

Case description: A 52-year-old female patient, previously rehabilitated with four Straumann implants in both the maxilla and mandible via guided surgery seven years earlier, presented with a fracture of her maxillary full-arch prosthesis. The existing prostheses were removed, and digital impressions were taken using both the TRIOS 5 intraoral scanner and the ICAM 4D photogrammetry system with coded scan markers. From both digital workflows, custom laser-sintered titanium verification bars were fabricated. Clinical evaluation of each bar was performed using the Sheffield one-screw test, tightening a single screw and observing the opposite side for any lifting or misfit.

DISCUSSION: The photogrammetry-derived bar showed complete passive fit with no observable lift or stress during testing. In contrast, the TRIOS 5-based bar demonstrated slight vertical displacement, indicating relative misfit. Photogrammetry provided independent capture of implant positions, minimizing errors associated with scan stitching and soft-tissue mobility. The use of rigid markers and simultaneous image triangulation ensured high geometric accuracy, especially important in edentulous arches. Based on the superior fit, final monolithic zirconia prostheses with titanium bars were fabricated using photogrammetric data and delivered to the patient. This case highlights the clinical advantage of photogrammetry for full-arch impressions in edentulous patients where passive fit is critical to long-term prosthetic success.

Keywords: Intraoral scanner, Implant impression, Photogrammetry, Dental prosthesis, Implant-Supported

SS-114 Evaluation of Elastic Recovery and Dimensional Stability of 3D-Printed Versus PVS Gingival Mask Materials

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This study aimed to evaluate the elastic recovery and dimensional stability of gingival mask materials fabricated by additive manufacturing and conventional methods. After gingival contouring on a partially edentulous typodont to simulate the emergence profile, a reference patient model was produced using a 3D printer (Shining 3D AccuFab-L4D, Shenzen, China).

Intraoral scans and conventional impressions using polyvinyl siloxane (PVS) material were obtained from this reference model. Based on the scan data, detachable gingiva model sets were digitally designed and 3D printed using a gingiva-colored resin (PowerResins Gingiva, 3BFab Teknoloji, Istanbul, Turkey) for Group A (additively manufactured). For Group B (conventional), model sets were fabricated by pouring dental stone and applying the PVS-based gingival mask (Gingifast Rigid, Zhermack, Italy) into conventional impressions.

Eight model sets were produced for each group. Custom healing abutments were placed on the implant analogs and kept in place for 10 minutes to simulate clinical conditions. After removal and a 10-minute waiting period, all models were re-scanned using an extraoral laboratory scanner. The resulting scan data were compared with baseline (T0) data using metrology software(Geomagic Qualify 2012). Three-dimensional deviation analyses were performed to evaluate dimensional changes and elastic recovery.

Additionally, standardized disc specimens of 12x4mm of both materials were tested using a rheometer (Discovery HR-30, TA Instruments, New Castle, DE, USA). The elastic recovery test results were consistent with the typodont model findings. Additively manufactured gingival masks demonstrated significantly better elastic recovery compared to PVS-based materials ($p < 0.1$). However, despite showing lower dimensional stability, according to the stress-strain curve; the PVS-based masks exhibited viscoelastic behavior more similar to natural gingiva, while 3D printed masks were more rigid and less flexible.

Keywords: 3d printed gingiva mask, additively manufactured gingival mask, elastic recovery

SS-115 Estimating occlusal vertical dimension using facial landmarks and deep learning-based models

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Statement of problem: The determination of Occlusal Vertical Dimension (OVD) using traditional methods is often subjective and inconsistent, highlighting the need for a deep learning-based approach to accurately and reproducibly predict OVD from facial landmarks. Purpose. The purpose of this study is to assess the efficacy of deep learning algorithms in predicting the OVD from selected facial landmark points.

MATERIALS-METHODS: The study was conducted using standardized frontal and lateral photographs of 200 individuals, comprising 100 males and 100 females. Manual measurements of facial landmarks were taken from these digital images. These images and landmark data measurements were used to train and evaluate deep learning models based on the You Only Look Once version 8 (YOLOv8) architecture, including its sub-variants (YOLOv8s, YOLOv8m and YOLOv8l), each differing in complexity and parameter count. The performance of these models was evaluated in terms of their ability to accurately detect facial landmarks and predict the corresponding OVD values.

RESULTS: Among the models tested, the highest prediction accuracy was achieved by YOLOv8l, with a mean absolute error (MAE) of 1.35 mm and a coefficient of determination (R^2) of 0.786, indicating a strong correlation between the predicted and actual OVD values. The results demonstrate that the deep learning approach, particularly the YOLOv8 architecture, can effectively identify relevant facial landmarks and reliably estimate OVD with high accuracy.

CONCLUSION: The findings of this study support the feasibility of using deep learning-based models for the prediction of occlusal vertical dimension from facial photographs. The YOLOv8 model family, especially the large-sized variant, offers a promising tool for enhancing diagnostic precision and reducing variability in prosthodontic practice.

Keywords: Artificial Intelligence, Vertical Dimension of Occlusion, Prosthodontics, Dentistry

SS-116 Accuracy of Implant-Supported Reverse Scanning in the Edentulous Maxilla: Influence of Scanner Type

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Objectives: Reverse scanning is a digital workflow involving the extraoral scanning of an interim, implant-supported prosthesis. This allows a complete digital workflow for edentulous cases. This study aims to evaluate the accuracy of reverse scanning workflows using three different intraoral scanner systems.

Materials and methods: A maxillary edentulous cast was prepared with four parallel multi-unit implant analogues. An interim, implant-supported prosthesis was then designed and printed. The interim prosthesis was fixed to temporary abutments on the cast. Reverse scanning was performed using three different intraoral scanners (Group 1: Alliedstar, Group 2: Primescan, Group 3: TRIOS 5) and a standard reverse scan body protocol (n=10). Reference model was scanned using a high-precision desktop scanner. All digital impressions were aligned with the reference scan based on the position of the implant analogs. Trueness was evaluated by calculating the deviation between the test groups and the reference model, and the accuracy was compared across the scanners and workflows.

RESULTS: Trueness analysis showed significant differences among the three intraoral scanner systems used in reverse scanning. The scanner identified as Group 3 exhibited the lowest mean deviation, indicating the highest trueness among the tested workflows for both linear and angular deviations. Group 1, in contrast, presented higher variance patterns, suggesting less consistent accuracy. Despite overlapping confidence intervals in some cases, descriptive statistics favored Group 3 in both mean and interquartile range performance.

CONCLUSION: Reverse scanning accuracy is significantly influenced by the intraoral scanner system used. Among the evaluated systems, scanners demonstrated different trueness. Further studies should be evaluated with more scanner systems and in vivo conditions.

Keywords: reverse scan body, intraoral scanner, implant impression

SS-117 Do Build Orientation and Coffee Cycles affect Color Change and Roughness in Silica-based 3D-Permanent Resins?

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AIM: This in vitro study aimed to evaluate the influence of material type and build orientation on the color stability and surface roughness of 3D-printed permanent dental resins. Two additive-manufactured materials containing different silica-based fillers were tested following immersion in a coffee solution. Samples were produced at three build orientations (0°, 45°, 90°) and subjected to two surface treatments: manual polishing and Optiglaze coating.

MATERIALS AND METHODS: A total of 84 disc-shaped specimens (Ø13 mm × 1 mm) were fabricated using a DLP 3D printer (Asiga MAX) with two A1-shade resins: one containing pyrogenic silica (Saremco Crowntec) and the other containing non-pyrogenic, silanized glass filler (VarseoSmile TriniQ). Specimens were categorized based on build orientation and surface treatment. Color parameters (ΔE_{00}, ΔL, RTP_{00}) and surface roughness (Ra) were recorded before and after immersion in a standardized coffee solution. Data were analyzed using three-way ANOVA ($\alpha = 0.05$).

RESULTS: Material type, surface treatment, and their interaction significantly affected ΔE_{00}, ΔL, and ΔRTP_{00} ($p < 0.005$), while build orientation alone significantly influenced only ΔL ($p < 0.05$). The pyrogenic silica–based material exhibited greater color and translucency changes, particularly in oblique (45°) specimens that were manually polished. The non-pyrogenic group demonstrated higher color stability under all conditions. Surface roughness values showed no statistically significant differences among the groups ($p > 0.05$).

CONCLUSION: Material composition and surface treatment were critical determinants of optical stability. Pyrogenic silica fillers were more prone to discoloration and darkening, while non-pyrogenic silica fillers offered improved esthetic durability. Optiglaze application effectively mitigated discoloration in susceptible groups. Build orientation had a limited effect, and surface roughness remained consistent across variables.

Keywords: permanent resin, additive manufacturing, color stability, build orientation, surface treatment

SS-118 Is Closed-Bar Design a better option for All-on-Four Concept ?

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OBJECTIVES: This study aimed to investigate the biomechanical impact of implant angulation and the addition of a closed-bar design in All-on-Four-supported maxillary prostheses using finite element analysis (FEA).

MATERIALS-METHODS: A 3D edentulous maxilla model was obtained from the BodyParts3D open-source database. Based on Nobel Biocare specifications, straight and angled implants and abutments were modeled using Ansys SpaceClaim software. Four models were created: Model I included 30° angled posterior implants; Model II was similar but incorporated a palatal bar in the first molar region; Model III used 45° angled posterior implants; Model IV combined the 45° angle with a closed palatal bar. All models were subjected to a 200 N oblique occlusal force applied at the first molar. Displacement and von Mises stress values were recorded in the bone, implants, abutments, prosthesis, and substructure bar.

RESULTS: The highest displacement in all models occurred at the buccal cusp of the loaded first molar. Model I showed the greatest displacement (0.21 mm), while Model II exhibited the least (0.15 mm). The highest average von Mises stress was observed in components such as the distal implant, angled abutment, and substructure bar. Model II consistently presented the lowest stress values.

CONCLUSIONS: Implant angulation and the integration of a palatal bar notably affect stress distribution and displacement in All-on-Four prostheses. The closed-bar design in Model II improved biomechanical performance, suggesting a more stable and favorable stress response in the atrophic maxilla.

Keywords: All-on-Four, Finite element analysis, Closed-bar design, Atrophic maxilla, Implant-supported prosthesis

SS-119 Effect of mechanical aging and steam autoclaving on the accuracy of different mechanical torque limiting devices

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Statement of Problem: There is limited evidence regarding the long-term torque delivery accuracy of mechanical torque-limiting devices (MTLDs) from different manufacturers after repeated mechanical aging and sterilization. Purpose. The purpose of this study was to evaluate the accuracy of spring- and friction-style MTLDs from 6 implant manufacturers in delivering target torque values, and to assess the effects of mechanical aging and steam autoclaving on their performance.

Material and METHODS: Sixty new MTLDs from 6 manufacturers (spring-style devices: Astra Tech, Nobel Biocare, Straumann, Bilimplant; and friction-style devices: Neoss and Meisinger) were included in the present study (n=10). After initial measurements (T1), all devices underwent 500 simulated clinical uses to assess the effect of mechanical aging, after which torque values were recorded again (T2). Subsequently, each device was subjected to 100 steam autoclaving cycles under standardized conditions (134 °C, 7 minutes), and final torque values were collected (T3). All torque measurements were performed using a custom-designed device. Two accuracy metrics, absolute difference (ABSDIFF) and percentage deviation (PERDEV), were used for comparison. Statistical analyses included two-way robust ANOVA and Bonferroni-adjusted *post hoc* tests (α=.05).

RESULTS: At baseline, spring-style MTLDs demonstrated significantly lower ABSDIFF values than friction-style devices (P=.001), indicating higher initial accuracy. No significant differences were found between device types after mechanical aging (P>.05). Following sterilization, torque deviation increased in spring-style devices, particularly Astra (P<.05). All devices maintained torque delivery within the clinically acceptable ±10% threshold.

CONCLUSIONS: Spring-style MTLDs provided more accurate torque delivery initially, while friction-style devices demonstrated greater stability after repeated mechanical aging and sterilization. Device type and manufacturer-specific factors influence long-term accuracy.

Keywords: Mechanical torque limiting devices, Torque delivery, Steam autoclaving, Mechanical aging

SS-120 Influence of Cut-Rescan Strategies on the Accuracy of Preparation Area Scans with Different Intraoral Scanners

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PURPOSE: The aim of this study was to compare the accuracy of different cut-rescan strategies in the preparation area using different intraoral scanners (IOS).

MATERIALS-METHODS: Teeth #13 and #16 on a typodont model were prepared with a chamfer finish design. A full-arch reference scan was obtained using an industrial optical scanner. Then, the typodont was scanned ten times each with two different intraoral scanners (3S and MD). After the initial scans, the preparation areas were cut and rescanned using two different rescan strategies: cut-scan and cut-HD scan. All scans were evaluated using 3D analysis software, comparing the entire preparation, axial wall, and margin areas individually. Root Mean Square (RMS) values were obtained and statistically analyzed using repeated-measures ANOVA. The significance level was set at $p < 0.05$.

RESULTS: All RMS values were relatively low (<35 µm) and clinically acceptable. Overall model accuracy was higher with 3S compared to MD. For the preparation area, no significant difference was found between the two scanners ($p > 0.05$). For the 16 margin area, the interaction between scanner and rescan strategy was statistically significant, with MD cut-HD scans showing significantly higher accuracy than its initial scan ($p < 0.05$). In other regions, scanner type, rescan strategy, and their interaction showed no significant differences.

CONCLUSIONS: The accuracy of the molar tooth margin improved for MD with the cut-HD rescan. However, for the canine tooth, accuracy was similar regardless of scanner or rescan strategy. Although 3S demonstrated higher full-model accuracy, both scanners performed similarly in the preparation area. Clinically, cut-rescan techniques can be considered applicable for scanning preparation areas.

Keywords: Intraoral scanner, Cut-rescan strategy, HD scanning, Scanning accuracy, Trueness

SS-121 Short Time, Superior Aesthetics: A Case Series of Immediate Implant Placing and Immediate Loading

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INTRODUCTION: Immediate implant placement and immediate loading in the aesthetic region has become a popular treatment option to achieve a natural emergence profile and improve the patient comfort. This case series aims to present the rehabilitation of patients with immediate placement and immediate loading concept with a fully digital workflow and their follow-up over 2 years.

Case description: For the patients whose teeth in the aesthetic region were decided to be extracted and replaced with implants for various reasons, digital impressions were taken with an intraoral scanner before the treatment. After atraumatic extraction of the necessary teeth, the implants were placed immediately. Once the required primary stability was obtained, digital impressions were taken from the patients in the same visit for immediate loading. For the design of the provisional restorations, the STL files of the digital impressions taken before tooth extraction and after implant placement were combined in a CAD program. Thus, temporary restorations were designed to mimic the patient's natural emergence profile. Screw-retained 3D-printed temporary resin restorations loaded within 24 hours. Patients were called for follow-up visits throughout their osseointegration period. Digital impressions were taken for their permanent restorations after osteointegration, reflecting the same natural emergence profiles preserved with provisional restorations. Screw-retained monolithic zirconia restorations were designed and manufactured to mimic the soft tissue contours of the patients' teeth before extraction. Thanks to immediate placement and loading, patients completed their treatment in a short time and comfortably. A 2-year-follow-up after the delivery of permanent restorations showed that the peri-implant soft tissues were healthy and patients were aesthetically satisfied.

DISCUSSION: With the help of digitalization in implant dentistry, patient satisfaction can be increased by maintaining the health of peri-implant soft tissues and providing pink aesthetics compatible with natural teeth by performing immediate placement and immediate loading in a predictable manner.

Keywords: dental implants, digital impression, emergence profile, immediate loading

SS-122 Surface treatment effects on color stability and roughness of CAD-CAM ceramics

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OBJECTIVES: This study aimed to evaluate the effects of different surface treatments (hydrofluoric etching, air abrasion, and Er,Cr:YSGG laser irradiation) on the surface roughness and color change of three CAD/CAM glass ceramics: VITA MarkII, IPSe.max CAD, and Celtra Duo.

MATERIALS-METHODS: A total of 120 rectangular ceramic specimens (12×14×1.5 mm, n=40) were prepared. Each material was divided into four subgroups according to the surface treatment: air abrasion, hydrofluoric etching, and Er,Cr:YSGG laser at 2W and 3W. Surface roughness (Ra) was measured using profilometer, and color parameters (L_o, a_o, b_o) were recorded using a spectrophotometer before and after treatment. The color differences (ΔE_{00}) were calculated. Statistical analyses were performed using SPSS 25.0. Following tests for normality and homogeneity of variance, data were analyzed using repeated measures ANOVA and t-tests.

RESULTS: Statistical analysis revealed that both the treatment method and material significantly affected ΔE_{00} values ($p < .001$), while their interaction was not significant ($p = .059$). In the VITA Mark II group, significant differences in ΔE_{00} values were observed depending on the surface treatment ($p = .001$), with the highest color change occurring after etching and the lowest after air abrasion. All treatments caused a statistically significant increase in surface roughness ($p < .001$); the highest Ra values were recorded after air abrasion, and the lowest after 2W and 3W laser applications. Significant interaction effects were found between Material×Surface Treatment ($p = .002$) and Surface Treatment×Roughness ($p < .001$).

CONCLUSION: Surface treatments have a significant impact on both the color stability and surface roughness of CAD/CAM ceramics. Etching and air abrasion resulted in the greatest color changes, while air abrasion led to the highest surface roughness across all materials. For clinical applications, the choice of surface treatment should be considered to balance esthetic stability with micromechanical retention based on the type of ceramic material used.

Keywords: CAD-CAM, Color, Surface Roughness, Surface Treatment

SS-123 Digital Workflow in Obstructive Sleep Apnea Treatment with MODJAW: Case Report

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Intoduction: Obstructive sleep apnea (OSA) is characterized by repetitive apneas and hypopneas resulting from narrowing or collapses in the upper airway during sleep. Mandibular advancement device (MAD) therapy is a well-established treatment option for OSA. MAD effectively reduces snoring and obstructive respiratory events by mechanically advancing the mandible, expanding the oropharyngeal area, and stretching the tongue muscles to prevent collapse against the pharyngeal wall. This study aims to eliminate errors that may arise during the impression-taking process and jaw positioning of MADs produced using conventional methods. Additionally, it seeks to minimize production errors and save time by designing and preparing the MAD entirely in a digital environment

Case description: The patient's mandibular protrusion and mouth opening records were transferred to the digital platform using the MODJAW optical tracking device. The MAD was designed with appropriate protrusion and mouth opening distances, and its production was completed digitally.

DISCUSSION: The MODJAW enables the real-time recording and analysis of occlusion in both static and dynamic conditions. The transfer of the patient's mandibular movements to the digital environment eliminated potential errors in traditional processes, including impression-taking, jaw relation recording, and model fabrication from impressions, establishing a seamless digital workflow, and reducing time loss. A digital workflow facilitated by the MODJAW optical tracking device simplifies complex oral rehabilitations, including MAD production.

Keywords: MODJAW, Mandibular advancement device, Obstructive sleep apnea, Kinematic mandibular movements, Digital workflow

SS-124 The effect of adjacent teeth on the digital accuracy of the intraoral scanners

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OBJECTIVES: The aim of this study was to evaluate the effect of teeth adjacent to parallel or angled implants on digital impression accuracy in posterior three-unit fixed partial dentures.

MATERIALS-METHODS: In the Tipodont model of the upper jaw, implant analogs were placed in the first premolars and first molars region, parallel on the right side and angled 15 degrees on the left side, and 3 different scenarios were obtained by removing the adjacent teeth. Simulation (S1): Main model with partial edentulism with missing 1st premolars and 1st molars; simulation (S2): Partial edentulous model with missing 1st premolars, 2nd premolars and 1st molars; simulation (S3): Partially edentulous models with missing maxillary canines, 1st premolars, 1st molars and 2nd molars were obtained. With 4 different intraoral scanners (Trios 5, Trios 3, Virtuo Vivo and Medit i700), 10 digital images were obtained from each scenario with digital impression analogs. Digital accuracy were evaluated using reverse engineering software (Geomagic Control X).

RESULTS: The statistically significant difference was found between intraoral scanning devices ($p<0.05$). When device differences are analysed, the Medit i700 and Virtuo Vivo devices demonstrate the highest levels of accuracy in all scenarios and sides. The lowest accuracy values in all scenarios and sides were obtained with Trios 5.

CONCLUSION: The clinicians should consider the teeth adjacent to the implant in order to take a more precise impression for each intraoral scanning device.

Keywords: Implant, digital impression, intraoral scanner, accuracy, precision

SS-125 Comparative Estimation of Occlusal Contact Points Obtained with 2 Different Digital Systems with Artificial Intelligence

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OBJECTIVES: In this study, a comparative analysis of 5 different deep learning models was performed to predict T-SCAN occlusal analysis values from CEREC digital dental restoration images using the data recorded at the maximum intercuspal position.

MATERIALS-METHODS: Occlusal recordings were obtained from healthy 20 females and 20 males aged 18-25 at the maximum intercuspal position. Records were saved as.jpeg format and transferred to Adobe Photoshop CS6 program. Data prediction was performed with CNN (Convolutional Neural Network), ResNet-50 (Residual Network-50), Vision Transformer (ViT), Pix2Pix GAN (Pixel-to-Pixel Generative Adversarial Network) and CNN+Attention hybrid model on the dataset created using 80 images and corresponding T-SCAN data, and evaluated with MAE (Mean Absolute Error), RMSE (Root Mean Square Error) and clinical accuracy metrics.

RESULTS: The results indicate that models including attention mechanism tend to perform better. This study investigates the predictability of T-SCAN values from CEREC images with artificial intelligence.

Keywords: T-Scan, Cerec, Occlusal analyzers, Artificial Intelligence

SS-126 Evaluation of the Accuracy of Different Intraoral Scanners in Complete Denture Digitization

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Objectives: The aim of this study was to compare the accuracy of various intraoral scanners with different technologies in the digitization of complete dentures. The scan data obtained with intraoral scanners were evaluated by comparing them to reference STL files acquired using a high-precision laboratory scanner (3Shape E4).

MATERIALS AND METHODS: Three different intraoral scanners (Alliedstar AS260, iTero Lumina, and Sirona Primescan) were evaluated. A single maxillary complete denture was scanned ten times with each device, resulting in a total of 30 scans (n=10 per group). Reference data were obtained using a 3Shape E4 laboratory scanner. All scans were aligned and analyzed using Geomagic Control X software. Evaluations were performed separately for the intaglio and denture teeth surfaces.

RESULTS: Mean RMS values for the intaglio surface were 1.611 ± 0.021 µm for Alliedstar AS260, 1.388 ± 0.032 µm for iTero Lumina, and 1.688 ± 0.059 µm for Sirona Primescan. For the denture teeth surface, the respective values were 0.826 ± 0.050 µm, 1.188 ± 0.016 µm, and 0.544 ± 0.043 µm. Normality was confirmed using the Shapiro–Wilk test ($p > 0.05$). iTero Lumina showed the highest trueness for the intaglio surface, while Sirona Primescan had the lowest deviation for the denture teeth surface. Statistically significant differences were found among groups for both regions ($p < 0.001$).

CONCLUSIONS: The findings of this study indicate that the accuracy of intraoral scanners may vary depending on the type of surface being scanned. iTero Lumina provided the highest trueness on the intaglio surface, which is critical for soft tissue adaptation and retention, while Sirona Primescan achieved superior accuracy on the denture teeth surface, which is important for occlusal and esthetic planning. These results highlight the importance of selecting a scanner based on the clinical priority of the scanned region.

Keywords: Intraoral Scanners, Complete Denture, Surface Trueness, RMS Analysis, Digital Impression

SS-128 The effect of commonly used polishing protocols on the color stability of 3D- printed temporary crowns

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OBJECTIVE: Color stability is a crucial parameter for maintaining the long-term esthetic success of temporary restorations. This study aimed to evaluate the effects of different clinical polishing protocols applied to three-dimensional (3D) printed temporary resin crowns on their color stability.

MATERIALS-METHODS: Fifty standardized specimens (12×12×2 mm) were prepared using a 3D printing resin material (PowerResins, Temp Resin, A2, Turkiye) and randomly divided into five groups (n=10) as G1: Control (no polishing), G2: Mechanical polishing (DCPT 14 RA SET), G3: Silicon dioxide-containing polishing paste (Promida Prophy P), G4: Mechanical + silicon dioxide paste, G5: Diamond particle-containing polishing paste (Intensiv Unigloss). Initial color measurements were performed using a digital spectrophotometer (Vita Easyshade V). TSpecimens were exposed to a daily coffee cycle for 15 days. Color differences were calculated using the CIEDE2000 (ΔE00) formula, and the data were analyzed by one-way analysis of variance (ANOVA). Tukey's post-hoc test was applied for multiple comparisons ($p < 0.05$).

RESULTS: No significant differences were observed between the groups before the coffee staining cycle ($p > 0.05$). After staining, intergroup differences were statistically significant ($p < 0.05$). The lowest ΔE_{00} values were recorded in G5 (diamond particle- containing polish). G3 and G4 exhibited moderate color changes, comparable to the control group (G1). The highest color change was observed in G2 (mechanical polishing only), with ΔE_{00} values exceeding the clinically perceptible threshold ($\Delta E_{00} \geq 0.8$).

CONCLUSION: The diamond particle-containing polishing paste provided the best color stability both statistically and clinically. The polishing protocol plays a decisive role in the color stability of 3D-printed temporary crowns. The use of diamond-containing polishing systems is recommended, particularly in esthetic zone restorations.

Keywords: 3d printing, temporary crown, polishing protocol, color stability, CIEDE2000

SS-129 Evaluation of the effect of sintering speed and temperature on the microstructure, bend strength, and optical properties of monolithic zirconia

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OBJECTIVES: This study aimed to investigate the effects of different sintering temperatures and speeds on the microstructure, flexural strength, and optical properties of monolithic zirconia in vitro.

MATERIAL-METHODS: In this work, 90 disc-shaped monolithic zirconia blocks with the color option A2 were sintered at three different temperatures to create three groups. The samples were sanded at 300 rpm under water cooling with 600,800,1200 grit silicon carbide etching papers, respectively. Thirty pieces of zirconia material were sintered separately due to temperature and time. The sintered zirconia samples were polished with a zirconia polishing mill. The final dimensions of the disk-shaped samples were measured with a digital caliper. The normality of variables was assessed by Shapiro-Wilk, ANOVA, and LSD tests.

RESULTS: The results showed that as the sintering speed went up, the TP00 value went down; fast sintering gave the best strength, while normal sintering gave the worst; as the sintering speed went up, the CR value went up and the OP value went down; and there was a statistically significant difference in the DE2000 score between the different sintering groups.

CONCLUSIONS: In terms of clinical use, the fast sintering group can often be preferred due to its shortening of patient-side time, improved optical properties, and high bending strength.

Keywords: bend strength, cad/cam, monolithic zirconia, sintering, translucency

SS-130 Investigation of mechanical properties of different CAD/CAM denture base materials

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OBJECTIVE: The aim of this study was to evaluate the effects of different manufacturing methods and thermal cycling on the mechanical properties of denture base materials.

MATERIALS-METHODS: A total of 120 samples were produced in 12 subgroups (n=10) in 6 groups (n=20), including 4 CAD/CAM milling groups (Vita Vionic (VV), Ivoclar Ivotion (IV), Yamahachi PMMA Disk (YA), Tempo CAD On Dent (OD)), 1 3D group (Alias 3D Printing Resin (3B)) and 1 heat polymerized group (Schütz Dental Futura Basic Heat (KN)) as a control group, and half of the samples in all groups were subjected to thermal cycling. The samples were subjected to 10,000 thermal cycles in the thermal cycling device (5 - 55°C). Flexural strength values were measured with a Universal testing machine (Instron) and hardness values were measured with a Vickers hardness tester. Fracture surfaces of the samples were evaluated by scanning electron microscopy (SEM). Data were analyzed using one-way analysis of variance (ANOVA) and Tukey HSD test (α = 0,05).

RESULTS: 4 CAD/CAM milling groups exhibited the highest flexural strength values in the group without thermal cycling ($p<0,05$). The lowest flexural strength values were observed in the KN and 3B groups in the non-thermal cycling groups ($p>0,05$) and in the 3B group in the thermal cycling groups ($p<0,05$). The hardness values in the VV and 3B groups were similar among themselves in the non-thermal cycling groups ($p>0,05$), while they were significantly lower than all other groups ($p<0,05$).

CONCLUSION: Prosthetic base materials produced by CAD/CAM milling method exhibited high flexural strength values. The resin produced by the 3D printing method showed significant differences in mechanical properties with the samples in the CAD/CAM milling group, except for the VV group. Thermal cycling only increased the flexural strength of the conventional denture base material group (KN).

Keywords: Resin base material, CAD/CAM, 3D printer, Flexural strength, Thermal cycling

SS-131 Effect of Post curing Time and Solution Type on the Color Stability of 3D Printed Dental Resin Specimens

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OBJECTIVES: This study aimed to investigate the effects of different post curing durations and various immersion solutions on the color stability (ΔE value) of dental resin specimens.

MATERIALS-METHODS: VarseoSmile Trinique (BEGO, Bremen, Germany) 3D-printed dental resin was used. A total of 90 specimens, each measuring 12×14×2 mm, were prepared. Specimens were divided into three groups (15, 30, and 45 minutes) with 10 samples in each subgroup and immersed in cola, coffee, or distilled water for 7 days. Color parameters (L*, a*, b*) were measured at baseline and after immersion using a Vita Easyshade V (VITA Zahnfabrik, Bad Säckingen, Germany) spectrophotometer, and ΔE values were calculated. Data were analyzed using two-way ANOVA, Shapiro-Wilk and Levene tests ($p<0.05$).

RESULTS: Post curing time significantly affected ΔE values ($p<0.001$). Specimens post cured for 15 minutes exhibited significantly lower ΔE values (4.42±1.62) compared to those post cured for 30 minutes (5.44±1.70) and 45 minutes (5.75±1.61), with no significant difference between the 30- and 45-minute groups ($p=0.202$). Solution type also significantly influenced ΔE values ($p<0.001$). The highest color change was observed in specimens immersed in cola (6.94±1.08), followed by coffee (5.38±0.73), and distilled water (3.29±0.68). A significant interaction was also found between post curing time and solution type ($p<0.001$). The lowest ΔE values were recorded in specimens post cured for 15 minutes and stored in distilled water.

CONCLUSIONS: Post curing time and solution type significantly influence the color stability of dental resin specimens. A 15-minute post curing duration-maintained color changes at the lowest level, while longer durations did not offer further improvement. Exposure to acidic beverages such as cola resulted in greater discoloration. These findings highlight the importance of optimizing post curing protocols and limiting contact with pigmented beverages to preserve esthetic outcomes.

Keywords: 3-D printing, color, curing time

SS-132 Comparative Accuracy of Intraoral Scanner vs Three Photogrammetry Systems in Full-Arch Implant Scanning

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INTRODUCTION: Full-arch implant rehabilitations demand highly accurate capture of implant positions to ensure passive prosthesis fit. Photogrammetry-based systems have emerged as an alternative for full-arch implant impressions, often reporting superior accuracy compared to intraoral scanners (IOS). This study aims to compare the trueness and precision of a digital intraoral scanning workflow versus three photogrammetry systems for capturing complete-arch implant positions.

MATERIALS-METHODS: One edentulous patient with six interforaminal implant fixtures (full-arch "All-on-6" configuration) was scanned using four different digital impression systems. These included a high-precision intraoral scanner with a scan body system specifically designed to improve photogrammetric accuracy and three extraoral photogrammetry devices. The IOS used was a Primescan (Dentsply Sirona) coupled with Apollo SmartFlag® scan bodies to facilitate implant capture. The photogrammetry systems tested were the Imetric ICam4D, Shining 3D Aoralscan Elite (intraoral photogrammetry), and OXO photogrammetry unit. Each system was used to acquire three separate complete-arch scans on the same patient under identical conditions (n=3 scans per system). All scans were exported as STL files. A definitive reference model of the implant positions was established by designing a full-arch framework in Exocad (based on the implant coordinates) and using it as the baseline for comparison. Each scan was aligned to the reference in Geomagic Studio, and positional discrepancies were measured as Euclidean distance deviation (ΔD).

RESULTS: Welch ANOVA indicated significant trueness differences ($p<0.001$). Imetric demonstrated the best trueness (0.0171 ±0.0098 mm), followed by Shining Elite (0.0280 ±0.0180 mm), Apollo IOS (0.0355 ±0.0129 mm), and OXO (0.0518 ±0.0336 mm). Levene's test revealed significant differences in precision ($p=0.0089$), with photogrammetry systems showing better consistency.

DISCUSSION: Photogrammetry systems, particularly Imetric, provided significantly better accuracy compared to the intraoral scanner. These systems showed higher consistency (precision) and lower deviations (trueness).

CONCLUSION: Photogrammetry-based workflows are recommended for superior accuracy in full-arch implant impressions.

Keywords: Full-arch implants, Photogrammetry, Intraoral scanner, Accuracy, Implant restorations

SS-133 The effect of soft tissue retractors on the accuracy of digital impressions: a pilot study

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OBJECTIVE: This study aimed to evaluate the effect of a soft tissue retractor on the accuracy of digital impressions taken by dental students with no prior experience in digital scanning.

MATERIALS-METHODS: Nine second-year dental students with no previous experience in digital scanning participated in this study. An intraoral scanner (Primescan, Dentsply Sirona), routinely used in our faculty for clinical procedures, was employed. Each student performed ten scans without a retractor and ten scans using a soft tissue retractor (OptraGate, small, Ivoclar) on a phantom jaw model. All scans were performed in accordance with the scanning strategy recommended by the manufacturer, following a standardized sequence involving the occlusal, buccal, and lingual surfaces. The jaw was removed from the phantom model and digitized using a laboratory scanner (3Shape E4), which served as the reference model. All scans obtained by the students were superimposed onto the reference model and analyzed three-dimensionally using Geomagic Control X Viewer (2022.1). The resulting data were analyzed using a two-way ANOVA with a significance level of $\alpha < 0.05$.

RESULTS: The use of a retractor had no significant effect on scanning accuracy ($p = 0.519$). However, both the operator ($p < 0.001$) and the interaction between the operator and retractor use ($p < 0.001$) had a significant effect on accuracy.

CONCLUSION: The findings of this pilot study highlight the importance of operator training and competence in achieving accurate digital impressions, particularly in educational settings. Greater emphasis should be placed on developing scanning skills rather than relying solely on auxiliary tools to improve scan quality.

Keywords: Dental impression techniques, Operative dentistry, Dental education

SS-134 Which cleaning protocols best preserve the surface roughness and hardness of occlusal splints produced by additive, subtractive and conventional manufacturing?

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PURPOSE: To evaluate the effects of different cleaning protocols on the surface roughness and hardness of heat-polymerized polymethylmethacrylate (PMMA), computer-aided design/computer-aided manufacturing (CAD/CAM)-milled, and three-dimensional (3D)-printed splint materials.

MATERIALS-METHODS: One hundred eighty disc-shaped specimens (Ø16mm×3 mm) were fabricated from three occlusal splint materials: heat-polymerized PMMA (HP), CAD/CAM-milled (ML), and 3D-printed resin (3D). After baseline surface roughness (Ra) and Vickers hardness (VHN) measurements, specimens were divided into six cleaning groups (n=10): brushing with toothpaste (TP), or liquid soap (LS), immersion in chemical cleansers including effervescent denture cleansers (COR or CRP), a clove oil-based solution (EO), or distilled water (CON). TP and LS groups underwent 5,000 brushing strokes, while chemical groups were subjected to nine immersion cycles over 20 days, simulating 6 months of daily use. Post-exposure Ra and VHN measurements were performed. Data were analyzed using three-way ANOVA and *post hoc* Tukey HSD test ($\alpha = 0.05$).

RESULTS: ML exhibited the lowest Ra and highest VHN, while 3D showed the most significant changes over time ($p < 0.001$). Brushing increased Ra and decreased VHN in most groups, except for LS on ML and TP on HP ($p < 0.001$). COR reduced VHN in ML and HP; CRP affected only 3D ($p < 0.001$). EO reduced both Ra and VHN in 3D but increased Ra in the other materials ($p < 0.05$).

CONCLUSIONS: ML demonstrated superior surface stability, while 3D was the most susceptible to surface changes. Immersion in CRP tablets caused minimal surface alterations in both materials, preserving the stability of milled splints and reducing the extent of surface degradation in 3D-printed splints compared to other cleaning methods.

Keywords: Occlusal splint, polymethyl metacrylate, computer-aided design, three-dimensional printing, surface properties

SS-135 Effect of Bubble Tea on the Color Stability of Restorative CAD/CAM Blocks

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OBJECTIVES: This study aimed to assess the effect of bubble tea, a frequently consumed beverage in recent years, on the discoloration of restorative CAD/CAM blocks with different chemical compositions.

MATERIALS-METHODS: Specimens (2 mm-thick) were prepared from four CAD/CAM blocks (IPS Empress CAD, Vita Enamic, Brilliant Crios, Tetric CAD) (n=40). Baseline CIELAB values were measured using a spectrophotometer on a white background. The specimens were immersed in four different liquids (mango and passionfruit-flavoured bubble tea, strawberry and lemon-flavored bubble tea, black tea, and distilled water as control) for 28 days, with daily solution renewal (n=10). Colour measurements were repeated on days 7 and 28, and ΔE values were calculated. The effects of liquid type and CAD/CAM block on discoloration were analysed using two-way ANOVA and Tukey's HSD test ($p<0.05$).

RESULTS: Both the type of liquid and CAD/CAM block significantly affected discoloration. No significant discoloration was observed in the specimens stored in distilled water over time, whereas statistically significant color changes occurred in those immersed in other liquids. However, there were no significant differences in discoloration among the liquids other than the distilled water. Among the non-control groups, IPS Empress CAD exhibited significantly less discoloration compared to Brilliant Crios and Tetric CAD, while there were no statistically significant differences between Vita Enamic, Brilliant Crios, and Tetric CAD.

CONCLUSIONS: None of the specimens stored in distilled water exceeded the CIELAB 50:50% acceptability threshold (ΔE = 2.7), while all specimens, except IPS Empress CAD, stored in bubble tea or black tea exceeded this threshold. IPS Empress CAD, however, exceeded the CIELAB 50:50% perceptibility threshold (ΔE = 1.2). These findings indicate that bubble tea

causes significant discoloration comparable to black tea. Therefore, for long-term success, patients should be advised about the potential staining effect of bubble tea when these types of restorations are placed.

Keywords: Restorative CAD/CAM Blocks, Discoloration, Bubble Tea

SS-136 Surface Deformation of Carbide Burs and Its Impact on Monolithic Zirconia Crowns

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Objectives: This study aimed to evaluate the morphological changes occurring on carbide bur surfaces after repeated use in the fabrication of monolithic zirconia crowns and to investigate their potential impact on the quality and clinical performance of fixed restorations.

MATERIALS AND METHODS: Two carbide burs from the Ceramill Motion 2 system were analyzed: one unused and one used to fabricate 56 monolithic zirconia crowns. High-resolution scanning electron microscopy (SEM) images were obtained from defined areas, including the cutting tips and lateral edges. Surface topography was assessed comparatively for edge rounding, blunting, abrasions, surface dullness, and microcracks.

RESULTS: SEM evaluation of the used bur showed considerable mechanical wear, such as rounded edges, decreased tip definition, surface dullness, and localized microcracks. These structural deteriorations were not observed in the unused bur, which retained sharp edges and an intact surface. The wear observed in the used bur negatively affected milling precision, leading to reduced marginal fit and compromised surface quality in the resulting zirconia crowns.

CONCLUSIONS: Repeated clinical use of carbide burs compromises both milling accuracy and the clinical quality of fixed prosthetic restorations. Surface degradation can lead to decreased marginal adaptation and increased surface roughness, potentially affecting long-term success. Regular monitoring and timely replacement of burs are essential to ensure optimal outcomes in prosthodontic treatments.

Keywords: Zirconia Dental Restoration, Permanent Microscopy, Electron, Scanning Dental Instruments Surface Properties

SS-137 Digital Diagnostics of Temporomandibular Joint Function in Professional Flutists: A Non-Invasive Approach Using Hardware-Software Systems

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BACKGROUND: Professional flutists are at increased risk of musculoskeletal disorders due to the prolonged asymmetrical positioning of the head, neck, and jaw while playing. These postural and functional stresses may impact the temporomandibular joint (TMJ) and associated musculature. However, effective outpatient diagnostic tools for early detection of TMJ dysfunction in this population remain limited.

OBJECTIVE: To evaluate the functional state of the TMJ and masticatory muscles in professional flutists using a comprehensive digital diagnostic system.

METHODS: A total of 60 individuals were examined, including 30 professional flutists with ≥5 years of experience and ≥1 hour daily practice, and 30 age-matched controls with no instrumental background. Participants underwent clinical screening (including the Hamburg test and symptom questionnaires) and instrumental diagnostics: Joint Vibration Analysis (JVA), electromyography (EMG), jaw tracking, condylography, and occlusion analysis (T-scan).

RESULTS: Compared to controls, flutists exhibited significantly more TMJ clicks, joint pain, and muscle tenderness. Instrumental findings revealed that flutists had higher total vibration integrals on JVA (>20 PaHz), increased bioelectric potentials in masticatory muscles at rest, and a 21% greater right-side laterotrusion amplitude. Axiographic records frequently showed asymmetrical or non-physiological condylar paths, especially in those with longer playing history. No pathognomonic signs of TMJ dysfunction were identified, but ligament laxity and early signs of articular disc displacement were more prevalent among flutists.

CONCLUSION: Digital diagnostics enable early, non-invasive identification of TMJ functional disorders in professional flutists. JVA proved the most sensitive for detecting early joint changes. These findings highlight the need for targeted screening protocols and preventive care strategies for musicians exposed to repetitive strain.

Keywords: TMJ, TMD, occupational disease, musician, EMG, JVA

SS-138 The Effect of Scan Body Material and Exposure on Implant Positioning in CAD-CAM

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INTRODUCTION: Implant dentistry has become an essential part of general dental practice, and high precision in impression-taking is critical for the success of prosthetic treatments. While digital impressions offer improved accuracy, various clinical factors such as blood, saliva, implant position, and angulation can negatively affect their reliability. This study aimed to evaluate the effect of implant placement at different depths and the use of different scan body materials on the accuracy of implant positioning.

MATERIALS-METHODS: In this study, a total of 14 diagnostic models were prepared using two different scan body materials, PEEK and titanium, across 7 subgroups. Implants were placed at various depths ranging from bone level to 6 mm subcrestally. Reference data were obtained using a desktop scanner. For the experimental data, each group was scanned five times with an intraoral scanner, resulting in a total of 70 scans. All scan data were transferred to CAD software, and after image matching of the scan bodies, virtual implant and ti-base positions were determined. Deviations in ti-base positioning were analyzed using 3D analysis software. A two-way ANOVA test was conducted to evaluate the effects of depth and material variables (α=0.05).

RESULTS: The depth factor (p=0.000) and the interaction between depth and material (p=0.006) had a statistically significant effect on ti-base positioning accuracy. However, the material factor alone did not show a significant difference (p=0.559).

CONCLUSION: Deviations in implant positioning may adversely affect the passive fit of the prosthesis, potentially leading to complications such as screw loosening or fracture. Therefore, considering the length and material of the scan body during the implant planning phase may positively impact clinical outcomes and prognosis.

Keywords: implant, scanbody, cadcam

SS-140 Language-Based Performances of Different Large Language Models in the Diagnosis of Temporomandibular Disorders

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OBJECTIVES: This study aimed to determine the language-based performance of different large language models (LLMs) in the diagnosis of temporomandibular disorders (TMD) according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) and the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) decision trees.

MATERIALS-METHODS: A set of 22 case-based questions according to the RDC/TMD decision tree and 13 case-based questions according to the DC/TMD decision tree were asked to the LLMs (ChatGPT-3.5, ChatGPT-4, ChatGPT-4o, Microsoft Copilot, Anthropic Claude 2, Docus AI, Perplexity AI, and Google Gemini) in Turkish and English. The models' responses were evaluated by comparing them to the correct diagnoses in the decision tree; specifically, accurate answers were scored as 1, while incorrect, incomplete, or overly general answers were scored as 0. The accuracy rates for each model were calculated. Cochran's Q and McNemar tests were used for data comparison (p<0.05).

RESULTS: ChatGPT-4, ChatGPT-4o, Anthropic Claude 2, and Docus AI demonstrated significantly higher accuracy in answering RDC/TMD-based questions compared to Google Gemini, Microsoft Copilot, and Perplexity AI. In DC/TMD-based questions, Perplexity AI and Gemini had the lowest accuracy rates. Overall, the LLMs performed similarly in Turkish and English; however, Microsoft Copilot showed significantly better performance in English for RDC/TMD cases. When comparing performance across decision tree types, most models (except Docus AI and Perplexity AI) showed slightly better accuracy in DC/TMD-based questions, though the difference was not statistically significant.

CONCLUSIONS: Evaluating LLMs against validated diagnostic criteria provides important insight into their readiness for clinical use in TMD diagnosis. While certain models show promise, the variability in performance highlights the need for careful model selection and rigorous validation. These tools are not yet reliable enough for independent clinical decision-making. Continued development and evaluation are crucial to ensure their safe, effective integration into dental and medical practice without compromising patient care.

Keywords: Large Language Models, Artificial Intelligence, RDC/TMD, DC/TMD

SS-141 Simultaneous Rehabilitation with Obturator Prosthesis and Orbital Epithesis: A Clinical Case Report

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INTRODUCTION: Orbital and maxillary defects resulting from aggressive infections such as mucormycosis can cause severe functional and aesthetic impairments. This case report presents the prosthetic rehabilitation of a patient who underwent total maxillectomy and unilateral orbital resection. A custom-made, implant-retained silicone prosthesis was fabricated to restore facial symmetry, function, and psychosocial well-being.

Case description: A 52-year-old female patient underwent total maxillectomy and left orbital resection due to mucormycosis secondary to type 2 diabetes. The combined defect was rehabilitated using a two-piece, implant-retained silicone prosthesis. Conventional impression techniques were employed for the intraoral component, while facial impressions were taken in a seated position. Magnets embedded in the obturator and facial prosthesis enabled accurate alignment and secure retention. An acrylic ocular prosthesis was incorporated into the orbital section. Intrinsic coloring of the silicone was performed during the muffle process, with tulle mesh reinforcement applied to prevent marginal tearing. The prosthesis was delivered with hygiene instructions, and a structured follow-up schedule was established.

DISCUSSION: Wax modeling and the two-part muffle technique allowed for individualized aesthetic adaptation using the patient's facial references. Although CAD/CAM technologies offer benefits in terms of speed and digital precision, ensuring accurate fit remains challenging in extensive and anatomically complex maxillofacial defects. The irregular morphology of such defects and the difficulty in isolating soft tissues often compromise the accuracy of digital impressions. Furthermore, merging separately scanned anatomical regions, such as the orbital and maxillary zones, can result in misalignment due to software or hardware limitations. In this context, conventional techniques continue to provide superior operator control and aesthetic precision. The silicone prosthesis, supported by midfacial implants, achieved satisfactory outcomes in terms of retention, aesthetics, and overall patient satisfaction. Implant-retained maxillofacial prostheses remain a reliable option for restoring function and quality of life in patients with extensive anatomical loss.

Keywords: Maxillofacial Prosthesis, Conventional Techniques, Orbital Diseases, Dental Implants

SS-142 Surface Finishings and Aging Effects on 3D-Printed Permanent Resin Material

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AIM: This study aimed to compare the effects of polishing and glazing materials on the discoloration and surface roughness of 3D-printed resin material used for permanent restorations after exposure to simulated gastric acid (SGA) and artificial saliva (AS).

MATERIALS-METHODS: Sixty-four disc-shaped specimens (12 mm×1.5 mm) were fabricated from additively manufactured composite resin (Saremco Crowntec) and divided into four groups (n=8): as printed (control), mechanical polishing (3M Sof-Lex), and two glazing materials (GC Optiglaze and Vita Akzent LC). After surface finish application, specimens were immersed in AS and SGA at 37°C for 24 hours, simulating 2 years of aging. Color change (ΔE_{00}) and surface roughness (Ra, µm) were evaluated before and post-immersion. Statistical analyses included three-way repeated measures ANOVA, two-way ANOVA, Tukey HSD, and Bonferroni post-hoc tests (α=0.05).

RESULTS: No significant difference in ΔE_{00} was found for surface finishes and aging (P>0.05). All specimens showed ΔE_{00} below the acceptability threshold of 1.81. Significant two-way interactions were observed for Ra (P<0.05). Roughness increased significantly in AS and SGA regardless of surface finish type (P<0.05). Only the control group showed no significant surface roughness change after 24 hours, regardless of aging medium (P>0.05). All surface finish types showed roughness changes after 24 hours (P<0.05). Before immersion, mechanical polishing group exhibited the lowest Ra. However, mechanical polishing group exhibited the greatest increase in roughness, while control group showed the lowest (P<0.05). Significant differences were observed in baseline surface roughness among the surface finish groups (P<0.05), but all groups exhibited similar Ra values after 24 hours (P>0.05).

CONCLUSION: Surface roughness significantly increased after aging in gastric acid and artificial saliva, while color stability remained within acceptable limits for all groups. These findings suggest that polishing and glazing treatments, along with environmental conditions, may influence the surface integrity of 3D-printed permanent resin material.

Keywords: 3D-printing, surface roughness, color stability, polishing, glaze, permanent resin

SS-143 “Surgical and fixed prosthetic treatment of a patient with ectodermal dysplasia: a case report”

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INTRODUCTION: Ectodermal dysplasia (ED) encompasses a heterogeneous group of inherited disorders characterized by abnormal development of ectodermal structures, including teeth, hair, nails, and sweat glands. Midfacial hypoplasia, defective hair follicles and eyebrows, frontal bossing with prominent supraorbital ridges, nasal bridge depression, and protuberant lips are commonly observed findings. Hypodontia or oligodontia is also frequently seen in these patients. Because of the complexity of the clinical situation, multidisciplinary care is essential to restore and maintain oral function, facial esthetics, and overall quality of life.

Case description: This report describes the comprehensive rehabilitation of a 21-year-old female patient diagnosed with anhidrotic ectodermal dysplasia. The patient presented with oligodontia, retained deciduous teeth, peg-shaped permanent anterior teeth, dry skin, and midfacial hypoplasia. Clinical and radiographic assessments confirmed the diagnosis. The primary objectives of treatment were to improve facial esthetics, oral function, and speech. Lefort I osteotomy was performed for maxillary advancement. Following postoperative healing, clinical crown lengthening using fiber posts was performed to reestablish vertical dimension and prepare the temporomandibular joint for functional loading. A provisional fixed prosthesis was delivered and followed over 8 weeks; considering the patient’s aesthetic demands, zirconia-based fixed prosthetic restorations were fabricated. The final restorations were tried in the mouth, contact points, occlusion, and the aesthetics were assessed, and the restorations were cemented.

DISCUSSION: Prosthetic rehabilitation of ED patients is crucial, as it enables the restoration of both function and esthetics. This case addresses the necessity of an interdisciplinary, staged approach in managing complex craniofacial and dental manifestations of ED. Integration of surgical correction and prosthetic reconstruction allowed for an esthetically and functionally successful final restoration. This report contributes to the literature on adult management of ED, emphasizing the importance of contemporary materials and collaborative protocols in achieving comprehensive oral rehabilitation in such challenging cases.

Keywords: Ectodemal dysplasia,Zirconia,Esthetic

SS-144 İnvestigation of the effects of prosthesis cleaning solutions on the surface properties of base materials applied with different polishing methods

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PURPOSE: The aim of this study was to investigate the effects of denture cleaning solutions on the surface roughness and hardness of different base materials subjected to mechanical and chemical polishing.

MATERIALS-METHODS: In the study, samples of heat polymerized PMMA, CAD/CAM milled PMMA, Trinia, PEEK, 3D printer-produced PMMA base materials were used. The samples were randomly divided into two groups. One group was subjected to conventional polishing, while the other group was subjected to the chemical polishing agent optiglaze. The polished samples were randomly divided into 4 subgroups of 10 each, with one group being the control group. The other three subgroups were kept in distilled water, effervescent tablet, 1% NaOCl cleaning solutions. Surface roughness and hardness of the samples were measured before and after immersion in solutions. Since parametric test assumptions could not be met in the evaluation of the obtained data, statistical analysis was performed using the Kruskal Wallis test and Mann Whitney U test ($p=0.05$).

RESULTS: Independent of the solutions, mechanically polished samples showed lower roughness values, while chemically polished samples showed significantly higher values in terms of hardness ($p<0.05$). Roughness and hardness values of mechanically polished samples were significantly more affected by NaOCl solution ($p<0.05$), while solutions did not significantly affect roughness and hardness values of chemically polished samples.

CONCLUSION: In terms of surface properties, it was observed that Optiglaze gave better results than mechanical polishing, the materials produced with the CAD/CAM engraving method exhibited superior surface properties.

Keywords: CAD/CAM, microhardness, PMMA, roughness, 3D

SS-145 Effect of Nanoparticle Incorporation on the Physical Properties of Acrylic Resins

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Objectives: This study aimed to enhance the biocompatibility and mechanical performance of polymethyl methacrylate (PMMA) by incorporating nanoparticles, thereby improving their performance and extending their useability."

MATERIALS AND METHODS: Graphene (GN) and boron nitride (BN) nanoparticles were selected for their potential to improve PMMA's biocompatibility and mechanical properties. These were added to a self-curing acrylic resin at varying concentrations to form five experimental groups (n=6): control (C), 1 wt% BN (LBN), 3 wt% BN (HBN), 0.01 wt% GN (LGN), and 0.1 wt% GN (HGN). A total of 30 disc-shaped specimens (15 mm × 3 mm) were prepared. Nanoparticles were manually mixed with the PMMA powder to ensure homogeneity. Surface roughness and microhardness were measured using a 3D optical profilometer and a microhardness tester, respectively. Color stability was assessed with a spectrophotometer.

RESULTS: LBN significantly reduced surface roughness compared to the control, whereas HBN significantly increased it ($p<0.05$). GN showed no significant impact on roughness. BN reduced surface hardness, while GN increased it; however, these changes were not statistically significant. Low nanoparticle concentrations had no significant effect on color stability, whereas higher concentrations caused notable color alterations ($p=0.01 < 0.05$).

CONCLUSION: It can be stated that nanoparticles added at low concentrations will contribute to physical properties of PMMA. Especially addition of boron nitride at low concentrations is a viable method to reduce roughness values. Besides, it doesn't visibly change color stability. However, it reduces hardness values; this decrease is not at a level that will negatively affect mechanical requirements. High rates of nanoparticles both significantly increase roughness values and cause visible color changes.

Keywords: nanoparticles, acrylic resins, surface roughness, color stability

SS-146 The Effects of Different pH Levels of Artificial Saliva on 3D-Printed Permanent Resin Material

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OBJECTIVES: This study aimed to evaluate the color stability and surface changes of additively manufactured permanent resin material produced using two different surface finishing procedures at three pH levels of artificial saliva.

MATERIALS-METHODS: The study involved six groups (n=10). An additive-manufactured nano-resin material, BEGO TriniQ (Bego, Bremen, Germany), a permanent crown material for crown-bridge restoration treatments, was utilized. Following the manufacturer's recommendations, disc-shaped specimens (2x13mm) were created using a DLP 3D printer. Surface treatments for the samples in three groups were performed using only mechanical polishing (MP). The surfaces of the samples from the remaining three groups were treated with a protective surface coating material that included nanofillers, GC Optigalze (GC, Tokyo, Japan), which was applied after MP. All groups were immersed in artificial saliva at different pH levels of 3, 7, and 12 for 21 days. Before and after the immersion in artificial saliva, surface topography and spectrographic analyses were conducted (SEM/EDX, XRD, FTIR), and the sample's color changes were determined using the CIEDE2000 (ΔE_{00}) formula. Two-way ANOVA, One-Way ANOVA, and T-Test were conducted after confirming normal distribution, with significance accepted as $p<0.05$ and $p<0.01$.

RESULTS: Two-way ANOVA results demonstrated that both the surface finishing method ($p<0.001$) and the artificial saliva pH level ($p<0.001$) had statistically significant effects on the color change (ΔE_{00}) of the samples. Within each surface group, color change was significantly greater at pH 12 compared to pH 3 and 7 ($p<0.05$). Independent samples t-tests indicated that, across all pH levels, mechanically polished groups exhibited significantly greater color changes than glaze-coated groups ($p<0.01$).

CONCLUSION: These findings emphasize the significance of surface finishing procedures and the impact of pH levels on color stability. The surface coating material has been demonstrated to affect the resistance to color change against varying pH values.

Keywords: 3D-printing, Artificial Saliva, Color Change, Resin nano-ceramic, Mechanical polish, Coating Agents

SS-147 Surface properties and color stability of additively manufactured interim restorations: the role of surface treatments and mouth rinses

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Objectives: Additive manufacturing is increasingly used in prosthodontics. Nevertheless, the impact of various mouth rinses on the surface roughness and color stability of interim restorations produced by this method remains insufficiently investigated. This study aimed to evaluate the influence of different surface treatments and mouth rinses on discoloration and surface textures in interim restorations, with an additional focus on the role of polishing in reducing color changes.

Materials and methods: Using both conventional and additive manufacturing methods, 320 disc-shaped specimens were fabricated from four resin-based materials (80 specimens per material). Each material group was further divided into two subgroups (n=40) according to surface treatment: conventional finishing (Group 1) and surface sealant application (Group 2). Surface roughness were measured, after which specimens were subdivided into four groups (n=10) and immersed in one of the following solutions: LISTERINE (LIS), 0.2% chlorhexidine gluconate (CHX), 0.1% chlorhexidine gluconate (ELU), or artificial saliva (AS). Immersion periods were set at 24 hours (T1) and 7 days (T2). Color measurements were conducted pre- and post-immersion using a spectrophotometer, and color differences (ΔE) were calculated based on the CIELab system. Subsequently, all specimens underwent a standardized polishing protocol, and ΔE values were re-analyzed. Statistical analysis was performed using one-way ANOVA followed by Bonferroni *post hoc* tests (α=0.05).

RESULTS: PMMA specimens showed the highest surface roughness, while 3D-printed groups showed lower values (P <.05). Among the tested solutions, LIS resulted in the greatest color changes (ΔE). Specimens with surface sealant demonstrated superior resistance to staining and maintained lower surface roughness across all time points. Polishing significantly reduced ΔE in all groups.

Conclusions: Additively manufactured materials offer clinically acceptable surface and optical properties. Although mouth rinses may cause discoloration, applying a surface sealant and polishing helps maintain surface quality and enhances the esthetic longevity of interim restorations.

Keywords: Additive manufacturing, surface sealent, interim restorations, color stability, surface roughness

SS-148 Comparative Evaluation of Responses of Different Artificial Intelligence Systems in Answering Questions About Complete Dentures in Prosthetic Dentistry

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OBJECTIVES: This study aims to evaluate the accurancy of the responses given by three popular AI chatbots (ChatGPT, DeepSeek and Google Gemini) in between each other and within themselves, about complete dentures by Prosthodontists.

Material- METHODS: A total of 300 responses were obtained by sending the same amount of total denture questions to an AI chatbot 3 times a day, in the morning, at noon and in the evening. The results given by two prosthodontists were evaluated according to a 3-point Likert scale (0: incorrect, 1: partially correct/incomplete, 2: correct). In the study, Pearson Chi-Square test (p value<0.05) and Fisher's Exact test records and with data analyzes IBM SPSS 27 program.

RESULTS: The total correct response rate of the DeepSeek system was found to be (65.7%), Gemini (55.9%) and ChatGPT (50%). The incomplete response rate was found to be 30.3% in DeepSeek, 42.1% in Gemini and 47.3% in ChatGPT. The incorrect response rates were found to be (4%) in DeepSeek, (2%) in Gemini and (2.7%) in ChatGPT.

CONCLUSIONS: Although artificial intelligence chatbots are promising as a prosthetic dentistry education and consultancy guide, the answers given need to be examined and evaluated by prosthodontists. While DeepSeek showed the most reliable performance among the other chatbots; It has been observed that all of the chatbots somehow fail to meet clinical standards whithout inspection. This highlights the need for prosthodontists supervision in the integration of AI in dental education and patient-centered practices.

Keywords: Artificial Intelligence, Complete Denture, ChatGPT, Google Gemini, DeepSeek

SS-149 The effect of composite resin type on the color properties of high translucent zirconia repairs

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OBJECTIVES: The aim of this study was to evaluate the color and translucency compatibility of high translucent monolithic zirconia repaired with two different thicknesses of multi-shade, group-shade, and single-shade composite resins after aging.

MATERIALS-METHODS: High-translucent zirconia specimens with thicknesses of 1 mm and 1.5 mm were repaired using three different composite resins with thicknesses of 1 mm and 0.5 mm (n=60). Zirconia specimens with a thickness of 2 mm and without repair were used as the control group (n=10). Specimens were aged by thermal cycling (5-55 °C, 5000 cycles). Color and translucency changes were calculated with the CIEDE 2000 formula. Two-way analysis of variance was used to evaluate the ΔE_{00} and ΔTP values according to thickness and composite resin groups. The Kruskal-Wallis test was used to compare the color and translucency match between the high-translucent monolithic zirconia and composite resin groups ($p < .05$).

RESULTS: The single-shade composite resin exhibited the highest ΔE_{00} value, whereas the multi-shade composite resin demonstrated the highest ΔTP. Furthermore, thickness did not significantly influence either ΔE_{00} or ΔTP. Multi-shade and group-shade composite resins exhibited a color change consistent with that of the control group, while single-shade and group-shade resins showed translucency consistent with the control group.

CONCLUSIONS: Among the materials tested, the use of group-shade composite resin for high-translucent zirconia repairment was found to be more compatible in terms of color and translucency changes.

Keywords: Color change, high translucent zirconia, repair, single-shade composite, translucency change

SS-150 Combined Design of Meatus and Fixed Horizontal Pharyngeal Obturators in a Congenital Soft Palate Defect

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INTRODUCTION: Soft palate defects from congenital malformations or surgical excision of neoplasms can cause speech disorders, hypernasality and nasal regurgitation. Various pharyngeal obturators assist in rehabilitation of soft palate defects. Fixed horizontal obturators separate oropharynx and nasopharynx, taking the advantage of muscle contraction at lateral and posterior walls of pharynx. Meatus obturators provide static obturation high in the nasopharynx without muscle activity involvement. This case report presents prosthetic rehabilitation of a congenital soft palate defect combining both features of two pharyngeal obturators, with quality of life assessed via Oral Health Attitude Scale (OHA-S) and Oral Health Impact Profile Scale (OHIP-14).

Case description: A 52-year-old female patient referred to the prosthodontics clinic with complaints of speech difficulties and missing teeth. Anamnesis revealed a repaired congenital cleft lip and palate and velopharyngeal insufficiency. A posterior soft palate defect and missing FDI classification 21, 22 and 25 teeth were detected at intraoral examination. The surrounding oral and pharyngeal tissues were healthy, with no signs of inflammation or ulceration. The OHA-S was 153/205 (Improvable), and the OHIP-14 was 9/56 at pre-treatment. Due to insufficient velopharyngeal closure despite muscle activity, a fixed horizontal obturator was needed. Since velopharyngeal closure could be maintained at a higher level, a meatus obturator was also suitable. Accordingly, the design was adapted to benefit from both types. The final prosthesis was manufactured with heat-cured polymethyl methacrylate using the lost-wax technique. At one-month follow-up, the patient's OHA-S score increased to 179/205 (High), and OHIP-14 score improved to 2/56.

DISCUSSION: Speech improvement is usually limited in congenital defects due to altered speech learning patterns. However, the patient showed notable progress in "G" and "K" sounds at one month. OHA-S and OHIP-14 scores confirmed improved quality of life.

Keywords: Maxillofacial prosthesis, Palatal obturators, Velopharyngeal Insufficiency, Health impact assessment, Speech

SS-151 Evaluation of Model and Scan Body Accuracy in Additively Manufactured and Conventional Stone Models

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OBJECTIVES: This in vitro study aimed to evaluate the trueness and precision of additively manufactured (AM) dental models produced with resins of different viscosities and conventional stone models, as well as the accuracy of scan bodies (SBs) within these models.

MATERIALS-METHODS: Three model groups were created using a reference model with four parallel implants both posterior side: stone models (ST), AM models fabricated with low-viscosity resin (AM-A), and high-viscosity resin (AM-K). Each group included eight samples (n=8). SBs were placed both of implants (SB #24 and #26) and multi-unit abutments (SB #14 and #16) levels. All models were scanned with a high-resolution desktop scanner. Deviations were analyzed using Geomagic ControlX software. Statistical evaluation was conducted using one-way ANOVA and Games-Howell post-hoc test(α=0.05).

RESULTS: According to RMS results, AM-A showed the highest trueness, while AM-K showed the highest precision. Based on the 3D and angular deviation analysis of SBs, AM-A and ST groups showed comparable results, while the AM-K group often demonstrated significant differences. Inter-implant deviation values were generally similar across groups. Additionally, a significant variation between implant and abutment levels was observed in all groups ($p<0.018$).

CONCLUSIONS: In terms of model trueness, AM models exhibited higher trueness compared to stone models. Deviation analysis of SBs showed the AM-A group was comparable to ST, while AM-K showed the highest deviations, indicating resin viscosity affects implant positioning accuracy. SBs at the multi-unit abutment level showed greater accuracy than those at the implant level.

Keywords: 3D printing, AM dental model, stone model, resin viscosity, trueness, precision

SS-152 Combined Use of PEEK and Titanium Frameworks in the All-on-Four Concept: A Fixed Hybrid Case Report

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INTRODUCTION: The All-on-Four concept provides a predictable and efficient solution for full-arch rehabilitation in completely edentulous patients. Traditionally, these restorations are fabricated using metal frameworks such as titanium or cobalt-chromium alloys. Polyetheretherketone (PEEK), a high-performance thermoplastic polymer, has been recognized as a promising alternative due to its favorable biomechanical properties and patient-specific advantages. This case report describes a full-arch implant-supported monolithic zirconia fixed dental prosthesis supported by a titanium framework in the maxilla and a PEEK framework in the mandible.

Case description: An 84-year-old female patient presented with functional and esthetic concerns. The clinical and radiographic evaluations revealed advanced alveolar bone resorption and vertical dimension loss in both jaws. A fixed hybrid prosthesis following the All-on-Four protocol was planned to restore the advanced alveolar bone and soft tissue loss. After successful osseointegration, the prosthetic treatment was initiated using a digital workflow. All data were transferred to dental design software (Exocad, exocad GmbH, Germany). In the maxilla, a monolithic zirconia prosthesis was fabricated over a titanium framework. In the mandible, where bone resorption was more pronounced, a PEEK framework was fabricated using a Toronto-style design for load distribution, and individual monolithic zirconia crowns were placed. The PEEK framework was characterized for gingival reproduction using a ceramic-filled composite resin (GC GRADIA™ PLUS, GC Corp., Tokyo, Japan). This approach maintained a consistent material profile while achieving functional integrity and esthetic harmony across arches.

The selection of restorative frameworks should consider not only flexural strength but also the biomechanical requirements of each region. In this case, different frameworks were selected beneath a uniform superstructure to meet jaw-specific demands. PEEK, with an elastic modulus similar to cortical bone, promoted stress distribution in the mandible. Its low density further reduced prosthesis weight and minimized bone loading. A digital workflow enhanced design precision and clinical predictability.

Keywords: All-on-Four, PEEK, Titanium, Hybrid Prosthesis, Digital Workflow

SS-153 Effect of Cleaning Tablet on the Hardness and Translucency of Different Occlusal Splint Materials

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OBJECTIVE: To evaluate the effect of cleaning tablet on the hardness and translucency of different occlusal splint materials.

MATERIAL-METHODS: A total of 45 specimens (10 mm × 10 mm × 2 mm) were produced using 3-dimensional (3D) printed splint resin, thermoformed plate and heat-polymerized clear acrylic (control), with 15 specimens in each group. The hardness was measured using a Vickers hardness tester and color coordinates were measured against black and white backgrounds using a clinical spectrophotometer. The specimens were kept in artificial saliva at 37˚ for 1 week and the measurements were repeated after 1 month of cleaning tablet use. Translucency was measured using the relative translucency parameter (RTP) calculated by the CIEDE2000 formula. The data obtained were statistically evaluated using one-way ANOVA. Before and after measurements were evaluated using paired sample t-test (α=0.05).

RESULTS: While there was no statistically significant difference in the translucency change of 3D splint resin after the use of cleaning tablets ($p>0.227$), there was a difference for thermoformed plate and control group ($p<0.05$). After the use of cleaning tablets, the RTP of the control group was statistically higher than the experimental groups ($p<0.05$). The use of cleaning tablets caused a decrease in the hardness values of the control group and 3D splint resin samples ($p<0.05$), but made no difference in the thermoformed plate group ($p>0.05$). When the hardness change of the groups due to the use of cleaning tablets was evaluated, there was a significant difference between the hardness changes of only the thermoformed plate and 3D splint resin groups ($p<0.05$).

CONCLUSIONS: Cleaning tablets can be recommended as it leads to an increase in the translucency, but it should be kept in mind that it will lead to a decrease in the hardness of the 3D splint material and heat-polimerized acrylic.

Keywords: 3D printing, translucency, hardness, occlusal splint, cleaning tablet

SS-154 Diode laser treatment as a potential desensitizing method after tooth preparation: a clinical pilot study

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OBJECTIVES: Post-preparative dentin hypersensitivity can negatively impact patients' daily quality of life. Dentin hypersensitivity is defined as a short, sharp, and well-localized pain arising from exposed dentin to the oral environment through various mechanisms. Recently, low-level lasers have emerged as adjunctive treatments for dentin hypersensitivity. The diode laser exerts analgesic effects by inhibiting C-fiber depolarization and may promote reparative dentinogenesis and tubule occlusion without altering enamel or dentin morphology. Thus, this study aims to evaluate the impact of diode laser application on post-preparative dentin sensitivity in patients undergoing tooth preparation.

MATERIALS-METHODS: Thirteen patients who presented to the department of prosthodontics for fixed partial prosthetic treatment were enrolled. In each patient, two teeth that were prepared for the first time on the same day were included in the study (N=26). Dentin sensitivity was measured twice—first after the local anesthetic wore off and again one week post-preparation—using a visual analogue scale (VAS). On one of the prepared teeth (control)(n=13), a provisional acrylic restoration was fabricated and cemented according to the routine clinical protocol. On the contralateral prepared tooth (test)(n=13), diode laser was applied immediately after preparation and before provisionalization; thereafter, an identical acrylic provisional was cemented. Diode laser parameters were set at 90 mW, 2700 J, 650 nm wave length, with irradiation delivered for 30 seconds each from the buccal and palatal aspects of the tooth.

RESULTS: VAS scores were recorded at multiple time points for both laser-treated and untreated (control) teeth. Paired samples t-tests revealed a statistically significant reduction in sensitivity following each laser application compared to baseline. However, no significant difference was observed between the laser-treated and control teeth after provisional crown placement.

CONCLUSION: The results of this preliminary study suggest that diode laser therapy is effective in reducing dentin hypersensitivity over time.

Keywords: Dentin Hypersensitivity, Tooth Preparation, Diode Laser, Provisional Crown

SS-155 Retrospective Analysis of CAD/CAM Occlusal Splints

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OBJECTIVES: to investigate the clinical performance of computer-aided design and computer-aided manufacturing (CAD-CAM) occlusal splints.

Patients & METHODS: A total number of 49 patients (34 women, 15 men age 28±5 years) applied to Department of Prosthodontics and treated with CAD/CAM occlusal splints were included in this retrospective clinical study. Two different manufacturing technologies (3-dimensional printing and milling) and three different materials were investigated. For the production of Michigan-type digital splints, fully and hybrid digital workflows were applied. In fully digital workflow, intraoral scans were transferred to a dental software and either 3D-printed using CE-marked biocompatible splint resin material or milled from PEEK or PMMA blocks. In hybrid workflow, dental stone casts of the upper and the lower jaws of the patients were obtained by condensation type silicone impression material and were scanned with an extra-oral scanner. Then the splints were fabricated digitally (designed and milled/additively manufactured with CAD/CAM). The workflow was chosen randomly. The patients wore the splints for 6 months. Occlusal splint requirements (anterior and canine ramps, occlusal contact points, disocclusion in lateral and protrusive excursions,), fit, production time, as well as VAS of subjective evaluations were evaluated. Complications were also recorded. SPSS software was used for statistical analysis (P=.05).

RESULTS: Additively manufactured splints, regardless of workflow revealed greater surface wear (p >0.05). Patient satisfaction was highest in PEEK splints fabricated digitally; followed by fully digital resin and 3D printed (p >0.05). Milled splints in both materials demonstrated statistically significant fit than 3D-printed splints. Occlusal inaccuracy was encountered in 3 patients (6 %), renewal requirement in 1 patient (2 %) and fracture of the splints in 6 patients (12 %).

CONCLUSIONS: The results suggest that recent CAD/CAM technique and materials for the fabrication of occlusal splints are as good as conventional material and offer promising results.

Keywords: occlusal splint, CAD/CAM, TMD

SS-156 The İnfluence of Different Abutment Material And İmplant-Abutment Connection Types on Stress Distribution in Natural Tooth-İmplant Supported Fixed Prostheses: A Three-Dimensional Finite Element Analysis Study

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Purpose: The purpose of this study was to evaluate the effect of different abutment materials with different modulus of elasticity and implant-abutment connection designs on stress distribution in natural tooth-implant supported fixed prostheses using a three-dimensional finite element stress analysis.

Material and METHODS: Nine three-dimensional models were created to simulate a three-unit fixed prosthesis supported by a natural tooth and a dental implant along with the surrounding bone. These models were created according to combinations of abutment materials (titanium, zirconia, and hybrid), and impant-abutment connection types (external hexagonal, internal hexagonal, and Morse taper). A total of 400 N vertical and oblique forces were applied, 100 N to each premolar tooth and 200 N to the first molar tooth. The Von Mises stresses generated by these forces were analyzed.

RESULTS: Stress values in the bone around the implant were found to be higher than the stresses in the bone around the tooth. The morse taper connection design creates higher stress in the abutment, implant and screw than other designs, while creating lower stresses in the peri-implant cortical bone. Zirconia abutment creates higher stress on the abutment in the internal hexagonal and morse taper connection designs, while the hybrid design has created higher stresses in the implant. In the external hexagon connection design, the hybrid abutment design exhibited higher stress in the abutment, while the stress in the implant did not make any difference in abutment material.

CONCLUSIONS: The type of implant-abutment connection and abutment material affect the stress values generated in the natural tooth-supported dental implant prostheses. The internal hexagonal connection design in tooth-implant supported prostheses may reduce the risk of biomechanical failure in the prosthetic system.

Keywords: Implant-abutment connection, Tooth-implant connection, Finite element analysis, Hybrid abutment, Biomechanics

SS-157 Are Additively Manufactured Zirconia Abutments Ready for Clinical Practice? A Mechanical Evaluation

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OBJECTIVES: The aim of this in vitro study was to evaluate the fracture strength and failure modes of new generation low layer thickness zirconia abutments obtained with additive (3D printing) manufacturing techniques.

MATERIALS-METHODS: In this study, three groups were created for analysis: a standard prefabricated titanium abutment (control-CZ), a subtractive method produced titanium-based zirconia abutment (SZ), and an additive method produced low layer thickness titanium-based zirconia abutment (AZ). The AZ Group was produced a state-of-the-art 3D printer with a 30-micron layer thickness, representing a significant advancement in printing technology. All abutments and crowns were designed digitally, manufactured to the same dimensions, and screwed to the implants. The specimens underwent mechanical loading of 50 N at 1.6 Hz for 1.2 million cycles with simultaneous thermal cycling.Fracture strength was tested using a universal testing machine, and fracture types were examined via optical microscopy and scanning electron microscope. Welch ANOVA and Tamhane T2 tests were used for statistical analysis (α=0.05).

RESULTS: There was a significant difference in fracture resistance between the groups (p=0.011). The AZ group demonstrated higher strength (4186.06 ± 333.95 N) in comparison to the CZ group (3431.31±760.92 N, p=0.041), though this was not significantly higher than the SZ group (3382.70±944.25 N, p=0.080). Following a thorough analysis, it was determined that there is no statistically significant difference between CZ and SZ (p=0.999). All groups met the clinical requirements for molar region. CZ samples showed screw loosening and repairable deformation, while AZ samples had more frequent and irreparable fractures.

CONCLUSION: Although AZ abutments were advantageous in terms of fracture resistance, concerns remained regarding their failure type. However, the results obtained show that this method may be a promising alternative clinically, with appropriate printing parameters.

Keywords: additively manufacured zirconia, 3D print, custom abutment, layer thickness

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SS-158 Comparative Evaluation of Different Mechanical Test Methods in Additively Manufactured Permanent Resin Materials

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OBJECTIVES: This study aimed to comparatively evaluate mechanical testing methods used to assess additive-manufactured permanent restorative resin materials in comparison to ceramic systems. The focus was on examining the measurement sensitivity and methodological consistency of different test methods applied to the same material.

MATERIALS-METHODS: A total of 360 permanent restorative resin specimens were fabricated using a 3D printer(Form 3B, Formlabs) based on stereolithography (SLA) technology. To compare methods and evaluate correlations, a power analysis was conducted using software(G*Power 3.1.9.7), assuming a moderate correlation (r = 0.30), 80% power, and a 5% significance level, resulting in 90 samples per test. Specimen thicknesses were measured with a digital caliper, and all samples were polished using 1200 and 2500 grit sandpapers under water, followed by manual polishing with fine disks and polishing paste. Vickers and Knoop microhardness values were measured under standard load using a microhardness tester (Wilson, Buehler) in the research laboratory of Çukurova University Faculty of Dentistry. Biaxial flexural strength tests (disc specimens, 14 mm diameter, 1.5 mm thickness) and three-point flexural strength tests (rectangular bars, 25×2×2 mm) were performed using a universal testing machine(Testometric) according to ISO 6872. A crosshead speed of 1 mm/min was applied until fracture. Statistical analyses included normality testing with the Kolmogorov-Smirnov test, group comparisons using independent and paired samples t-tests, and consistency and agreement evaluation of repeated hardness measurements using Intraclass Correlation Coefficients (ICC).

RESULTS: Flexural strength values obtained from biaxial tests were significantly lower than those from three-point tests ($p < 0.001$). A significant difference was also found between Knoop

and Vickers microhardness values on the same specimens ($p < 0.001$), with Knoop values averaging 6 units higher.

CONCLUSION: Different mechanical tests applied to the same material group yielded significantly different results, indicating that test selection critically affects the evaluation of material's mechanical performance.

Keywords: flexure strenght, microhardness, additive-manufactured

SS-159 3D comparison of gingival contours of implant crowns with customized emergence profiles and natural teeth using the aesthetic integration area concept

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This study compares the gingival emergence profile formed using the functional compression technique with the gingival contour of the contralateral natural tooth, based on the aesthetic integration area (EIA) concept in implant-supported single crown restorations. This clinical study included 32 patients with a single missing tooth. Implants were placed using a two-stage surgical protocol. The functional compression technique was applied to shape the peri-implant soft tissue, and the emergence profile was contoured under the guidance of the Pink Esthetic Score (PES) and the Aesthetic Biological Contour (EBC) concept. Digital impressions were taken at the early stage and at the 8th-week using an intraoral scanner (Trios 3, 3Shape, Copenhagen, Denmark) and Standard Tessellation Language (STL) data were analyzed in computer-aided design (CAD) software based on the Aesthetic Integration Area (EIA) concept. There was no statistically significant difference between early and 8th-week gingival contour values ($p = 0.139$). A significantly higher median aesthetic value was observed in anterior teeth compared to premolars (1.43 vs. 0.58; $p = 0.002$). Tooth number 3 showed a significant change over time ($p = 0.03$), while age and gender had no significant effect ($p > 0.05$). This study showed that peri-implant soft tissue management using the functional compression technique effectively reproduced natural gingival contours in the anterior region. The results indicated that gingival esthetics and contour stability were maintained between the early and 8th-week evaluations.

Keywords: soft tissue management, emergence profile, implant-supported restorations,

SS-160 Prosthetic rehabilitation of an acromegalic patient with class III malocclusion: a case report

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INTRODUCTION: Acromegaly is a rare endocrine disorder caused by excessive growth hormone production, often due to a pituitary adenoma. This hormonal imbalance results in skeletal and soft tissue changes, especially in the craniofacial region. Common oral manifestations include mandibular prognathism, increased interdental spacing, and Class III malocclusion. These changes may compromise esthetics, function, and overall oral health. This case report presents a prosthetic approach to restoring occlusal harmony, vertical dimension, and esthetics in an acromegalic patient with Class III malocclusion.

Case description: A 60-year-old male presented with complaints of impaired chewing function and facial esthetics. Intraoral and extraoral examinations revealed reduced vertical dimension and skeletal Class III relationship. Partial edentulism was identified during clinical examination. Endodontic treatment was completed on all mandibular teeth. Full-crown preparations were completed on both arches. Occlusal vertical dimension was determined using wax rims. Fixed metal-ceramic restorations were fabricated, and removable partial dentures were provided to support occlusion and function.

DISCUSSION: In this case, prosthetic rehabilitation successfully addressed functional and esthetic concerns without surgical intervention. Although the patient declined orthognathic surgery, an acceptable occlusal scheme was achieved. Six-month follow-ups revealed stable prosthetic outcomes and high patient satisfaction. The case highlights the role of prosthodontics in managing complex cases where surgery is not an option. Comprehensive treatment planning can significantly enhance quality of life for patients with systemic conditions like acromegaly.

Keywords: acromegaly, class III malocclusion, prosthetic rehabilitation, vertical dimension

SS-161 Impact of gastric acid and on the bond strength between a hybrid ceramic and resin cement: an in vitro study

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OBJECTIVES: The aim of this study was to evaluate the durability of hybrid ceramic-resin cement bonding under acidic conditions.

MATERIAL-METHODS: CAD/CAM hybrid ceramic blocks (GC Cerasmart)were sectioned to obtain rectangular specimens (N=46) which were surface-treated with 600 and 800 grit silicon carbide abrasive. Afterwards, all specimens were etched with HF for 60 sec and silanization was applied. A dual- cure adhesive resin cement (G-Cem Link Force) was applied on the surface treated specimens in PTFE cylindrical molds. After the incubation period of 24 hours, specimens were randomly divided into two groups to be immersed for 126 hours: half were treated with artificial saliva and the other half with hydrochloric acid. Following this period, shear bond strength was evaluated using a universal testing machine operating at a crosshead speed of 1 mm/min. The force at failure was recorded in Newtons which was divided by the bonding surface to obtain the Mpa value. All debonded specimens were examined under a light microscope to determine failure type as follows: 1. adhesive failure 2.Cohesive failure 3. Mixed failure. Data was statistically analyzed by Mann-Whitney U test.

RESULTS: Group HCl showed a bond strength value of 7.09 ± 1.98 MPa, while the bond strength obtained fort he artificial saliva group was 8.66 ± 3.49 MPa with no significant difference betwen them ($p > 0.05$).

CONCLUSION: Although the HCl solution appeared to reduce the bond strength at the cement–ceramic interface, this finding was not significant. Based on this findings, in cases where the intraoral pH is significantly low, the bond strength between adhesive resin cements and hybrid ceramics may be slightly reduced. However, this is unlikely to have a notable impact on clinical performance.

Keywords: bond strength, gastric acid, hybrid ceramic, resin cement

SS-162 Fracture Resistance of 3D-Printed Three-Unit Ceramic-Filled Resin Bridges with Varying Connector Designs and Dimensions

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INTRODUCTION: In recent years, digital manufacturing technologies have become increasingly prevalent in dentistry. Among these, additive manufacturing (AM) methods have gained attention due to their efficiency, cost-effectiveness, and reduced material waste. Ceramic-filled hybrid resins used in fixed dental prostheses (FDPs) require thorough mechanical evaluation—particularly regarding the design and dimensions of the connector area, which plays a critical role in structural integrity. This study aimed to investigate how different connector shapes and sizes influence the fracture resistance of three-unit resin bridges produced via AM.

MATERIALS-METHODS: A total of 60 three-unit FDP specimens (VarseoSmile® TriniQ®, BEGO, Germany) were fabricated using a 3D printer and divided into six groups based on connector cross-sectional area (2×2 mm², 3×3 mm², and 4×4 mm²) and embrasure shape (sharp [V-shaped] and rounded [U-shaped]). After post-processing according to manufacturer guidelines, the specimens were thermocycled for 5000 cycles (5–55°C) and subjected to fracture testing under vertical load. Statistical analysis was performed using two-way ANOVA and Tukey *post hoc* tests ($p<0.05$).

RESULTS: Connector shape and size had a statistically significant effect on fracture resistance ($p<0.05$). Increased cross-sectional area consistently resulted in higher resistance values. Notably, at 2x2 mm² thickness, V-shaped connectors demonstrated superior strength compared to U-shaped ones. No statistically significant difference was found between two connector designs at 3x3 mm² and 4x4 mm² connector area. The highest fracture resistance was observed at 4×4 mm² connector area in both designs.

CONCLUSION: Connector geometry may significantly affect the fracture resistance of AM-fabricated FDPs, particularly in smaller cross-sectional areas. As connector thickness increases, the impact of shape diminishes. With appropriate design, ceramic-filled hybrid resins show promise as a reliable material for clinical application in multi-unit prosthetic restorations.

Keywords: Fracture resistance, ceramic-filled resin, additive manufacturing, connector design.

SS-163 The effect of a modified preparation design on the marginal and internal fit of endocrowns: a triple scan study

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The aim of this study was to investigate the effect of ferrule and four-grooved modified butt-joint (BJ) preparations on the marginal and internal fit of endocrowns. Triple scans of the endocrowns were performed using an intraoral scanner (Cerec Omnicam, Dentsply, Germany). A computer-aided manufacturing (CAM) unit (Cerec MC/XL, Sirona Dental, Germany) was used to mill resin-nanoseramic blocks (Cerasmart, GC Corp, Japan). Tooth preparations were performed on first molar teeth of an acrylic training model of a lower jaw. The modified BJ preparation included four retention grooves, which were placed on the inner axial walls of the cavity and at the corners. Buccolingual, mesiodistal and oblique sections were taken from the teeth using software (Exocad Dental CAD, Exocad, Germany). Absolute marginal discrepancy (AMD), marginal discrepancy (MD), axial fit, pulpal fit and overall fit values were determined using reference points. A statistical analysis was performed using ANOVA. For the modified BJ group, the AMD and MD values were 271 ± 30 µm and 227 ± 30 µm respectively, and for the ferrule group they were 246 ± 30 µm and 229 ± 30 µm ($p>0.05$). The AMD and MD values obtained regardless of the preparation were 258 ± 21 µm and 228 ± 21 µm, respectively ($p>0.05$). The overall internal fit was 202 ± 58 µm in the modified BJ group and 193 ± 49 µm in the ferrule group ($p>0.05$). The axial and pulpal fit values obtained regardless of the preparation were 107 ± 15 µm and 252 ± 15 µm, respectively ($p<0.01$). The findings of this study demonstrated that the modified BJ preparation produces similar marginal and internal fit values to the ferrule preparation. It was suggested that the modified BJ could serve as an alternative to the ferrule in teeth with weak root dentin.

Keywords: marginal fit, butt-joint, triple scan, computer-aided design, resin- nanoceramic, endocrown

SS-164 The Contribution of Digital Smile Design to Multidisciplinary Treatment Processes in Aesthetic Dentistry: A Case Report

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INTRODUCTION: Digital smile design represents a modern, patient-centered approach that enhances planning accuracy and treatment predictability in aesthetic dentistry. The integration of evolving digital technologies into clinical workflows enables more efficient and successful outcomes within shorter timeframes. The coordinated collaboration of various disciplines within a unified digital platform facilitates a more controlled treatment process that is precisely aligned with the individual needs of the patient. Dental treatment, supported by a multidisciplinary approach and conducted in accordance with a digital workflow, will be comprehensively presented through video documentation.

Case Report: A 21-year-old female patient presented with aesthetic concerns. Clinical examination revealed multiple diastemas, a prominent maxillary labial frenulum, partial edentulism in the mandibular arch, and insufficient keratinized gingiva. Intraoral and facial scans were digitized and exported in STL format, then aligned using Exocad software to establish a digital foundation for smile design. A customized maxillary anterior design was developed based on aesthetic principles and evaluated through an intraoral mock-up. During clinical assessment, the need for periodontal intervention—specifically gingivectomy—was identified to improve pink aesthetics. A multidisciplinary treatment plan was established, and a digital workflow was created accordingly. Periodontal procedures, including frenectomy, gingivectomy, and free gingival grafting, were completed prior to the prosthetic phase. Following soft tissue healing, tooth preparations were finalized, and definitive restorations were designed using a virtual articulator within the Exocad platform. Full-ceramic restorations were then fabricated and adhesively cemented.

DISCUSSION: The patient's prosthetic and periodontal requirements were comprehensively managed through a digitally coordinated, multidisciplinary approach. This integrative methodology enabled the treatment process to proceed in a controlled, predictable, and patient-specific manner. The incorporation of digital tools facilitated a systematic, aesthetically guided workflow that enhanced both clinical efficiency and patient satisfaction.

Keywords: Multidisciplinary treatment processes, Digital smile design, Digital workflow

SS-165 Dental Shade Assessment via Various Digital Photograph Parameters: A Pilot Study

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OBJECTIVES: Accurate shade matching is essential for successful restorative and prosthodontic dental treatments. Various methods, including visual, digital, and spectrophotometric techniques, have been utilized for shade selection. However, there is limited data regarding the optimal photographic parameters that yield the most accurate shade matching in digital photography. This pilot study aims to evaluate color differences arising from variations in photographic parameters -specifically camera aperture and ISO-while maintaining a constant shutter speed of 1/125.

MATERIALS-METHODS: Spectrophotometric shade analysis (VITA Easyshade) was performed ten times on the maxillary right central incisor of a subject and the A1 tab from the VITA Classical shade guide before photography. A total of 12 digital images were captured using a DSLR camera (Canon EOS 850D) equipped with a 100 mm macro lens and ring flash (without polarized filter). The photographic parameters included a constant shutter speed (1/125 s), varying aperture values (f/11, f/13,f/22, f/32), and ISO values (100,160,200). Colorimetric evaluations were conducted using Adobe Photoshop, analyzing CIE Lab* coordinates and calculating ΔE values.

RESULTS: The lowest ΔE value was recorded with ISO 200, f/32 aperture, and 1/125 shutter speed in the tooth group (5.41 ± 1.92), while the highest ΔE value was obtained with ISO 100, f/11 aperture, and 1/250 shutter speed in the shade guide group (62.14 ± 3.90). The digital photographic ΔE values mostly remained within the clinically unacceptable threshold (ΔE > 2.7 and ≤ 5.4).

CONCLUSION: Within the limitations of this pilot study, digital photography alone for shade selection remains inconclusive. Further studies are warranted to comprehensively compare shade-matching accuracy using digital photography.

Keywords: Dental Digital Photography, Shade Matching, Dental Shade, Colorimetry, ΔE, Spectrophotometry

SS-166 Evaluation of the Effectiveness of Anterior Repositioning Splint Therapy in Patients with Balancing Side Contact Occlusion: A Clinical Study

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OBJECTIVE: This study aimed to evaluate the effectiveness of anterior repositioning splint(ARS) therapy in patients with temporomandibular disorders(TMD) exhibiting balancing side occlusal contact.

MATERIALS-METHODS: 41 patients(27 females,14 males) presenting with TMD symptoms were included in the study. Based on the presence of balancing side contact during lateral mandibular movements, patients were divided into two groups: unilateral (n=20) and bilateral (n=21) occlusal contact. All patients received ARS therapy for four weeks. Pain, functional limitation, mandibular deviation, temporomandibular joint (TMJ) and masticatory muscle tenderness, and patterns of maximum mouth opening were evaluated.

RESULTS: In the bilateral contact group, pre-treatment rates of ear pain, headache, and restricted mouth opening were 38%,71%, and 29%, respectively. These rates decreased post-treatment to 4%,14%, and 0%, respectively. Spontaneous TMJ and masticatory muscle pain, initially present in 62% of patients, was reduced to mild levels in only a few cases following treatment. A marked decrease in muscle tenderness and lateral movement-related pain was observed. Normalization of the opening pattern occurred in 6 out of 9 patients with pre-treatment deviation. A significant increase was recorded in maximum mouth opening(p=0.000). In the unilateral contact group, 35% of patients reported ear pain, 55% headaches, and 50% difficulty in mouth opening before treatment. Following treatment, only one patient continued to experience headache. TMJ and muscle pain complaints fully resolved in patients with balancing contact on either side. The previously common tenderness in the masseter and temporalis muscles completely disappeared. Pain during lateral movement decreased from 35% to 5%, and 80% of cases with deviation in the opening curve normalized. A significant increase in maximum mouth opening was observed(p=0.004).

CONCLUSION: ARS therapy is an effective and conservative treatment option for alleviating joint and muscle-related symptoms and improving mandibular functions in TMD patients with both unilateral and bilateral balancing side occlusal contacts.

Keywords: Temporomandibular disorder, anterior repositioning splint, occlusion, balancing contact, conservative treatment

SS-167 Prosthetic Restoration Fabrication in The Virtual Patient Constructed Through The Integration of 4D Dynamic Occlusion Records: A Case Report

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INTRODUCTION: Digital dentistry offers comprehensive solutions for complex dental treatments, enabling patient-specific and functional restorations that overcomes iatrogenic factors and discomfort. These workflows enhance esthetics, save clinical time, and improve functional outcomes. Their effectiveness is maximized by constructing a virtual patient through the integration of datasets such as cone-beam computer tomoghraphy (CBCT), facial scans, and intraoral scans. However, to achieve accurate and functional restorations and successful post-delivery care, incorporating jaw motion records and dynamic occlusion data has become essential. This case report evaluates the effectiveness of the Zebris JMA system during both the manufacturing and post-delivery phases of prosthetic restorations.

Case description: A patient requiring prosthodontic rehabilitation with crown restorations was selected. Diagnostic data included intraoral scans, CBCT, and facial scans were collected. To incorporate dynamic occlusion, the Zebris JMA system was used to record 4D mandibular movements and create a functional virtual patient. Prosthetic simulations were carried out in Exocad CAD software. Occlusal schemes, articulatory behavior, and workflow efficiency were analyzed to assess clinical accuracy. Post-treatment, the Zebris system was used again to evaluate occlusal contacts and temporomandibular joint (TMJ) relations.

DISCUSSION: The integration of 4D mandibular motion data into digital workflows minimizes the limitations of static occlusion, leading to restorations with improved esthetic and functional precision. In this case, the Zebris JMA system enabled both functional design and validation of restorations by assessing occlusal harmony and TMJ dynamics. This dual-phase application highlights its utility not only in treatment planning but also in post-treatment evaluation. The findings and processes of this case will be conveyed through multimedia presentations, including videos and visual materials. Further studies are recommended to explore reproducible, time-efficient, and cost-effective workflows applicable to multi-patient clinical settings.

Keywords: Digital Dentistry, Dynamic Occlusion,Virtual Patient,

SS-168 Crown Application on Tooth Number 21 with Horizontal Fracture Due to the Trauma

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INTRODUCTION: Dental trauma during childhood can lead to aesthetic and functional loss, especially in permanent anterior teeth. In growing individuals, complicated fractures require careful prosthetic planning and appropriate restorative approaches. CAD/CAM-supported post-core and all-ceramic crowns offer aesthetic and tissue-compatible solutions for young patients. This case report presents the prosthetic management of a trauma-induced fracture using digital techniques.

Case description: A 11 year old patient presented to our clinic with a history of trauma to tooth number 21. Clinical and radiographic evaluation revealed a complicated crown fracture classified as Ellis Class VIII involving a large coronal segment of the affected tooth. Initially, root canal treatment was performed, and the fractured fragment was cemented using an appropriate luting agent. However, due to repeated decementation of the fragment, a more durable and successful prognosis was aimed by controlled palatal flap retraction to expose the tooth, followed by post placement and crown restoration. Both post placement and tooth preparation were completed in the same session. Using CAD/CAM technology, a full ceramic crown was fabricated from CEREC Tessera lithium disilicate glass ceramic blocks and cemented. Considering the patient's diastema in adjacent teeth and ongoing growth phase, the crown was designed to preserve the diastema.

DISCUSSION: In growing patients with immature root development, post-core and crown restorations should be carefully planned considering long-term biomechanical effects and tissue preservation. Although minimally invasive approaches are preferred in the literature, repeated debonding in this case necessitated a more permanent solution. Post placement enhanced the support of the remaining tooth structure, improving restoration stability. The CAD/CAM fabricated full ceramic crown provided esthetic and functional harmony suitable for the patient's age. This case highlights the efficacy of digital technologies in achieving successful prosthetic outcomes even in pediatric patients.

Keywords: CAD/CAM, tooth injuries, prosthodontics, pediatric dentistry

SS-169 The effect of glass fiber reinforcement on the fracture toughness of 3D-printed crown material

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PURPOSE: Additive manufacturing technologies are commonly used to fabricate three dimensional (3D)-printed dental restorations, especially with the advantages of lower cost, time and higher production competence. The purpose of this study was to evaluate the fracture toughness (FT) of 3D-printed permanent crown materials reinforced with different ratios of chopped glass fibers.

MATERIALS-METHODS: Forty premolar crowns were 3D-printed using ceramic filled hybrid permanent crown material reinforced with glass fibers ratios of none (Cnt), 1%, 1.5% and 2% by weight, respectively (n=10). The crowns were cemented to the titanium frameworks with dual-cure resin cement. After specimens were stored in 37 ºC distilled water for 24 hours, FT values were determined using a Universal Testing Machine. While FT data were statistically analyzed using one-way ANOVA and Tukey HSD post-hoc test, chi-squared test was used to evaluate the failure types (α=0.05). The fracture types were analyzed using a stereomicroscope (×25).

RESULTS: Fiber reinforcement had a significant effect on the FT values (p=0.01) according to ANOVA. The highest FT value was determined for 2% fiber reinforced crowns (1010 ±131 N) with a significant difference compared to the Cnt group (856 ±58 N) (p=0.008). No statistically significant differences were found between the fiber reinforced crown groups (p>0.05). The distribution of fracture types was not significantly different among the test groups (p=0.073).

CONCLUSION: While the glass fiber reinforcement improved the overall fracture toughness of 3D printed permanent crown materials, the ratio of 2% provided successful FT results.

Keywords: 3D Printing, Dental Crown, Glass Fiber, Mechanical Testing

SS-170 “Mandibular Kinematics Analysis with MODJAW After Digital Full-Mouth Rehabilitation of Severely Worn Dentition: Case Report”

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INTRODUCTION: Excessive jaw movements beyond physiological limits can lead to various dental problems, including tooth wear. Patients with severe and generalized tooth wear commonly present with clinical symptoms such as tooth sensitivity, difficulty in chewing, compromised esthetics, and fractures of both dental tissues and restorations. The aim of this case report is to evaluate the effect of treatment on mandibular movement patterns using the MODJAW optical jaw tracking device after the rehabilitation of the patient’s dentition with a full-arch fixed zirconia prosthetic restoration fabricated through a digital workflow.

Case description: A 55-year-old male patient with severely worn dentition and four previously placed implant-supported crowns presented to our clinic with complaints of reduced chewing function and esthetic concerns. Clinical examination revealed mandibular deviation during mouth opening and working-side occlusal contact of all teeth during lateral movements. The patient’s functional mandibular movements were recorded using the MODJAW optical tracking device. Tooth preparations were completed, and provisional crowns were digitally designed using Exocad software program, with proper occlusion and reconstruction of the worn cusps. The provisional restorations were manufactured and used by the patient for five weeks. Subsequently, definitive restorations were fabricated and delivered. MODJAW recordings were repeated. The digital kinematic records of the mandible obtained before and after treatment enabled the evaluation of treatment effects in a digital environment.

DISCUSSION: The MODJAW optical tracking device provides superior accuracy with less margin of error compared to traditional methods in diagnosing and monitoring treatment of challenging rehabilitation cases. This indicates a significant advancement in the evaluation of mandibular movement and demonstrates improved assessment of treatment effectiveness and outcomes in clinical practice.

Keywords: MODJAW, Full Mouth Rehabilitation, Mandibular Kinematics, Optical Jaw Tracking Systems, Occlusion

SS-171 Comparative evaluation of chatGPT and perplexity AI in delivering accurate information on complete dentures: an expert-based analysis

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OBJECTIVE: This study aims to assess and compare the accuracy of two widely used AI chatbots—ChatGPT and Perplexity AI—in providing information related to prosthetic complete dentures, based on assessments made by expert investigators.

MATERIALS-METHODS: A total of 30 standardized questions were developed, covering core topics in complete denture prosthodontics, including clinical procedures, material selection, patient care, and maintenance. These questions were submitted to ChatGPT (OpenAI) and Perplexity AI. The responses were independently evaluated by two prosthodontic specialists using a modified DISCERN tool. the results were statistically analyzed. Interrater reliability was assessed using the Spearman rank correlation coefficient (r_s), while comparative quality scores between platforms were evaluated using the Wilcoxon signed-rank test. Statistical significance was set at α =.05. Descriptive statistics were used to present mean scores and standard deviations for both platforms.

RESULTS: A statistically significant positive correlation was found between the evaluators for both platforms, indicating a high level of interrater reliability (ChatGPT: r_s =.749, P <.001; Perplexity: r_s =.905, P <.001). The mean quality score for Perplexity responses (19.65 ± 4.11) was significantly higher than that for ChatGPT (12.80 ± 3.25), as determined by the Wilcoxon signed-rank test (Z = -4.78, P <.001). These findings suggest that the experts exhibited a high degree of agreement and perceived a clear difference in the quality of AI-generated content between the two platforms.

CONCLUSION: Based on expert evaluations, Perplexity demonstrated superior performance in generating reliable and higher-quality responses related to complete dentures compared to ChatGPT. These results emphasize the importance of platform-specific validation when integrating AI tools into dental education and clinical support systems.

Keywords: Artificial Intelligence, Complete Dentures, ChatGPT, Perplexity, Quality Assessment, Interrater Reliability

SS-172 The reliability of ai-based information in implant-supported prostheses: a multidimensional evaluation of chatgpt

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OBJECTIVE: This study evaluates the accuracy, reproducibility, and readability of ChatGPT's responses regarding implant-supported prostheses, given the increasing use of AI in patient education and healthcare communication.

MATERIALS-METHODS: Thirty standardized questions about implant-supported prostheses were submitted to ChatGPT on two separate occasions. The responses generated were recorded and independently assessed by 2 prosthodontics specialists. Accuracy was assessed using a modified 5-point Likert scale. Reproducibility was measured by comparing responses across sessions. Readability was analyzed using the Flesch Reading Ease and Flesch-Kincaid Grade Level formulas. Descriptive statistics summarized the Flesch-Kincaid Grade Level scores. An independent samples t-test assessed differences between weeks, and Pearson correlation evaluated score relationships. Analyses were performed in Python (v3.10) using SciPy (v1.11.4), with significance set at p <.05.

RESULTS: The mean accuracy score showed a slight increase in the 2nd week; however, this difference was not statistically significant (p >.05). A moderate and statistically significant positive correlation was observed between the scores across weeks (ρ = 0.44, p =.015), indicating overall consistency in responses. In terms of readability, the majority of responses in both weeks were classified at university and postgraduate levels, with no responses falling within the simplest reading categories. A significant difference was found in the distribution of readability levels between the 2 weeks (χ^2 = 63.20, p <.001), suggesting that the linguistic complexity of ChatGPT's responses varied over time.

CONCLUSION: ChatGPT demonstrates promising consistency and a moderate level of accuracy in providing information about implant-supported prostheses. However, variability in linguistic complexity and limitations in scientific depth highlight the need for refinement before it can be considered a reliable tool for clinical use or patient education.

Keywords: Accuracy, Artificial Intelligence, ChatGPT, Implant-Supported Prostheses, Readability, Reproducibility

SS-173 Adhesive strategies for zirconia: toward a rational protocol – a systematic review

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INTRODUCTION: Owing to its polycrystalline structure, zirconia cannot undergo the same bonding protocols as etchable ceramics, which continue to represent the gold standard in adhesive dentistry. Numerous surface treatments and luting materials have been proposed to enhance the adhesive potential of zirconia.

OBJECTIVE: To identify the most effective surface pretreatment and luting material for achieving optimal bond strength to zirconia.

MATERIALS AND METHODS: This systematic review was conducted following the PRISMA guidelines. The literature search was performed across the PUBMED, COCHRANE LIBRARY, and GOOGLE SCHOLAR databases using the **Keywords:** ("zirconia" AND "bonding" AND "bond strength" AND "surface treatment" AND "longevity" AND "resin composite"). Study selection was based on predefined inclusion and exclusion criteria, with only articles published from 2014 onward considered for inclusion to ensure the relevance and currency of the data.

RESULTS: A total of 12 articles met the eligibility criteria. Key data including the type of zirconia used, surface pretreatment methods, bonding agents, measured bond strengths, and aging protocols were extracted and summarized in comparative tables.

CONCLUSION: Effective bonding to zirconia requires appropriate surface pretreatment. Among the available options, air particle abrasion followed by the application of an MDP-containing primer and conventional resin composite appears to yield the most reliable adhesion performance.

Keywords: zirconia, bonding, surface treatment, primer, resin composite, longevity

SS-174 The Effect of Thermal Aging on The Mechanical Properties of CAD/CAM Milled and Conventional Heat-Polymerized PMMA Denture Base Resin

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OBJECTIVES: The aim of this study was to compare the mechanical properties of CAD/CAM-manufactured PMMA (Ivoclar Vivadent Ivotion, Liechtenstein) and conventional heat-polymerized PMMA (President Dental Procryla, Germany) denture base resins before and after thermal aging.

MATERIALS-METHODS: Two types of PMMA denture base resin materials were used: a CAD/CAM-milled (Ivoclar Vivadent Ivotion, Liechtenstein) and a conventional heat-polymerized PMMA (President Dental Procryla, Germany). For each denture base resin material, two groups were established: one subjected to thermal aging and the other kept as a control without aging, resulting in a total of four experimental groups. All specimens were fabricated in accordance with the ISO 20795-1:2013 standard, which specifies the test methods and requirements for denture base polymers. Thermal aging was applied using a thermocycling protocol consisting of 5000 cycles between 5°C and 55°C. The sample size was determined based on a power analysis performed using G*Power 3.1 (n = 13) to ensure adequate statistical validity. Each group consisted of 13 specimens, resulting in a total of 52 specimens. All specimens were subjected to mechanical testing, including a three-point bending test to determine flexural strength and a Vickers microhardness test to evaluate surface hardness. The results were statistically analyzed using SPSS version 22.0 software.

RESULTS: Before thermal aging, the CAD/CAM group showed higher flexural strength and hardness values compared to the conventional heat polymerized group ($p < 0.05$). After thermal aging, both groups exhibited a decrease in mechanical properties; however the reduction was less pronounced in the CAD/CAM group.

CONCLUSION: CAD/CAM PMMA showed better performance in mechanical properties and appeared more resistant to thermal aging compared to conventional heat-polymerized PMMA. These findings suggest that CAD/CAM PMMA may offer improved long-term clinical durability.

Keywords: CAD/CAM, PMMA, denture base, thermal aging, flexural strength, hardness

SS-175 Translucency of CAD/CAM Ceramics: Effect of Thickness, Cement Shade, and Background Color

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OBJECTIVES: To evaluate the effect of different resin cement shades and background colors on the translucency parameter (TP) of dental ceramics with different thicknesses.

MATERIALS-METHODS: Rectangular specimens (n = 12 per group) with three thicknesses (0.8 mm, 1.0 mm, and 1.2 mm ± 0.01 mm) were prepared from lithium disilicate (IPS EMAX CAD), zirconia-reinforced lithium silicate (CeltraDuo), and leucite-reinforced glass ceramic (VITA Suprinity). Three cement shades (opaque, translucent, and A1) were tested on two composite backgrounds (A1 and A3). Cementation was simulated using a glycerin gel (refractive index = 1.52) to ensure consistent optical contact. Translucency values were measured via spectrophotometry using the CIE Lab* system on both white and black backgrounds. Statistical analyses included Shapiro–Wilk and Kolmogorov–Smirnov tests for normality, one-way ANOVA, Tukey HSD *post hoc* testing, and both paired and one-sample t-tests (α = 0.05).

RESULTS: All groups showed significant translucency differences by thickness ($p < 0.001$). ANOVA revealed that cement shade and background color significantly affected TP in several groups, particularly EMAX 1 mm on A3 ($p < 0.001$), VITA Suprinity 1 mm on A1/A3 ($p < 0.05$), and CeltraDuo 1 mm on A3 ($p = 0.012$). Translucent cement consistently yielded higher TP values than A1 and opaque shades ($p < 0.001$). Paired-sample t-tests showed TP values were significantly lower over A3 backgrounds, especially in the EMAX group ($p < 0.003$ for all thicknesses). One-sample t-tests confirmed statistically measurable TP in all groups ($p < 0.001$), with the highest mean in EMAX 0.8 mm on A3 (1.0728).

CONCLUSIONS: Both resin cement shade and background color play a significant role in the final translucency of ceramic restorations. Translucent resin cement used over lighter backgrounds yields more favorable optical properties, particularly in high-translucency ceramic systems.

Keywords: Translucency, resin cement, CAD/CAM ceramics, lithium disilicate

SS-176 In Vitro Evaluation of Methyl Methacrylate (MMA) Release from Different Temporary Denture Base Materials

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INTRODUCTION: Residual methyl methacrylate (MMA) released from temporary denture base materials is of clinical concern due to its potential biological effects. Recently, light-polymerized and 3D-printed denture base resins have emerged as alternatives to conventional cold-polymerized acrylics. This study aimed to compare the in vitro MMA release levels of three clinically relevant temporary denture base materials.

MATERIALS AND METHODS: Three materials were tested: cold-polymerized acrylic resin, light-polymerized baseplate resin, and 3D-printed denture base resin. Ten samples were prepared for each group (n=10), standardized to 0.05 g per specimen. Samples were immersed in 2 mL and 5 mL of artificial saliva and incubated at 37°C. MMA release was quantified using high-performance liquid chromatography (HPLC) at 15 minutes, 30 minutes, 1 hour, and 24 hours. Data distribution was analyzed with the Shapiro-Wilk test; the effects of time, material, and saliva volume were assessed using two-way ANOVA and Tukey post-hoc tests ($p<0.05$).

RESULTS: No MMA release was detected before 24 hours in the 3D-printed and light-polymerized groups. The cold-polymerized acrylic group showed progressive MMA release starting from 15 minutes, with a significant increase over time ($p<0.001$). At 24 hours, it exhibited the highest MMA levels among all groups. A significant difference between 2 mL and 5 mL saliva volumes was observed only in the cold-cure group. The 3D-printed resin showed the most stable performance across all time points.

CONCLUSION: Temporary denture base materials should be selected with consideration of residual monomer release. The results support the biocompatibility of 3D-printed resins for short-term clinical applications, especially when early MMA release and toxicity are of concern.

Keywords: 3D-printed resin, Methyl methacrylate, Temporary denture base, Cold-polymerized acrylic, Light-polymerized baseplate, HPLC

SS-177 The effect of different isolation methods on residual cement in implant-supported crowns with cement retainers with different gingival levels

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OBJECTIVE: This study aimed to evaluate the effectiveness of different isolation methods in preventing cement overflow from adhering to the abutment surface in the peri-implant region during cementation. Additionally, the impact of abutment step depth on residual cement levels after cementation was examined.

METHOD: Digital models were created from intraoral scans of a patient missing a right lower first molar, which was replaced with a dental implant. Other teeth were present and positioned in the occlusal plane. Three main groups were formed in the study based on the abutment step–gingival margin relationship: 0.5 mm, 1.5 mm and 2.5 mm. Each group was then divided into three subgroups based on the isolation method applied (rubber dam, Teflon tape or cleaning with a probe) (n = 10). The digital data were transferred to Exocad software and the restorations were designed in the CAD environment using 3Shape Dental Designer. Temporary crowns were then produced from PMMA blocks using a CAM system. The resulting crowns were then cemented using polycarboxylate cement.

After cementation, the abutment-crown complexes were placed in condensed silicone and photographs taken under constant lighting at a specific distance were analysed using Adobe Photoshop. Residual cement and total abutment surface areas were marked using a magnetic selection tool and pixel-based measurements were performed. The obtained data were statistically evaluated using IBM SPSS Statistics v23 software.

FINDINGS: Regardless of the isolation method used, statistically significant differences were found in the amount of residual cement present, depending on the abutment depth (P = 0.0001). The rubber dam was determined to be the most effective isolation method, while the Teflon tape and probe cleaning methods were found to be less effective.

CONCLUSION: The amount of residual cement is significantly influenced by variables such as the isolation method used and the abutment depth.

Keywords: abutment margin position, isolation methods, peri-implantitis, residual cement

SS-179 Effect of combined application of self-etching primer and hydrofluoric acid on the microtensile bond strength between resin cement and polymer-infiltrated ceramic network material

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PURPOSE: To evaluate the effect of hydrofluoric acid (HF), self-etching primer (Monobond Etch & Prime; MEP), and combined application of these protocols (HFMEP) on microtensile bond strength (μTBS) between polymer-infiltrated ceramic network material and resin cement.

MATERIALS-METHODS: Specimens were divided into four groups based on the surface treatment applied: Control (C), HF, MEP, and HFMEP. Resin-cement build-ups were obtained and cut into resin-ceramic beams. The beams were randomly divided into 2 subgroups according to aging condition: 1) 24 h water storage and 2) 10.000 thermocycling (TC). μTBS was measured using a universal testing device. The surface roughness (Ra) of additional samples (n=20) for each treatment group was measured using a profilometer. One sample per group was subjected to scanning electron microscopy. Data were analyzed by ANOVA, Tukey's HSD, and independent t-tests (α=.05).

RESULTS: C and HF groups exhibited the lowest and highest Ra values, respectively (p<.001). μTBS values for HF and MEP groups were similar at baseline (p>.05), but MEP treatment resulted in significantly higher μTBS values than in the HF-etched group after TC (p<.001). μTBS values for the HFMEP group were higher than those for solely HF or MEP-applied groups at baseline (p<.001). After TC, the μTBS values for all groups were reduced (p<.001).

CONCLUSION: The combined application of hydrofluoric acid and self-etching primer effectively improved resin bond strength compared to hydrofluoric acid etching alone. The high μTBS values obtained after thermocycling with the self-etching primer application alone indicated that this application may be a viable treatment alternative for polymer-infiltrated ceramic network material.

Keywords: Hydrofluoric acid etching, Polymer-infiltrated ceramic network, Resin bond strength, Self-etching primer

SS-180 Evaluation of Fit and Manufacturing Trueness of Ti-Base Monolithic Zirconia Restorations: In-Vivo Digital Analysis

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This study aimed to evaluate the manufacturing trueness, intraoral fitting accuracy, and proximal contact quality of Ti-Base monolithic zirconia single crowns using both in-vivo and ex-vivo digital workflows.

Clinical data were obtained from 21 patients restored with implants using two different Ti-base designs (Nucleoss and Bilimplant). All digital impressions were acquired using a single intraoral scanner (3Shape). Restorations were fabricated using a standardized CAM system (CORiTEC350i, imes-icore) and a single zirconia material (Aconia BSM). Three STL datasets were generated: (1) baseline intraoral scans (IOS1-STL), (2) scans after crown delivery (IOS2-STL), and (3) 360° scans of the fabricated restorations (RCAM-STL).

All datasets were analyzed using Geomagic Control X. For intraoral fitting accuracy, IOS1 and IOS2 datasets were superimposed. Manufacturing trueness was assessed by aligning CAD-STL and RCAM-STL files. Deviations were recorded as RMS values, and contact points with adjacent teeth were analyzed to evaluate proximal fit.

Statistical analysis was performed using Student's t-test to compare different Ti-base designs, and a one-sample t-test to assess restoration accuracy. The significance level was set at $p < 0.05$.

No significant differences were found between the two Ti-base types in RMS deviation, TSP scores, or proximal contact values ($p > 0.155$). All restorations demonstrated clinically acceptable fitting and manufacturing accuracy, with a mean deviation around 40 µm. Internal gaps averaged 66–67 µm, and proximal contact distances were approximately 75 µm.

To the authors' knowledge, this is the first clinical study to assess intraoral fitting accuracy of digitally fabricated Ti-Base monolithic zirconia restorations. Although restorations showed high accuracy, minor occlusal adjustments may still be required during clinical placement.

Keywords: Manufacturing trueness, Fitting, Ti-Base Monolithic Zirconia

SS-181 Prosthetic rehabilitation of two complex cases: bilateral condylectomy and severe class III malocclusion

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INTRODUCTION: This clinical report presents the prosthetic rehabilitation of two patients diagnosed with bilateral condylectomy and severe skeletal Class III malocclusion. These conditions pose significant challenges in restorative dentistry due to impaired occlusion, esthetics, and function. A multidisciplinary treatment approach is essential to achieve optimal clinical outcomes.

Case Descriptions: Case 1: The first case is a 40-year-old male patient presenting with severe skeletal Class III malocclusion, partial edentulism, and loss of vertical dimension. Orthognathic surgery was recommended to the patient, but he refused the surgical option. Basic periodontal treatments were performed. The occlusal vertical dimension was reestablished using wax templates. Full-mouth rehabilitation was accomplished with metal-ceramic crowns and removable partial dentures. Case 2: A 44-year-old female patient presented with complaints of inadequate mastication, functional limitations, and esthetic concerns. Clinical examination revealed bilateral condylectomy, significant bone loss in the right mandible, and partial edentulism. Basic periodontal treatments were carried out. The remaining teeth were prepared for prosthetic rehabilitation. The occlusal vertical dimension was determined using diagnostic wax-ups and confirmed through clinical try-ins. The maxilla was restored with metal-ceramic crowns and a removable partial denture, while the mandibula was rehabilitated with an implant-supported overdenture.

DISCUSSION: The prosthetic rehabilitation of patients with bilateral condylectomy and skeletal Class III malocclusion requires accurate diagnosis, detailed treatment planning, and interdisciplinary collaboration. In both cases, significant improvements in esthetics and function were achieved, the occlusal vertical dimension was successfully reestablished, and a functional Class I occlusion was obtained. Six-month follow-up evaluations showed stable prosthetic outcomes and high levels of patient satisfaction. These cases emphasize the effectiveness of individualized prosthetic approaches in the management of complex dental anomalies.

Keywords: angle class III, bilateral condylectomy, prosthetic rehabilitation, vertical dimension

SS-182 Effects of zirconium-based toothpaste concentrations on tooth shade improvement: an in vitro study

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OBJECTIVE: The aim of this in vitro study was to assess how different concentrations of a zirconium-containing toothpaste influence changes in tooth color, with the goal of identifying its potential for cosmetic use.

MATERIALS-METHODS: Forty extracted human teeth, free of caries, were embedded in auto-polymerizing acrylic resin. The samples were divided into four groups (n = 10) based on the concentration of zirconium in the toothpaste: 0.5%, 1.0%, 2.0%, and 5.0%. Each group contained five anterior and five posterior teeth. All teeth underwent mechanical brushing for two minutes using a rotary handpiece at 20,000 rpm. Color measurements were taken before and after brushing using the VITA Easyshade® spectrophotometer. The color changes were evaluated using CIE Lab* parameters, and ΔE values were calculated to quantify the total color difference. Statistical analysis was performed using One-Way ANOVA and Tukey-Kramer tests for normally distributed data, and Kruskal-Wallis with Dunn's tests for non-parametric data.

RESULTS: The 5% zirconium group demonstrated a statistically significant increase in L* values for anterior teeth (p = 0.023), indicating a visible whitening effect. A concentration-dependent trend was observed, where higher zirconium content resulted in greater improvements in tooth shade.

CONCLUSIONS: Toothpaste formulations containing zirconium particles can effectively enhance tooth brightness, particularly on anterior surfaces. The results suggest that higher concentrations yield better whitening effects, making zirconium a promising abrasive agent in aesthetic oral care products.

Keywords: Zirconium, Tooth whitening, Spectrophotometry, Abrasive agents, Color improvement

SS-183 Effects of Whitening Mouthwashes on Color Stability and Translucency of 3D-Printed Dental Resin

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OBJECTIVES: This study aimed to evaluate the effects of whitening mouthwashes on the color stability (ΔE) and translucency parameter (TP) of 3D-printed dental resin specimens over three weeks, simulating real-life usage.

MATERIALS-METHODS: Seventy-six specimens of VarseoSmile Triniq (BEGO, Bremen, Germany) dental resin (12×14×2 mm) were prepared and divided into four groups: Colgate, Rocs, Listerine, and distilled water (control). Specimens underwent a standardized mouthwash protocol: immersion in 25 mL of solution with agitation for 60 seconds, rinsing with distilled water, twice daily. Measurements were taken at baseline (T0), after 1 week (T1), 2 weeks (T2), and 3 weeks (T3). Color parameters (L*, a*, b*) and TP values were recorded using a Vita Easyshade V spectrophotometer. ΔE values were calculated. Data were analyzed using repeated measures ANOVA, one-way ANOVA, and non-parametric tests as appropriate ($p<0.05$).

RESULTS: Significant differences in ΔE and TP values were observed among groups at all time points ($p<0.05$). Listerine and Colgate groups showed the highest ΔE values at each measurement point, indicating a progressive whitening effect. Rocs exhibited moderate changes, while distilled water showed minimal alterations. Over time, ΔE values increased significantly in Colgate, Rocs, and Listerine groups ($p<0.001$), with the greatest changes occurring between the first and second weeks. Similarly, TP values increased notably in the Colgate and distilled water groups over three weeks ($p<0.05$), suggesting enhanced translucency. A significant interaction between solution type and time was observed for both ΔE and TP parameters.

CONCLUSIONS: Whitening mouthwashes demonstrated a progressive whitening effect and enhanced translucency in 3D-printed dental resin specimens over three weeks of simulated daily use. Among the tested formulations, Listerine and Colgate showed the most pronounced esthetic improvements. These findings suggest that regular use of whitening mouthwashes may be an effective adjunct for maintaining and enhancing the esthetic longevity of dental restorations.

Keywords: 3-D printing, color, mouthwashes, translucency

SS-184 Investigation of bond strength of dual-cure resin cement with different expiry dates to a nanohybrid ceramic with different surface treatment

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OBJECTIVE: This study aims to evaluate the effect of dual-cure resin cements with different expiration dates on the adhesion of polymer-infiltrated ceramic network (PICN) materials to teeth. Two different surface treatments were applied, and adhesion was assessed with a shear bond test.

METHOD: Ceramic blocks made of PICN material (Vita Enamic) and 84 sound teeth extracted for periodontal reasons were used. The teeth were divided into six groups (n=14) based on cement type and surface treatment. HF1,5: dual-cure resin cement expired by 1,5 years with hydrofluoric (HF) acid etching; TS1,5: dual-cure resin cement expired by 1,5 years with tribochemical silica coating; HF1: dual-cure resin cement expired by 1 year with HF acid etching; TS1: dual-cure resin cement expired by 1 year with tribochemical silica coating; HF0: non-expired dual-cure resin cement with HF acid etching; TS0: non-expired dual-cure resin cement with tribochemical silica coating. After cementation, samples were subjected to 10,000 thermal cycles. Shear bond strength was tested at 0.5 mm/min, and fracture types were analyzed under a stereomicroscope at 20x magnification. Two ceramic samples with surface treatments were further analyzed using scanning electron microscopy (SEM). Statistical analysis was conducted with Minitab 14 software, with significance set at $p<0.05$.

RESULTS: The results showed that bond strength was significantly higher for non-expired cements compared to cements expired by 1 and 1.5 years. Additionally, HF acid etching significantly increased bond strength compared to tribochemical silica coating. Adhesive fractures were the most frequently observed type.

CONCLUSION: Bond strength values were statistically significantly higher in ceramic groups treated with HF acid etching and in groups using non-expired dual-cure cements. It is advised to avoid using expired materials in clinical settings.

Keywords: hybrid ceramic, PICN, CAD/CAM, surface treatments, shelf life

SS-185 Effect of Simulated Gastric Acid on Optical and Surface Properties of Monolithic Restorative Materials

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Purpose: The aim of this study was to evaluate the surface roughness (Ra), optical properties (ΔE_{00}, RTP), and mass loss of monolithic CAD/CAM materials following exposure to simulated gastric acid.

MATERIALS AND METHODS: Four CAD/CAM materials (Vita Enamic, Celtra Duo, Cerasmart, and IPS e.max CAD) were evaluated, with twelve specimens per group (N=48). Optical properties (L*, a*, b* values and RTP) were assessed using a spectrophotometer, while surface roughness (Ra) was measured with a profilometer. Mass loss was determined through gravimetric analysis. All samples were immersed in an acidic solution and incubated at 37°C for 96 hours, followed by post-immersion measurements. Data were found to be non-normally distributed based on Kolmogorov-Smirnov and Shapiro-Wilk tests.

RESULTS: Statistically significant differences ($p < 0.05$) were observed in the surface characteristics and optical properties of the CAD/CAM materials following acid exposure. All groups showed ΔE_{00} values below 0.8, remaining within clinically perceptibility threshold. Following gastric acid exposure, Celtra Duo exhibited the highest surface roughness values (0,15±0,02), whereas E.max CAD showed the lowest (0,04±0,007).

CONCLUSION: Although simulated gastric acid had significantly different effects on the various CAD/CAM blocks, all groups demonstrated properties that remain clinically acceptable. These findings highlight the importance of material selection in restorative dentistry, particularly for patients with gastroesophageal reflux disease.

Keywords: CAD-CAM, Gastric Acid, Restorative Materials, Surface Roughness, Translucency Parameters

SS-186 Fractal evaluation of overdenture patients with two different attachment types

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OBJECTIVE: The aim of this study is to evaluate the changes in mandibular trabecular bone using fractal analysis in patients using implant-supported overdenture prostheses with two different attachment types.

MATERIALS-METHODS: The study consists of a total of 16 patients treated at Erciyes University Faculty of Dentistry, 9 of whom used locator attachments and 7 used ball attachments for their implant-supported overdenture prostheses. In this study, panoramic radiographs taken for treatment and follow-up purposes were selected from the archive and evaluated retrospectively. Radiographs taken after implant surgery and before prosthesis placement, and radiographs taken after a minimum of two years of prosthesis use were evaluated. On panoramic radiographs, three regions of interest were selected for each implant: mesial, distal, and apical areas. Fractal analysis was performed using the box-counting algorithm. The mean values of the mesial, distal, and apical surfaces were calculated. The normal distribution of the data was assessed using the Shapiro-Wilk test, and a normal distribution was observed. Data were analyzed using dependent and independent sample t-tests.

RESULTS: Fractal analysis is a mathematical method used to examine complex geometrical structures. Bone tissue, especially trabecular bone, has a fractal structure. Therefore, fractal analysis is an effective tool for evaluating bone architecture.

According to the results of the dependent sample t-test performed at the end of the study, no statistically significant difference was found between the regions in terms of bone density over time ($p > 0.05$). However, when the groups before and after prosthesis placement were evaluated within themselves, a statistically significant difference was found in the mandibular cortical width value in the locator attachment type ($p = 0.041$).

CONCLUSION: In patients using overdenture prostheses, fractal dimension and mandibular cortical width values may be useful for quantitatively and objectively evaluating bone changes caused by different attachment types.

Keywords: Fractal, Overdenture, Locator, Ball, Attachment

SS-187 Periodontal status of indirect resin composite restorations with proximal box elevation: 3-year clinical results

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OBJECTIVES: The objective of this prospective controlled clinical trial was to evaluate the periodontal status of posterior indirect resin composite (IRC) restorations followed by proximal box elevation (PBE) over time based on clinical and radiographic observations.

MATERIALS-METHODS: Large defects on molars (N=80) with deep cervical margins at proximal side received IRC (SR Nexco, Ivoclar Vivadent AG) restorations following PBE (Tetric-N Flow and Tetric-N Ceram, Ivoclar Vivadent AG) between 2018 and 2022 (NCT 03832829). Out of 80, 42 restorations with PBE at one proximal side (mesial or distal) in 39 patients were included in the study. Periodontal parameters including, plaque index (PI), gingival index (GI), probing depth (PD) and bleeding on probing (BoP) were recorded at baseline (15 days after cementation), 12, 24 and 36 months. Periodontal status at sound side (control) and PBE side of the same tooth were compared using Wilcoxon sign rank test (PI, GI and PD) and Mc Nemar's test (BoP). Influence of the degree of PBE on BoP was analyzed (Pearson chi-square test).

RESULTS: Data could be collected from 42, 39, 33 and 30 teeth at baseline, 6, 12, 24 and 36 months, respectively. None of the periodontal parameters differed between PBE and control at baseline and during follow-ups ($p< 0.05$), except for significantly higher PD values at PBE side at 6-month recall ($p=0.008$). The BoP did not differ between PBE (66.7%) and control (56.7%) at 36-month follow-up ($p=0.549$). The degree of PBE extension in terms of biologic width violation had no influence on BoP ($p> 0.05$). No bone resorption observed during the study period.

CONCLUSION: Based on the findings of this study, PBE could be advised as an acceptable option from the biological aspect, even if biologic width violation was mandatory.

Keywords: Deep margin elevation, periodontal health, proximal box elevation, indirect resin composite restorations

SS-188 Complete-Arch Rehabilitation Using a Digitalized Twin-Stage Technique

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INTRODUCTION: The application of computer-aided design–computer-aided manufacturing (CAD-CAM) technology has improved the predictability of complete-arch prosthodontic rehabilitation. Yttria-stabilized zirconia, known for its excellent aesthetics and strength, is widely used; however, its mechanical properties may deteriorate following extensive occlusal adjustments. Therefore, minimizing intraoral modification is essential, particularly in complex cases. The Twin-Stage Technique, proposed by Hobo and Takayama, enables posterior disclusion even in the presence of condylar path deviation. This case presents a digitally guided complete-arch zirconia prosthesis fabricated using the Twin-Stage Technique, offering a reproducible method for achieving functional occlusion with minimal adjustment.

Case description: A 68-year-old male with well-controlled systemic conditions presented with masticatory dysfunction due to multiple posterior missing teeth. A complete-arch fixed dental prosthesis using yttria-stabilized zirconia was planned with increased occlusal vertical dimension. Eccentric interocclusal records proved inconsistent, indicating variation in mandibular movement. To minimize occlusal adjustments and preserve zirconia strength, the Twin-Stage Technique was applied to accommodate mandibular deviation while achieving posterior disclusion. After extractions and abutment preparation, provisional fixed and removable prostheses were fabricated based on a diagnostic wax-up. The removable prostheses guided the design of a surgical guide for implant placement. Following osseointegration, a definitive impression was taken, and CAD-based provisional prostheses were fabricated using the Twin-Stage protocol. Final zirconia prostheses replicating the provisional design were delivered. Minimal occlusal adjustments were required, and mutually protected articulation was achieved.

DISCUSSION: Digital application of the Twin-Stage Technique enabled predictable full-arch rehabilitation even with unreliable eccentric records. It also reduced chairside adjustment time and minimized the risk of zirconia degradation, supporting long-term clinical success.

Keywords: Complete-arch rehabilitation, Twin-Stage Technique, Digital workflow, Yttria-stabilized zirconia, Occlusal adjustment

SS-190 Effective use of cognitive interviews in validating questionnaires in a head and neck multidisciplinary study

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INTRODUCTION: The use of questionnaires as data collection tools is often preferred by researchers, mainly because of their ease of use and cost effectiveness. The validation of new questionnaires can be challenging; cognitive interviews are one of the methods used, and were used in this study, whose aim was to gather information on the extent of surgical treatment and maxillofacial prosthodontic rehabilitation for patients with head and neck defects in South Africa.

Materials and methods: The participants were from the specialties of Ear Nose and Throat surgery, Plastic and Reconstructive surgery, Maxillofacial and Oral surgery, Ophthalmology and Prosthodontics. It also included Dental Technicians/Technologists. Each group, represented by four or five participants, were interviewed using a questionnaire designed specifically for their speciality. In total, twenty-six participants were interviewed, and the 'think aloud' and 'concurrent probing' methods were used.

RESULTS: The number of questions in the questionnaires ranged from twenty-six to thirty-one. Five to ten questions from these questionnaires were found to be unclear, confusing or difficult to respond to. Four of these questions were from all five clinical disciplines and were almost similar. Amongst them were questions requiring long term memory which participants found difficult to respond to. So, options with different ranges were added to these questions to make it easier for participants to choose responses applicable to them. Participants found this to be very helpful and were able to respond without prompts. Other questions were also amended accordingly. Majority of Dental Technicians/Technologists did not know what multidisciplinary teams (MDT) were. An introduction defining MDT had to be included at the beginning of the MDT section.

CONCLUSION: Cognitive interviews proved to be very valuable in the validation process of the questionnaires in this study and the pretesting allowed for the acceptable use of the questionnaires on an online platform.

Keywords: questionnaires, cognitive interviews, survey validity, surveys

Funding: This study was funded through the University of the Witwatersrand's Chancellor's Female Academic Leaders Fellowship grant (2024 - 2025)

SS-191 Immediate and Delayed Restoration in Implant Treatment for Single Tooth Replacement – A Case Series

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Soft tissue management is essential for achieving esthetic outcomes in implant dentistry. Immediate and delayed restoration protocols offer distinct advantages. Immediate restoration with provisional crowns preserves soft tissue contours, shortens recovery time, reduces clinician visits, and enhances comfort and esthetics. Delayed restoration allows for more controlled soft tissue adaptation. This case series evaluates the soft tissue outcomes of three patients treated with single-tooth implants using both protocols. Three female patients with single tooth loss in the esthetic zone received implant treatment with different protocols. - In the first patient, a primary canine tooth was extracted, and an implant was placed immediately. A provisional restoration was provided, followed by a definitive prosthesis after osseointegration. - In the second patient, an impacted canine was extracted, and an implant was placed, but a provisional was delayed due to conditions. Soft tissue shaping was gradually achieved with a provisional, followed by a definitive prosthesis. Both the provisional and definitive restorations for this patient were produced using conventional methods. - The third patient presented with an osseointegrated implant. Soft tissue was gradually shaped using provisional restoration, and a definitive prosthesis was fabricated using a digital workflow. All stages were photographed and evaluated using the Pink Esthetic Score (PES) by a specialist. In the treatment of single-tooth loss in the anterior region, achieving optimal soft tissue contour is crucial. Pink Esthetic Score (PES) was used for esthetic evaluation, and results showed similar outcomes between immediate and delayed restoration protocols. The use of provisional restorations in both protocols facilitates soft tissue management and enhances esthetic outcomes in the definitive prosthesis. Both protocols demonstrated clinically comparable and acceptable esthetic outcomes, supporting the effectiveness of individualized soft tissue management.

Keywords: Dental Implants, Dental Implant Loading, Dental Prosthesis, Implant-Supported, Single-Tooth Implant, Immediate Restoration

SS-192 Accuracy of 3 different printers at marginal, internal and occlusal surfaces

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OBJECTIVES: The aim of this study was to evaluate the accuracies of the study models obtained using 3 different types of 3D printers comparing with the digital model.

MATERIALS-METHODS: Teeth number 14 and 16 were prepared for the study. An intraoral scanner was used to obtain a reference digital model for comparisons. Models were then printed with DLP, SLA and LCD printers at 50 µm (n=5 for each). Each model was then scanned with a desktop scanner. The scanned data was saved in STL format and were then compared with reference models to obtain deviations at internal, occlusal and marginal surfaces. A 3D metrology program was used to superimpose the reference model and the scanned models. Root mean square (RMS) error values were used to report data. Nominal and critical values were set before tests.

RESULTS: SLA samples exhibited the least deviation on all surfaces. The least deviation among all subgroups was observed on the occlusal surface of SLA samples (30.30±5.53 µm). The highest deviation was detected on the occlusal surface of LCD samples (69.88±7.49 µm). SLA and DLP models exhibited the highest deviations at marginal surfaces where the LCD model exhibited the least. When each surface was compared within each other, the deviations were found to be significantly different from each other ($p=0,01<0,05$). Each 3D printer exhibited its highest accuracy, at a different surface.

CONCLUSION: The accuracy of samples obtained from SLA 3D printers was found to be significantly higher. It can be said that LCD technology needs development in terms of dimensional stability. Deviations in samples obtained from DLP printers exhibit average values.

Keywords: 3d printer, digital model, sla, dlp, lcd

SS-193 Effect of Different Final Impression Techniques on the Retention of Maxillary Complete Dentures: A Quantitative and Qualitative Evaluation

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OBJECTIVES: The aim of this clinical study was to compare the retention of maxillary complete dentures fabricated using two different impression techniques, and to evaluate patient satisfaction after short-term use. The relationship between the retention values and patient satisfaction was also investigated.

MATERIALS-METHODS: Twenty completely edentulous patients were included in the study. For each patient, two maxillary complete dentures were fabricated using different impression techniques. In the first technique, border molding was performed using green stick compound prior to the final impression (MS group). In the second technique, border molding was carried out simultaneously with the final impression using medium-body polyether, without the use of green stick compound (M0 group). The retention of the dentures was measured using a custom-designed device that applied vertical dislodging forces, and each denture was tested three times. Patient satisfaction was evaluated using a 100-mm Visual Analog Scale (VAS).

RESULTS: Statistical analysis showed significantly higher retention values in the MS group compared to the M0 group ($p<0.05$). However, no significant difference in VAS scores was found between the groups ($p>0.05$). Both techniques resulted in clinically acceptable retention from the patients' perspective.

CONCLUSIONS: Green stick compound-based border molding improves denture retention. Despite the difference in objective retention values, patient satisfaction remained similar in the short term, indicating that both methods are viable options in clinical practice.

Keywords: Complete dentures, retention, impression technique, border molding, patient satisfaction

SS-194 Digital analysis of the effects of different illuminations, shade guides, and clinical experiences on optimal shade selection

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OBJECTIVES: To evaluate the shade matching performance of observers with different clinical experiences using different shade guides and illumination sources.

MATERIALS-METHODS: Sixty participants aged 21–35 from Faculty of Dentistry were included: researchers in Prosthodontic Department (GroupRA); fifth-grade students (GroupIS); third-grade students (GroupPS). Participants were asked to match shades (A2,B2,C2,D2) from VITA Classical (VC) under different illuminations (daylight; light-correcting device (Smile Lite)), with VC and VITA3D-MASTER (V3D). Platform was designed and assessments were conducted in a viewing booth (5500°K). L*,a*,b* values of the shade tabs were measured with a spectrophotometer (control group). Color differences (ΔE^*_{00}) between the selected shades and the controls were calculated. Perceptibility and acceptability thresholds were $0.8\Delta E^*_{00}$ and $1.8\Delta E^*_{00}$, respectively. ΔE^*_{00} were scored as $0\Delta E^*_{00}=0$; $0.8\Delta E^*_{00}$–$1.8\Delta E^*_{00}=1$; $>1.8\Delta E^*_{00}=2$. Statistical analysis was performed using Kruskal Wallis and Mann–Whitney-U test ($p<0.01$).

RESULTS: In Group RA, differences were found between Smile Lite and daylight for B2 ($p=0.001$, $\Delta E^*=0.08$) and C2 ($p=0.004$, $\Delta E^*=0.15$) with VC; however, illumination had no effect with V3D ($p>0.01$). Comparing the shade guides under daylight, differences were observed for B2 and D2 ($p<0.01$). Using Smile Lite, significant differences were exhibited for all shades ($p<0.01$). In GroupIS; differences were observed between the guides and illuminations, for B2 and D2 ($p<0.01$). In GroupPS; significant difference was found only for D2 ($p=0.001$) under daylight selection; whereas B2 and D2 selections differed with Smile Lite ($p<0.01$). Difference was found in C2 selection between GroupRA and PS (VC: $p=0.008$; V3D: $p=0.011$) under daylight. No differences were exhibited between GroupRA and IS, when VC was used with Smile Lite. GroupRA showed significantly better performance in A2,B2,C2 selections.

CONCLUSIONS: Shade selections were influenced by the shade guides and the illuminations. Researchers often made unacceptable mismatches for B2 and D2. Using light-correcting device with VC shade guide seems like best choice in shade selection.

Keywords: color, illumination, shade guide

SS-195 Screening For Obstructive Sleep Apnea in Dental Clinics: A Comparative Validation of STOP-BANG and Berlin Questionnaries

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This study aimed to evaluate the risk of Obstructive Sleep Apnea (OSA) in patients attending a dental clinic using two widely validated screening tools: the STOP-BANG and Berlin Questionnaires. A secondary objective was to assess the clinical utility and predictive accuracy of these questionnaires in identifying individuals at high risk for OSA, as confirmed by overnight polysomnography (PSG). The study also sought to highlight the potential role of dental professionals in the early detection and referral process for patients with suspected OSA.

This cross-sectional study was conducted at the Dental Clinic of Gazi University's Department of Prosthodontics. Fifty-four adult patients referred to the sleep clinic with suspected OSA and scheduled for overnight PSG were included. Before PSG, participants underwent oral and airway evaluations in the dental clinic. Individuals with cognitive impairment or complete edentulism were excluded. All participants completed the STOP-BANG and Berlin Questionnaires, and their anthropometric data—including height, weight, BMI, and neck circumference—were recorded. Statistical analyses were performed to examine correlations between questionnaire-based risk levels and PSG-confirmed OSA severity. Ethical approval was obtained from the Gazi University Ethics-Committee.

Of the 54 patients analyzed (29.6% female; mean age: 50.93 ± 10.95 years), PSG results revealed 50.0% had severe OSA, 33.3% moderate, and 16.7% mild OSA. The STOP-BANG classified 57.4% of patients as high risk, while the Berlin Questionnaire identified 92.6% as high risk. No statistically significant association was found between OSA severity and STOP-BANG (p=0.505) or Berlin (p=0.650) risk categories. Similarly, AHI scores showed no significant correlation with STOP-BANG (r=0.177, p=0.200) or Berlin scores (r=0.238, p=0.084).

Although statistical significance was not achieved, the high-risk classifications by both questionnaires closely mirrored the overall distribution of moderate to severe OSA. These tools, when used in conjunction with basic oral evaluations, may support early identification and referral by dental professionals within interdisciplinary sleep-health care.

Keywords: SLEEP DISORDERS, POLYSOMNOGRAPHY, QUESTIONNAIRES, OBSTRUCTIVE SLEEP APNEA

SS-196 Digital load-based analysis of bone changes around abutments restored with fixed prostheses following prosthetic principles

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OBJECTIVE: This study aimed to assess whether restorations designed according to fixed prosthetic principles cause long-term changes in alveolar bone density around abutment teeth. Additionally, the influence of individual load indices, calculated based on abutment surface areas, on bone resorption risk was evaluated.

MATERIALS-METHODS: CBCT scans obtained at two time points (T1 and T2) at least six months apart between 2016 and 2025 at Fırat University Faculty of Dentistry were retrospectively analyzed. A total of 55 abutment teeth (restored with 22 fixed prostheses from 15 patients) were included based on predefined criteria. Using 3D Slicer, a total of 110 root segments and 2-mm peri-abutment bone zones were segmented separately on T1 and T2 scans. Mean HU values were extracted from each scan and normalized using patient-specific coefficients based on the mean HU of maxillary sinus airspaces. Prosthesis lengths and abutment surface areas were used to calculate load indices. Statistical analyses were conducted in JASP, including Paired Samples T-Test for assessing changes in normalized HU values between T1 and T2, Pearson and Spearman tests for correlation, and Pearson correlation with ANOVA to evaluate the association between load indices and HU change (T2–T1) across three groups: low (<0.15), moderate (0.15–0.30), and high (≥0.30).

RESULTS: A strong correlation between T1 and T2 values ($r = 0.920$, $p < 0.001$) indicated stable bone density. Although normalized HU values slightly increased, the change was not significant ($t = -1.319$, $p = 0.193$). No significant correlation was found between load indices and HU changes ($r = -0.072$, $p = 0.603$). ANOVA showed no significant group differences ($F(2,52) = 0.526$, $p = 0.594$), though descriptie statistics suggested that HU values tended to rise with higher load indices (low load:+0.098, medium load:+0.201, high load:+ 0.504).

CONCLUSION: Properly planned fixed prostheses help maintain alveolar bone density over time, regardless of load distribution.

Keywords: Fixed prostheses, Cone beam computed tomography, Alveolar bone density, HU values, Load distribution, 3D segmentation

SS-197 Evaluation of the Effect of Different Post-Curing Times and Surface Treatments on Soft Liner Bond Strength in 3D-Printed Denture Base Resins

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OBJECTIVE: The aim of this in vitro study was to evaluate the effect of different post-curing times and surface treatments on the soft liner bond strength of acrylic resin material fabricated using three-dimensional (3D) printing.

MATERIALS-METHODS: Half-dumbbell-shaped acrylic resin specimens (7×12×36 mm) were digitally designed using CAD software. A total of 108 specimens were produced using a Digital Light Processing (DLP)-based 3D printer with biocompatible acrylic resin at a 90° build orientation. After production, the specimens were cleaned in isopropyl alcohol and subjected to post-polymerization in a UV curing unit at different exposure cycles (2×1000, 2×2000, and 2×3000). After surface preparation, the specimens were sterilized with ethylene oxide and divided into three main groups based on post-curing duration. Each main group was then randomly divided into three subgroups based on surface treatment: control (no treatment), acid etching, and sandblasting. The subgroups were labeled as follows: Group 1 (2×1000 cycles): G1K (control), G1A (acid), G1S (sandblasting); Group 2 (2×2000 cycles): G2K, G2A, G2S; and Group 3 (2×3000 cycles): G3K, G3A, G3S. Following the surface treatments, a soft liner was applied to all specimens, and tensile bond strength was measured using a universal testing machine. Data were analyzed using two-way analysis of variance (ANOVA) and Shapiro-Wilk normality tests.

RESULTS: Bond strength values varied depending on post-curing time and surface treatment. In Group 1, the acid-etched subgroup (G1A) exhibited the highest bond strength, while the control subgroup (G1K) showed the lowest. In Group 2, the control subgroup (G2K) demonstrated significantly higher bond strength compared to the acid (G2A) and sandblasted (G2S) subgroups. In Group 3, no statistically significant differences in bond strength were observed among the subgroups (p =.090).

CONCLUSION: Different post-curing durations and surface treatments significantly affect the bond strength of soft liners to 3D-printed denture base resins.

Keywords: 3D Printing, Post-Polymerization, CAD/CAM Denture Base, Additive Manufacturing, Soft Liner, Tensile Bond Strength

SS-198 Does fiber ribbon reinforcement increase the fracture strength of endodontically treated teeth?

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OBJECTIVE: This study evaluated the fracture strength of fiber-reinforced endocrowns and post-core restorations in mandibular premolar teeth.

MATERIALS-METHODS: Twenty extracted human mandibular second premolars were endodontically treated and horizontally sectioned 2 mm above the cementoenamel junction. The specimens were randomly divided into two main groups: fiber post-core (FP) and endocrown (BJ), each with two subgroups (n = 5). The subgroups were as follows: fiber-reinforced fiber post-core (FP1), conventional fiber post-core (FP2), fiber-reinforced endocrown (BJ1), and conventional endocrown (BJ2). In the FP2 group, a conventional fiber post was luted with flowable resin (G-aenial Universal Injectable, GC Dental, Japan), and a core was built with composite (Filtek Ultimate, 3M ESPE, Germany). In FP1, a fiber ribbon (everStick NET, GC Dental) was applied over the fiber post before composite build-up. The BJ groups had their axial walls smoothed and undercuts removed. In BJ2, the pulpal base was created with flowable resin, while in BJ1, it was modified with fiber ribbon reinforcement. All restorations were fabricated from hybrid ceramic (Cerasmart270, GC Corp, Japan) using Computer Aided Design/Compuer Adied Manifacturing (CAD/CAM) and cemented with G-CEM One (GC Dental, Japan). Fracture strength was tested by applying a compressive load at 90° to the horizontal plane (parallel to the long axis) with a constant force of 50 N. Data were analyzed using three-way ANOVA ($p < 0.05$).

RESULTS: The effect of base type on fracture resistance was statistically significant (p=0.029). The highest fracture resistance was found in the FP1 group (1016 ± 60 N) and the lowest in the FP2 group (760 ± 161 N).

CONCLUSION: Fiber reinforcement increased the fracture strength of endodontically treated mandibular premolars, with greater effectiveness observed in post-core restorations.

Keywords: endocrown, hybrid ceramic, fracture strength, fiber ribbon, post-core

SS-199 Effect Of Cigarette Smoking On Dental Zirconia: Substractive Versus Additive

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OBJECTIVE: To compare the effect of smoking on color difference, translucency, and surface roughness of dental zirconia produced by substractive and additive.

MATERIAL-METHOD: A total of 60 zirconia disc (14 × 1 mm) were produced using milling blocks (VITA YZ T) and printable resin (INNI-CERA (BCM-W500/1000)), with 30 disc in each group. All specimens were polished with OptraGloss (Ivoclar Vivadent). Surface roughness was evaluated with an optical profilometry device. Color coordinates were measured against black and white backgrounds using a clinical spectrophotometer. After initial measurements, each group was divided into four subgroups according to the exposure environment: Additive-Smoke (AS), Additive-Saliva (ASa), Substractive-Smoke (SS), Substractive -Saliva (SSa), AS, and SS groups were exposed to cigarette smoke and artificial saliva for 1 month. Surface roughness and color coordinates measurements were repeated. Translucency was measured using the relative translucency parameter (RTP), and color difference was calculated by the CIEDE2000 formula. Data were analyzed using Kruskal-Wallis, paired samples t-test, and one-way ANOVA (α=0.05).

RESULTS: The RTP of the additive group was statistically significantly lower compared to the substractive group ($p<0.05$). The SA and Ra values of the print group were significantly lower than those of the substractive group ($p<0.05$). After exposure to the environment, the RTP of the PS was statistically decreased ($p<0.05$) but made no difference in the other 3 groups ($p>0.05$). The exposure environment did not statistically affect the surface roughness of any group. There was a statistically significant difference between the color differences of the AS and SS groups ($p <0.05$).

CONCLUSION: Additive dental zirconia has lower surface roughness, lower translucency, and less coloration with smoking than that produced by a substractive one. The additive dental zirconia, which is a new production method, is promising, but the translucency feature should be improved.

Keywords: Smoking, Zirconia, Additive, Substractive, Translucency, Roughness

SS-200 Clinical Application of the STAB Consensus in the Evaluation and Management of Bruxism Patients: A Case-Based Approach

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INTRODUCTION: Bruxism is a common, multifactorial condition characterized by repetitive jawmuscle activity, including clenching, grinding, and various mandibular movements. Clinical assessment has been inconsistent due to the lack of standardized diagnostic criteria, complicating diagnosis and treatment. To address this, the Standardised Tool for the Assessment of Bruxism (STAB) was developed through international expert consensus. This study demonstrates the clinical utility of the STAB framework for grading bruxism as “possible,” “probable,” or “definite”. It also highlights how a standardized diagnostic process can facilitate personalized treatment in general dental practice.

Case description: Three patients with clinical signs or self-reported symptoms of bruxism were evaluated using the STAB protocol. The assessment included self-report questionnaires and clinical examinations. Instrumental evaluations, such as electromyography or polysomnography, were unavailable. Each patient was classified using STAB criteria, and individualized management plans were developed based on bruxism severity and type.

DISCUSSION: The STAB tool enabled a structured diagnostic process, improving consistency among clinicians. Patients gained a better understanding of their condition, enhancing compliance and follow-up. Integrating the STAB consensus into clinical workflows provides a standardized, evidence-based method for bruxism assessment and management. This improves diagnostic clarity, supports tailored interventions, and offers a replicable model for broader clinical and research use.

Keywords: Bruxism, STAB, diagnosis,

SS-201 Evaluation of the Bond Strength of Fiber Posts Cemented with Different Cements and Techniques

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OBJECTIVES: Fiber posts are used in teeth that are endodontically treated and have excessive loss of structure. These posts are passively inserted into the root canal using various luting agents. In clinical practice, resin cements and glass ionomer cements are commonly used. This study aimed to evaluate the bond strength of the fiber posts to root dentin using different types of cements and application techniques, measured by the push-out test.

MATERIAL-METHODS: A total of 48 extracted, single-rooted human canine teeth were used. Following endodontic treatment, the teeth were prepared for fiber post placement and randomly assigned into four groups according to the type of cement and application **METHOD:** RC (resin + coating), RL (resin + lentulo), GC (glass ionomer + coating), and GL (glass ionomer + lentulo). From each specimen, 2 mm thick root slices were obtained, resulting in 144 samples. Push-out tests were performed at a crosshead speed of 0.5 mm/min. Data were statistically analyzed using the Kruskal–Wallis H test and Bonferroni-corrected Mann–Whitney U tests.

RESULTS: There was a statistically significant difference among the groups ($H = 34.1$; $p = 0.0001$). The highest mean bond strength was observed in the RC group (68.65 MPa), the lowest was in the GC group (20.03 MPa). Regionally, the bond strength in the coronal was significantly higher than in the apical across all groups ($p < 0.0001$).

CONCLUSION: Bond strength is affected by both the type of cement and technique. Resin cements, particularly when applied via coating, demonstrated the highest performance. Glass ionomer cements showed relatively lower bond strength. Bond strength of fiber posts is significantly higher in coronal region compared to middle and apical thirds, indicating that extending post length beyond the coronal area may not always enhance retention, and apical extension is therefore not always necessary.

Keywords: bond strength, fiber post, glass ionomer cement, resin cement

SS-202 Prosthetic Rehabilitation Following Post-Oncologic Surgery in a Patient with a Mandibular Floor Defect: A Case Report

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INTRODUCTION: Mandibular overdentures supported by implants offer predictable retention and function. However, oncologic surgery in the oral cavity may drastically alter both hard and soft tissue anatomy, potentially preventing the use of the patient's existing prosthesis. This case report presents the prosthetic rehabilitation of a patient with a post-oncologic defect in the floor of the mouth, aiming to restore function without causing tissue trauma.

Case description: An 81-year-old edentulous patient had previously received a mandibular overdenture supported by two implants at our clinic. After being diagnosed with oral cancer in the left mandible, surgical resection caused significant anatomical alterations like the fusion of the alveolar ridge with the floor of the mouth. Due to the oncologist's instruction to avoid trauma and poor post-surgical adaptation of the existing prosthesis, the patient remained edentulous for approximately one year. The patient later returned to our clinic with masticatory difficulty seeking a new prosthetic rehabilitation. The previous prosthesis was modified by trimming the posterior flanges and used as a custom tray to take a functional impression. A new overdenture was fabricated and permanently relined with a long-term soft liner to protect the resected area.

DISCUSSION: This case demonstrates the clinical benefit of modifying an existing prosthesis to adapt to surgical defects and allow for atraumatic impression procedures. The use of a permanent soft liner ensured gentle adaptation to delicate tissues while restoring masticatory function. Individualized impression strategies and material selection are essential for successful prosthetic rehabilitation in post-oncologic patients with complex anatomical changes.

Keywords: Prosthetic rehabilitation, post oncologic surgery, atraumatic impression, mandibular floor defect, implant-supported overdenture.

SS-203 Effect of treatments applied to monolithic zirconium with different thicknesses on surface roughness and bending strength before and after thermal aging

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OBJECTIVE: This study aims to investigate the effects of different surface treatments and thermal cycling on the surface roughness and biaxial bending strength of monolithic zirconium samples prepared with different thicknesses.

METHOD: In this study, 160 VITA YZ® HT brand monolithic zirconium samples were prepared in a disk shape, 80 pieces of 1 mm thickness, 80 pieces of 2 mm thickness, and 15 mm diameter. Half of the samples prepared with different thicknesses were subjected to thermal cycling. Four subgroups were created according to the surface treatment for all sample groups (n=10). The subgroups were created as control (C), abrasion and polishing (AP), abrasion and glaze (AG), and abrasion, polishing and glaze (APG). The surface roughness values of the samples were measured with a profilometer device. Biaxial bending strength was evaluated using the piston technique on three balls. Statistical analysis was performed with three-way Robust ANOVA.

RESULTS: In all samples, the average surface roughness was the highest in the C and AP groups and the lowest in the AG group. This difference was found to be statistically significant. The highest bending strength values were found in the APG group and the weakest in the K group. This difference was not found to be statistically significant. The effect of the thermal cycling process on surface roughness was found to be statistically significant, while its impact on bending strength was insignificant. The effect of the material thickness on surface roughness and bending strength was statistically significant.

CONCLUSION: The application of thermal cycling increased the surface roughness value and decreased the bending strength. The increase in the sample thickness decreased the surface roughness values and increased the bending strength. The combined application of abrasion, polishing, and glazing processes decreased the surface roughness of the material and increased the bending strength.

Keywords: Monolithic Zirconium, Surface Finishing, Thermal Cycling, Surface Roughness, Biaxial Bending Strength

SS-204 Comparative Evaluation of Microhardness of Provisional Crown and Bridge Materials Produced with Different Polymerization Protocols: An In vitro Study

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OBJECTIVE: The aim of this study was to compare the microhardness values of two temporary crown materials produced with different polymerization protocols.

MATERIALS-METHODS: Sixty disk-shaped specimens (10 mm in diameter and 2 mm in thickness) were prepared from a self-cure or dual cure temporary crown materials (Protemp 4, 3M ESPE; Tempsmart DC, GC). Each material group was divided into three subgroups according to the polymerization protocols (n=10): Group P1: 5 min-chemical cure, group P2: 5 min-chemical cure + 5 s-light cure, group P3: 5 min-chemical cure + 1 min-extra oral light cure, group T1: 5 min-chemical cure, group T2: 2,5 min-chemical cure + 5 s-light cure, group T3: 3 min-chemical cure + 1 min-extraoral light cure). The specimens from each group were tested by Vickers surface microhardness tester. The measurements were converted into HV (Vickers hardness number) and statistically analyzed by analysis of variance.

RESULTS: Group T2 showed the highest microhardness values (15.93 ±1.14 VHN) followed by Group P2 (15.78 ± 1.87 VHN) and Group P1 (15.72 ±1.26 VHN). It was reported that group P3 (12.76 ± 1.52) had significantly lower microhardness values compared to groups P1 (15.72 ± 1.19) and P2 (15.78 ± 1.86) (p=0.0002 and p=0.0001, respectively). When the groups that were subjected to the same polymerization method were compared, a statistically significant difference was found only between P3 (12.76 ± 1.52) and T3 (15.06 ± 2.34) (p=0.003).

CONCLUSIONS: Within the limitations of this study, it can be concluded that different polymerization methods have a statistically significant effect on microhardness values of temporary crown materials. Mechanical properties of temporary crown materials can also be significantly affected by polymerization protocols.

Keywords: temporary crown materials, microhardness, polymerization protocols

S-205 Smartphone-based shade matching in prosthodontics: a game changer in daily practice?

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OBJECTIVES: Accurate shade selection is essential for esthetic outcomes in fixed prosthodontics. Visual methods are widely used but prone to operator bias and environmental influence. While spectrophotometers provide higher precision, they are costly and less practical. Advances in mobile technology have introduced smartphones with high-resolution cameras and apps as accessible tools for shade matching. This review aims to systematically evaluate the accuracy, reliability, and clinical applicability of smartphone-assisted shade selection methods compared with conventional and device-based approaches.

MATERIALS-METHODS: This comprehensive narrative review was conducted in accordance with PRISMA guidelines. The review was conducted using 12 full-text studies retrieved from PubMed, Scopus, Web of Science, and Embase between 2015 and 2024. The included studies comprised randomized controlled trials, in vitro experiments, and systematic reviews evaluating the performance of smartphone cameras, digital applications, and adjunct devices (e.g., gray cards, light-correcting filters). Data were synthesized on ΔE values, inter-/intra-observer reliability, and correlation with spectrophotometric standards.

RESULTS: The majority of studies demonstrated that smartphone-assisted methods showed significantly improved accuracy over visual shade selection, with ΔE values consistently below the clinically acceptable threshold (<3.7) in controlled conditions. Several studies reported high reliability (ICC > 0.80) and repeatability when smartphones were used with standardized lighting and calibration aids. Advanced methods employing AI and facial landmark detection further enhanced consistency. Meta-analyses confirmed that digital methods—particularly smartphone and DSLR photography—outperformed visual techniques and, in some cases, approached spectrophotometric precision.

CONCLUSION: Smartphone-assisted shade matching represents a promising, cost-effective, and accessible solution for clinical and home-based color selection in dentistry. When combined with standardization protocols and adjunct calibration tools, smartphones can deliver reliable results comparable to spectrophotometers. However, variability in lighting and device parameters remains a challenge. Future research should focus on developing AI-integrated, real-time calibration systems to enhance communication between clinicians and dental technicians.

Keywords: Smartphone, prosthodontics, color, shade matching

SS-206 Effect of Different Color and Size Auxiliary Geometric Parts on Digital Implant Measurement Accuracy: A Comparison Study

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Purpose: The use of intraoral scanners in the fabrication of implant-supported restorations is increasing. However, in the digital workflow initiated by intraoral scanning, factors such as the large amount of mobile tissue, the absence of anatomical reference points, and long distances between implants may affect scanning accuracy. This study aimed to compare the internal accuracy of digital impressions obtained using auxiliary geometric parts of different sizes and colors.

MATERIALS AND METHODS: Two digital maxillary models were designed in a CAD software with bilateral posterior teeth and anterior edentulism, with two digital implant analogs placed in the canine region—one model with parallel and the other with angled placement. These models were printed using dental resin in a 3D printer. Implant analogs and scan bodies (SBs) were attached and scanned with an industrial scanner to obtain a reference model. The auxiliary geometric parts were grouped and placed, and each configuration was scanned ten times with an intraoral scanner. The resulting scans were evaluated using the reverse engineering software Geomagic Control X by comparing RMS values and angular deviations.

RESULTS: In the model with parallel analogs, no statistically significant differences were found in angle or RMS values ($p>0.05$). In the angled model, while no significant angular deviation was observed in the analog at position 13, statistically significant differences were found in the analog at position 23 regarding RMS values and inter-implant angle ($p\leq0.05$).

CONCLUSION: When implants are placed in parallel, the use of auxiliary geometric parts in different colors and sizes does not significantly affect scanning accuracy. However, in angled implant placements, although the geometric part has no impact on the implant located closer to the scanning start point, it significantly affects the accuracy of the scan for the more distant implant.

Keywords: Geomagıc Control X, IOS, Dıgıtal Dentistry

SS-207 Fracture resistance of conventionally and digitally manufactured complete denture bases: an in vitro study

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OBJECTIVES: The aim of this study was to compare the fracture resistance of conventionally and digitally fabricated maxillary complete denture bases.

MATERIAL-METHODS: An edentulous maxillary master cast was scanned and a virtual complete denture base was designed which was used to produce all denture bases. Four different denture fabrication methods were used as 2 conventional (injection molding and compression molding) and 2 digital (3D-printed and milling) techniques (n=10). All denture bases were kept in 37°C distilled water for 24 hours. The fracture test was utilized using a universal testing device by applying a load on the intaglio surfaces of complete denture bases. The maximum load at fracture was recorded as Newtons (N). The fracture type classification for each sample was made as follows: 1. Crack in acrylic base with preserved integrity, 2. The fracture of the base in two fragments and 3. Catastrophic fracture. The statistical analysis of fracture strength data was made using Kruskal-Wallis H Test. Fracture types were statistically analyzed using chi-square test (α=0.05).

RESULTS: Denture bases fabricated by milling method showed the highest fracture strength (1404.64±33.90 N) ($p < 0,001$), while differences between other methods were insignificant ($p \geq 0.05$). Fracture types were significantly associated with the fabrication method ($(\chi^2) = 27.5$, $p = 0,0001$), with 3D printing showing only catastrophic failure, while milling and compression molding methods showing mostly fractures in 2 fragments. The major fracture type of injection molding group was crack in acrylic base with preserved integrity.

CONCLUSION: The fracture strength of complete dentures can be enhanced by using milling fabrication method. As the conventional fabrication method, injection molding can be preferred, since preservation of the denture base integrity without fracture was mostly presented in this technique.

Keywords: 3D printing, CAD/CAM milling, Complete denture, Conventional manucfacturing, Fracture strength,

SS-208 Full mouth implant rehabilitation of non-syndromic severe jaw bone resorption with bicortical iliac bone grafting: technical note

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INTRODUCTION: The iliac bone has lost its popularity due to its rapid resorption, the presence of a second surgical site, tissue morbidity in the post-operative period and gait disorders. However, studies have shown that grafts taken from the lateral region of the iliac bone are less resorbed. In this case, the iliac bone taken from the lateral region was fixed to the upper and lower jaw bone with bicortical surfaces facing buccally. In this way, the resorption of the iliac bone with high cortical and cancellous content was minimized and long-lasting restorations were aimed.

Case description: A 42-year-old male patient was applied to the Gazi University Faculty of Dentistry with complaints about his prostheses. The patient has no medical systemic disease, has a history of complete edentulism for 15 years. When the radiological images of the patient were examined, there was severe vertical and horizontal bone resorption of upper and lower jaw that will not respond to implant treatment. According to clinical and radiographic examinations, an anterior approach iliac operation and implant treatment were planned for both upper and lower jaw under general anesthesia. Following healing process application of full mouth fixed prosthodontics were planned.

CONCLUSION: Implant retained dental prostheses are a comfortable treatment option for edentulous patients. In clinical practice, reconstructions with grafts taken from the lateral region of the iliac bone bicortically before fixed prosthodontic restorations are a reliable approach in patients with advanced bone resorption.

Keywords: dental implant, iliac bone graft, implant retained prosthesis, full mouth rehabilitation

SS-209 Evaluation of the Effect of Increasing the Occlusal Vertical Dimension on Condylar Parameters Using MODJAW: A Clinical Study

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OBJECTIVES: The aim of this clinical study is to evaluate the effect of increasing the occlusal vertical dimension (OVD) on condylar inclination (CI) and Bennett angle (BA) by recording data using the MODJAW tracking system.

MATERIALS-METHODS: Mandibular kinematic data of 15 asymptomatic volunteers were recorded using the MODJAW tracking device. These data were transferred to a virtual environment. A design was created in the Exocad software program to increase the vertical dimension by 2 mm on the maxillary teeth. This new vertical dimension was transferred to the patient's mouth using PMMA, after which MODJAW recordings were taken again. The new recordings were compared with the initial recordings for evaluation. For each participant, CI and BA values were measured at 3 mm and 5 mm of condylar displacement during two separate recording sessions.

RESULTS: In this study, condylar inclinations (right/left, 3 mm and 5 mm) and Bennett angles (right/left, 3 mm and 5 mm) obtained from 15 patients were compared before and after treatment. According to the results of the Paired Samples t-Test, no statistically significant differences were found between pre-treatment and post-treatment values in any of the measurement parameters ($p > 0.05$). No significant changes were detected in the 3 mm and 5 mm measurements before and after treatment.

CONCLUSION: Occlusal vertical dimension should not be regarded as a fixed reference, but rather as a dynamic dimension within a physiologically tolerable range, provided that it respects the patient's functional mandibular movements. Increasing the vertical dimension within safe limits can be achieved in a controlled manner using MODJAW recordings.

Keywords: MODJAW, bennett angle, condylar inclination, occlusal vertical dimension, mandibular kinematics

SS-210 Contemporary perspectives on dental aesthetic perception

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OBJECTIVE: This study aims to investigate whether aesthetic perception differs between dental students and individuals from other professional groups. It also examines the effect of dental education on aesthetic perception. With increased cultural interaction and the widespread use of social media, dental aesthetics have shifted toward personalized preferences.

MATERIALS-METHODS: An online survey was administered to a total of 243 participants via Google Forms. Participants were divided into two groups: dental students and individuals from other professions. The survey included paired images created using Adobe Photoshop 2024, in which features such as tooth size, color, shape, alignment, presence of diastema, and lip fullness were altered. Participants were asked to choose which image they found more aesthetically pleasing, and their social media usage was also recorded. The data were analyzed using R version 4.4.0; statistical significance was set at $\alpha = .05$, and odds ratios (OR) with p-values were reported.

RESULTS: No significant difference was found between the two groups in terms of overall aesthetic perception. Both groups preferred natural tooth color, small, and well-aligned teeth. A significant difference was observed in perceptions of gingival appearance and diastema: dental students and individuals from other professions showed a significant difference in their evaluations of these categories ($p < .05$). No significant differences were found in the other categories ($p > .05$). Aesthetic perception in both groups was significantly influenced by social media. Instagram was found to be the most frequently used and influential platform in shaping aesthetic preferences.

CONCLUSION: Dental aesthetic perception may vary according to professional background. Being aware of these differences can help clinicians in treatment planning and patient communication.

Keywords: aesthetics, perception, dentistry, social media

SS-211 Comparison of Translucency Parameter of Different 3D- Printed Permanent Restorative Resins

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PURPOSE: The subtractive manufacturing has been extensively studied and widely implemented in dentistry, additive manufacturing materials—particularly those intended for permanent restorations—are relatively new, and data regarding their clinical performance remain limited. This in vitro study aimed to evaluate the Translucency Parameter (TP) of three different 3D-printed permanent restorative materials: VarseoSmile Crown Plus (BEGO), P-Crown Resin (Senertek), and Print Crowntec (Saremco), each fabricated at varying thicknesses (1.0 mm, 1.5 mm, and 2.0 mm).

MATERIALS-METHODS: Three commercially available permanent resin materials were investigated. A total of 135 specimens were 3D printed according to the manufacturers' protocols, with 15 samples fabricated per material and per thickness (1.0 mm, 1.5 mm, and 2.0 mm). Color measurements were performed using a desktop spectrophotometer on both black and white backgrounds, before and after thermal aging. L*, a*, b* values were recorded. Following color measurements, the TP values were calculated using a specific formula.

RESULTS: Thermal aging significantly affected the Translucency Parameter (TP) values of the VarseoSmile Crown Plus (ASIGA) group ($p = 0.00001$), indicating a reduction in translucency after aging. In contrast, no statistically significant differences were observed in the TP values of the P-Crown Resin (Senertek) ($p = 0.320$) and Print Crowntec (BEGO) ($p = 0.358$) groups between pre- and post-aging conditions. These findings suggest material-dependent variations in the optical stability of 3D-printed permanent restorative resins upon thermal aging.

CONCLUSION: Among the tested 3D-printed permanent restorative materials, VarseoSmile Crown Plus exhibited a significant change in translucency following thermal aging, whereas P-Crown Resin and Print Crowntec demonstrated greater stability in their optical properties. These results underscore the importance of material selection when considering the long-term esthetic performance of additively manufactured permanent restorations.

Keywords: Transparency, 3D printed dental materials, termal aging, cad-cam, permanent dental materials, additive dentistry

SS-212 A Hybrid Telescopic-Implant Overdenture Rehabilitation Following Premaxillary Resection: A Case Report with 3D-Printed Gothic Arch Tracing for Mandibular Guidance and a Literature Review

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INTRODUCTION: Maxillofacial defects after cancer surgery create major difficulties for fitting prosthetics, especially regarding how the upper and lower jaws fit together, keeping the prosthetics in place, and appearance. In patients who have lost teeth or part of their upper jaw, finding a stable bite position is made harder by changes in their mouth's shape and muscle control.

Case description: This case report describes the prosthetic rehabilitation of a partially edentulous patient who had undergone a subtotal premaxillary resection due to squamous cell carcinoma. The prosthetic plan included a special type of upper denture that was held in place at the front by two crowns on the remaining teeth and at the back by two implants in the premolar area, which were linked with locator attachments. To achieve precise mandibular positioning, a custom-designed 3D-printed Gothic arch tracing device was fabricated based on the patient's individualized occlusal vertical dimension and anatomical constraints. The use of the 3D-printed Gothic arch made it possible to accurately record the patient's specific centric relation, addressing the sensory issues caused by the removal of part of the upper jaw. The hybrid overdenture demonstrated excellent stability, esthetics, and phonetic function. Both the patient and the clinical team reported high satisfaction, and no mechanical or biological complications were observed during the follow-up period.

DISCUSSION: This case highlights the clinical potential of combining telescopic and implant-retained attachments in complex maxillofacial rehabilitation cases. Additionally, using 3D-printed tools for tracking movement improves the accuracy of measuring jaw position for patients with changed mouth structures. This multidisciplinary approach may serve as a valuable protocol in oncologic prosthetic rehabilitation.

Keywords: Hybrid overdenture, telescopic crowns, implant locator, 3D printing, Gothic arch tracer, maxillofacial prosthetics

SS-213 Oral health-related quality of life and quality of dental prostheses in older adults

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OBJECTIVES: In today's world, the adoption of a multidisciplinary approach is becoming increasingly prevalent across various fields, including dentistry. This study aims to examine the relationship between the condition of prosthetic appliances and older adults' quality of life.

MATERIALS-METHODS: This cross-sectional study was conducted by dental students at the School of Dental Medicine, University of Zagreb, as part of World Oral Health Day screenings of individuals aged 65 and older.. Fifty-eight participants (14 male and 44 female) completed the OHIP-14 questionnaire assessing oral health-related quality of life. The clinical quality of 41 fixed prosthetic restorations was evaluated using the California Dental Association (CDA) index. Seventeen upper and 21 lower complete dentures were evaluated using the Nevalainen index.

RESULTS: The median OHIP-14 score was 13, with a mean of 14.69. The highest scoring item was (Have you been thinking about your teeth?" with a median score of 3, reflecting prevalent oral health concerns. Most fixed prostheses showed acceptable ratings for occlusion, texture, and contour (majority rated as R or S); however, marginal adaptation had the highest number of poor ratings (15 rated as V). Color received the highest number of excellent ratings (22 rated as R). Denture evaluation showed better performance for upper dentures than lower dentures, with the latter frequently rated poor in both retention and stability.

CONCLUSION: Although varying levels of prosthetic quality and psychosocial scores were observed, this study did not establish a clear relationship between the two. The results highlight the complexity of evaluating subjective well-being through tools like OHIP-14 and emphasize the need for further investigation with larger, controlled samples to better understand potential contributing factors.

Keywords: OHIP-14, CDA index, older adults, fixed and removable prostheses, prosthetic quality

SS-214 Exploring Dental Students' Perspectives on Teledentistry

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OBJECTIVES: This study aims to evaluate dental students' level of knowledge about teledentistry and to analyze their current awareness in this field. Additionally, it explores students' expectations regarding the future role of teledentistry and their attitudes toward this technology. The study seeks to provide insights into how teledentistry may be incorporated into dental education in the context of rapidly advancing digital health technologies.

MATERIALS-METHODS: A questionnaire consisting of 30 questions was administered to 368 dental students from 1st to 5th year. The survey included multiple-choice and multiple-response questions. Questions 1 and 2 collected demographic data; questions 3 to 16 measured knowledge; 17 to 19 assessed viewpoints; 20 to 25 explored future expectations; and 26 to 30 addressed technological developments and ethical issues. Data analysis was performed using IBM SPSS v28. Knowledge questions were scored based on accuracy (correct = 1 point; incorrect = 0 points). Normality was evaluated visually and using the Shapiro-Wilk test. Due to non-normal distribution, non-parametric tests were applied: Kruskal-Wallis H test for more than two groups and Mann-Whitney U test for two-group comparisons. Significance was set at $p < .05$.

RESULTS: A statistically significant difference in knowledge levels was found among class years ($p < .05$), with mean scores increasing from the 1st to the 5th year. Significant differences were observed in responses to whether teledentistry education should be mandatory and whether it should be free of charge ($p < .05$), while responses to other questions showed no significant differences ($p > .05$).

CONCLUSIONS: The findings suggest that dental students' knowledge and attitudes toward teledentistry vary according to their year of study. Teledentistry is becoming increasingly important due to its ability to improve access to healthcare and enhance communication. Therefore, fostering digital health literacy early in dental education could be beneficial.

Keywords: Teledentistry, Education, Students, Awareness

SS-215 Influence of toothbrushing and toothpaste on surface roughness and color stability of CAD/CAM interim crown material

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PURPOSE: This study aimed to investigate different toothbrushing periods and toothpaste effect on the surface roughness (Ra) and color stability of surface sealant agent coupled CAD/CAM interim crown material.

MATERIAL-METHODS: One hundred and fourty rectangular-shaped specimens(15×9x2 mm) specimens were prepared from highly cross-linked polymethyl methacrylate (PMMA) blocks (Telio-CAD) using CAD/CAM system and divided into two surface treatment groups as conventional polishing and surface sealant agent (Optiglaze Color) coupling groups. Then specimens from each surface treatment groups were divided into seven subgroups as control (no toothbrushing), simulated toothbrushing with distilled water or toothpaste for 2 weeks, 3 months and 1 year (n=10). The Ra values of the specimens were recorded before (Ra 0) and after toothbrushing processes (Ra 1). Color parameters of each specimen were measured with a spectrophotometer and color differences (ΔE_{00}) were calculated by the CIEDE2000 formula. The data were statistically analyzed by ANOVA and Tukey HSD tests.

RESULTS: Compared to conventional polishing, surface sealant agent application presented lower Ra values on test groups. The specimen group that was conventionally polished and brushed for 1 year with toothpaste, presented the highest surface roughness values and the differences between this group and all other test groups were statistically significant ($p<0.05$). In both conventionally polished and surface sealant agent applied test groups, 1 year of brushing resulted in higher ΔE_{00} values regardless of the brushing agent.

CONCLUSIONS: In terms of surface roughness, although the application of a surface sealant agent provides better results in interim crown restorations, it may cause an increase in color differences depending on the brushing time and the brushing agent used.

Keywords: CAD/CAM, Interim Dental Prosthesis, Toothbrushing, Surface Roughness, Color

SS-216 Evaluation of Deformations Occurring After Porcelain Firing in Metal-Ceramic Restorations

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OBJECTIVES: This study aimed to evaluate the dimensional deformations in metal substructures used for metal-ceramic restorations after porcelain firing. While all-ceramic systems are increasingly popular, metal-ceramic restorations remain widely used, particularly in implant-supported and multi-unit prostheses. The focus was on comparing deformation outcomes in metal substructures produced by traditional casting and modern sintering techniques.

MATERIALS-METHODS: A total of 24 metal substructures were fabricated using three different

METHODS: Group 1 – Ni-Cr alloy via casting; Group 2 – Co-Cr alloy via casting; Group 3 – Co-Cr alloy via sintering. All substructures were based on a master model prepared on the upper right central incisor of a phantom maxilla with a shoulder finish line. After fabrication, each sample underwent standard porcelain firing cycles including opaque, dentin, and glaze firings, followed by sandblasting. Marginal discrepancies were measured vertically at mesial, distal, buccal, and palatal points using a precision projector with 0.001 mm accuracy. Horizontal measurements also performed at mesio-distal and vestibulo-lingual points using the same technic. Each measurement was repeated twice. Statistical analysis was performed using non-parametric tests due to non-normal data distribution (Shapiro-Wilk test).

RESULTS: Following dentin-glaze firing, the least vertical marginal deformation was observed in the Ni-Cr casting group ($p<0,001$). After sandblasting, a significant reduction in marginal disperancy was detected in both the Co-Cr casting and Co-Cr sintering groups. No statistically significant difference was observed in horizontal deformations among the groups. Intra-group comparisons showed that deformation increased progressively through each porcelain firing stage in cast groups, while the sintered group maintained superior dimensional stability.

CONCLUSION: The results indicate that sintered Co-Cr substructures demonstrate significantly better resistance to dimensional changes during porcelain firing compared to cast substructures. This suggests that sintering may be the preferred method in clinical scenarios demanding high precision, particularly in implant-based and multi-unit prosthetic restorations.

Keywords: Dental porcelain, fixed dental prosthesis, dental casting technique, sintering, dental marginal adaptation

SS-218 A Novel Two-Step Milling Technique for Precise Tooth Positioning in Digital Dentures: A Clinical Case Report

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In a classic two-piece digital denture workflow, inaccuracies in tooth positioning in denture bases is unavoidable due to cement space and offset values. These discrepancies often lead to increased chairside occlusal adjustments. This abstract presents a novel two-step milling technique aimed at improving prosthesis accuracy and reducing clinical adjustment time.

An elderly, medically-compromised patient presented with unstable existing dentures and existing implants. Clinical challenges included a moderate-severe Class II skeletal discrepancy and a severely resorbed ridge with minimal tissue support. Optimal border extension, occlusal stability and passive tooth positioning were critical for success.

A digital approach was employed, incorporating a closed-mouth impression technique, gothic arch tracing and a novel laboratory milling technique. The novel approach involved a two-step milling process: first, the denture base was milled from PMMA using a defined coordinate system. After cementation of PMMA teeth, the same disk was re-mounted and re-milled using the identical coordinate data to create a monoblock denture structure.

This technique eliminates discrepancies from cement space and mispositioning by refining the tooth-base interface to match the original CAD design. Excess cement is also removed during the second milling, leading to a cleaner and more precise prosthesis. To further aid stability, teeth were positioned in the neutral zone despite the skeletal discrepancy, and existing ball attachments were converted to locators. Only minimal occlusal adjustments were required at insertion, and the patient reported high satisfaction with comfort and function.

This two-step milling technique offers a significant improvement over standard digital denture workflows by enhancing tooth-base interface accuracy and reducing chairside time. It underscores the value of coordinated clinical-laboratory efforts and digital precision in managing complex edentulous cases, especially in medically compromised patients.

Keywords: Prosthodontics, Dentures, Computer-Aided Design, Dental Technology, Dental Prosthesis Design, Aged

SS-219 Evaluation of Staphylococcus aureus Adhesion on Modified PEEK and PEKK Surfaces

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Objectives: The aim of this study is to evaluate the adhesion of Staphylococcus aureus to the surfaces of Polyetheretherketone (PEEK) and Polyetherketoneketone (PEKK) materials with different fillers under in vitro conditions.

MATERIALS AND METHODS: In this study, 16 samples (8×8×3 mm) of unfilled PEEK, glass fiber-reinforced PEEK, nanoceramic-reinforced PEEK, and PEKK were prepared and their surfaces standardized using 400, 800, and 1200 grit SiC sandpapers. In vitro biofilm formation was evaluated using S. aureus (ATCC 29213). After culturing, the bacteria were adjusted to 0.5 McFarland standard and added to TSB (Tryptic soy broth) for incubation. The samples were incubated with the bacterial suspension for 72 h at 37 °C. Following incubation, they were rinsed with phosphate-buffered saline (PBS) and air-dried. Samples were divided into two groups. The first group was stained with crystal violet and evaluated visually under a stereomicroscope. Then, each was washed with 500 µL ethanol for 5 min, and 100 µL aliquots from each sample (in triplicate) were transferred into 96-well plates. Absorbance was measured spectrophotometrically at 490 nm. The second group was fixed in 2% formaldehyde, dehydrated in increasing ethanol concentrations, sputter-coated with gold-palladium, and examined by SEM.

RESULTS: SEM imaging, crystal violet staining, and spectrophotometric analysis showed varying levels of S. aureus adhesion on PEEK and PEKK surfaces. Unfilled PEEK and PEKK showed high adhesion across all methods. Nanoceramic-reinforced PEEK exhibited notable colonization in SEM, but moderate results in staining and absorbance. Glass fiber-reinforced PEEK showed the lowest adhesion. These findings suggest that filler type and surface properties influence microbial attachment.

CONCLUSION: Filler content and material type influence microbial interactions. Particularly, glass fiber-reinforced PEEK and PEKK have been rarely investigated in this context. This study provides novel insights into the microbial behavior of these materials and emphasizes the need for advanced in vitro and clinical research.

Keywords: Polyetheretherketone, Polyetherketoneketone, Staphylococcus aureus

SS-220 What Is The Issue? Layer Thickness or The Specialty of The Microorganism

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OBJECTIVES: The aim of this study was to evaluate whether the main reason for biofilm formation on the 3-D printed dental materials is the roughness thought to be caused by layer thickness, or the cellular properties of the microorganism itself.

MATERIALS AND METHODS: Digital design was made to produce 10 samples (diameter: 10 mm, thickness: 2 mm). Three groups of samples with thicknesses of 30, 50 and 70 µm were obtained using a 3D printer. The post-process was performed according to the manufacturer's recommendations. The surface roughness (Ra) of each sample was measured at 20x magnification (Zeiss, Germany). For biofilm evaluation, bacteria were cultured aerobically at 37 °C. The microbial adherence was estimated as follows: non-adherent (0), weakly adherent (+), moderately adherent (++) or strongly adherent (+++).

RESULTS: The Ra value was measured as 0.582±0.02 for 30 µm BLT, 0.606±0.04 for 50 µm BLT, and 0.776±0.02 for 70 µm BLT. 70 µm samples exhibited significantly the highest Ra values ($p<0,05$). E.coli showed moderate adhesion on both 30 and 50 µm samples. Candida also showed moderate adhesion on the 70 µm samples. Other microorganisms showed weak adhesion on other samples.

CONCLUSION: This study reveals that the idea that adhesion will increase as the layer thickness increases may be incorrect. E. coli adhesion was found to be higher in samples with a layer thickness of 30 and 50 µm compared to 70 µm. This shows that there are factors other than layer thickness, and one of these factors is undoubtedly the specialties of the microorganism itself. Extracellular polymeric matrix and adhesive polysaccharide production, pili and tail structures accelerate adhesion and biofilm formation independently of surface properties.

Keywords: Built layer thickness, roughness, biofilm formation, 3-D printers, 3-D print resins

SS-222 Palatal perforation closure using a hawley-type appliance in a patient with sarcoidosis

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INTRODUCTION: Palatal perforations are rare but challenging complications that may result from systemic conditions such as sarcoidosis. These defects can significantly impair speech, swallowing, and overall quality of life. This case report presents the prosthetic management of a patient with palatal perforation secondary to maxillary bone loss associated with sarcoidosis and long-term corticosteroid therapy.

Case description: A 26-year-old female presented to our clinic with a recently noticed opening in the palate. Clinical examination revealed a perforation in the palatal region. The patient had a medical history of sarcoidosis and had been on long-term steroid treatment. Cone-beam computed tomography (CBCT) showed severe maxillary bone resorption. She reported long-standing nasal obstruction and noted the palatal opening a few weeks prior. Her main complaints included nasal regurgitation of food and fluids during meals and severe speech impairment. A conventional maxillary impression was taken, and a Hawley-type removable prosthesis was fabricated. An acrylic extension was designed to obturate the perforation site. At the delivery appointment, immediate improvement in speech was observed. During follow-up, the patient reported elimination of nasal leakage during eating, indicating functional success of the appliance.

DISCUSSION: Sarcoidosis, particularly with prolonged corticosteroid use, can lead to destructive lesions in the maxillofacial bones. In this case, prosthetic rehabilitation using a modified Hawley appliance effectively sealed the palatal defect, significantly improving both phonation and swallowing. This non-invasive approach may serve as an efficient interim or long-term solution for similar cases where surgical options are limited or contraindicated.

Keywords: Sarcoidosis, Palatal Perforation, Maxillary Bone Loss, Prosthodontics, Removable Appliance

SS-223 Comparative Assessment Of Burnout Levels Among Dentists Treating Pediatric And Geriatric Patients

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OBJECTIVE: This study aims to compare the burnout levels of prosthodontic specialists treating geriatric patients and pediatric dentistry specialists treating child patients.

MATERIALS-METHODS: The present study was conducted at the Faculty of Dentistry, Atatürk University, with the participation of a total of 94 dental specialists. Of the participants, 69 were female and 25 were male. The study cohort consisted of 41 prosthodontists and 53 pediatric dentistry specialists. Data collection was carried out using a structured questionnaire comprising three components: a sociodemographic information form, the Maslach Burnout Inventory (MBI), and the Minnesota Satisfaction Questionnaire (MSQ), both of which are widely validated instruments for assessing occupational burnout and job satisfaction, respectively. The normality of the data distribution was evaluated using the Shapiro-Wilk test. In accordance with the distribution characteristics of the data, appropriate parametric statistical tests were employed for subsequent analyses.

RESULTS: This study aimed to compare burnout levels and job satisfaction among dentists specializing in Pediatric Dentistry and Prosthodontics. Data were collected using the Maslach Burnout Inventory and the Minnesota Satisfaction Questionnaire, assessing emotional exhaustion, depersonalization, personal accomplishment, and job satisfaction. The results showed no significant differences in burnout or job satisfaction between the specialties. Emotional exhaustion and depersonalization were moderate to high, while personal accomplishment was high. Job satisfaction was generally high in both groups. Demographic factors such as gender, hobbies, and sleep duration influenced burnout subscales, while marital status, working institution, and income did not significantly affect burnout or job satisfaction.

CONCLUSION: In conclusion, this study found no significant differences in burnout levels, job satisfaction between Pediatric Dentistry and Prosthodontics specialists. Both groups exhibited moderate to high emotional exhaustion, while overall job satisfaction remained high. To reduce burnout, improving physical and psychological work conditions, managing patient load, and creating a supportive environment are recommended for dental professionals.

Keywords: Burnout, Prosthodontics, Pediatric Dentistry, Job Satisfaction

SS-224 In-vivo analysis of clinical workflow impact on denture base fabrication: conventional vs digital methods

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OBJECTIVES: This in-vivo study aimed to evaluate and compare the accuracy of complete denture base fabrication using conventional, fully digital, and hybrid clinical workflows.

MATERIALS-METHODS: Thirteen edentulous patients receiving prosthetic treatment at Istanbul University Faculty of Dentistry were included in this study, supported by the Research Fund of Istanbul University (Project No: 40536). Each patient received four complete denture bases fabricated using different workflows: Conventional (C), Fully Digital (D), Hybrid Early (HE), and Hybrid Late (HL). In the C group, dentures were fabricated using heat-polymerized resin on master casts obtained from functional impressions. The D group utilized intraoral scanning and additive manufacturing following CAD design. The HE group combined digital design and custom trays with conventional impression techniques. The HL group involved scanning conventionally obtained casts and designing the denture digitally. The intaglio surfaces of all dentures were scanned and superimposed on reference models at 22 predefined points using Geomagic X software. Overall and regional deviation values were calculated across six anatomical regions. Additionally, visual investigations of the scanning were performed and a questionnaire on the anatomic structures was answered.

RESULTS: The conventional group showed the lowest mean deviation (0.199 ± 0.730 mm), followed by the HE group (0.309 ± 1.009 mm), with no significant difference ($p > .05$). The D (2.564 ± 6.078 mm) and HL (2.428 ± 5.721 mm) groups exhibited significantly greater deviations. No statistically significant difference was observed in the postdam region ($p = 0.287$), though variation was seen in other anatomical regions.

CONCLUSION: The HE workflow demonstrated accuracy comparable to conventional methods and may serve as a reliable alternative. The D and HL workflows showed greater deviations, highlighting current digital limitations. Nonetheless, digital workflows may offer adequate precision in select regions. Further studies are warranted to enhance their clinical applicability.

Keywords: Complete Dentures, Digital Workflow, Additive Manufacturing, Intraoral Scanning

SS-225 Evaluation Of Fracture Strength And Stress Distribution Of Cad-Cam Post-Core Systems Produced From Different Materials

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İntroduction: This study aimed to evaluate the fracture resistance and stress distribution of monoblock post-core restorations made from PEEK, nano hybrid composite, glass fibre reinforced composite (GFR-C), and zirconium using a CAD-CAM system and finite element analysis.

METHOD: Forty-eight mandibular second premolar teeth with single roots were endodontically treated and divided into four groups (n=12): PEEK, Nano HB, GFR-C, and Zirconium. Post-cores were fabricated with CAD-CAM. After thermal aging, specimens were subjected to static loading at a 45° angle using a universal testing machine. For finite element analysis, a 100 N force was applied at 45°. Maximum Von Mises stress values were recorded. Fracture resistance was analyzed using One-Way ANOVA and Dunnett T test for pairwise comparisons.

RESULTS: PEEK (674.07 N) and nano hybrid composite (666.10 N) showed similar fracture resistance ($p > 0.05$). GFR-C (993.53 N) and zirconium (1240.20 N) showed significantly higher resistance ($p < 0.05$), with zirconium being the highest ($p < 0.05$). Maximum Von Mises stress was highest in zirconium post-cores (69.230 MPa) and lowest in PEEK (22.968 MPa). In the root, PEEK showed the highest stress (40.390 MPa), zirconium the lowest (17.773 MPa).

CONCLUSION: Zirconium post-cores had the highest strength but caused catastrophic fractures. Fractures in PEEK, GFR-C, and nano hybrid groups were repairable. All materials showed clinically acceptable fracture resistance.

Keywords: CAD-CAM, PEEK, Trinia, post-core

SS-226 In Vitro Evaluation Of Fracture Strength And Marginal Fit Of Titanium Substructures Produced By Additive Manufacturing

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OBJECTIVE: Despite the advantages of titanium alloys, conventional casting is challenging, and milling is costly and time-consuming. The Selective Laser Melting (SLM) technique offers an efficient alternative. Since marginal fit is critical for the long-term success of fixed prostheses, this study aimed to compare the marginal fit and fracture resistance of three-unit frameworks fabricated from SLM-manufactured titanium alloy with those produced from CAD/CAM-milled zirconia and direct metal laser sintered cobalt-chromium (Co-Cr) alloys.

MATERIALS-METHODS: Standardized metal dies simulating mandibular second premolars and molars (5 mm height, 6° convergence, 1 mm chamfer) were used to fabricate 60 frameworks, divided into three groups (n=20 each):

Group 1: Co-Cr frameworks (Direct Metal Laser Sintering),

Group 2: Zirconia frameworks (CAD/CAM milling),

Group 3: Titanium (Ti6Al4V) frameworks (SLM).

Marginal fit was evaluated using the silicone replica technique and analyzed under an Atomic Force Microscope (AFM) at 100x magnification in buccal, lingual, mesial, and distal sections. Fracture strength was assessed by applying vertical load to the pontic's central fossa until failure. Data were analyzed using Kruskal-Wallis and Mann-Whitney U tests.

RESULTS: Zirconia showed the largest marginal gaps in both premolar and molar sites. However, internal gap differences among the three groups were not statistically significant ($p>0.05$). Occlusal gaps were greater than both marginal and internal gaps across all groups, with Co-Cr exhibiting the highest values. In fracture resistance, titanium alloy had the highest strength, followed by Co-Cr and zirconia, with significant differences between groups ($p<0.05$).

CONCLUSION: SLM-produced titanium frameworks demonstrated a comparable marginal fit to Co-Cr and superior fracture resistance overall. Despite inferior marginal adaptation compared to zirconia, titanium may serve as a viable substructure alternative, particularly in metal-allergic patients. Further clinical research is warranted.

Keywords: Titanium, Additive manufacturing, Zirconium, Substructure, Fracture strength, Marginal fit

SS-227 The Degree of Polymerization in 3D Printed Denture Base Materials With Various Post Polymerization Cycles

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OBJECTIVE: The aim of this study was to evaluate the effects of different resin types, base thicknesses, and post-polymerization water immersion durations on the degree of polymerization in denture bases fabricated using 3D printing technology.

MATERIALS AND METHODS: Two different photo-polymerizable resins (Denturetec and Dentabase) were used to fabricate specimens with three different base thicknesses (2.5 mm, 3.1 mm, and 3.3 mm) via 3D printing. Post-printing procedures were carried out in accordance with the manufacturers' instructions. The specimens were then immersed in water at 45°C for 30 and 60 minutes. A total of 60 specimens were included in the study. The degree of polymerization measurements were performed using FT-IR/ATR (Fourier Transform Infrared/Attenuated Total Reflectance) spectroscopy. Spectra were recorded twice for each specimen: once after the post-printing procedures and once after the water immersion process. The degree of conversion was calculated by determining the peak heights corresponding to the double bonds of vinyl aliphatic and aromatic/carbonyl groups. Statistical analysis was conducted using the Kruskal-Wallis and Mann-Whitney U tests.

RESULTS: No statistically significant effect was observed for resin type, base thickness, or water immersion duration on the degree of polymerization ($p>0.05$).

CONCLUSION: The current post-processing protocols applied to 3D-printed denture bases appear insufficient in achieving the desired chemical properties. Therefore, modification of these post-printing protocols is recommended. Among the tested protocols, immersion in water at 45°C for 30 minutes was found to improve the degree of polymerization. Considering that different temperature conditions may influence polymerization, future R&D studies using post-curing units equipped with controlled temperature settings are suggested.

Keywords: complete dentures, base thickness, 3D printing, polymerization degree

SS-228 Effect of cross-linker incorporation on mechanical properties of additive-manufactured occlusal splint material

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OBJECTIVES: Incorporating cross-linkers is considered a viable approach to improving the mechanical properties of additive-manufactured materials. This study aimed to evaluate the effect of a cross-linker on the mechanical properties of an additive-manufactured occlusal splint material fabricated in different print orientations.

MATERIALS-METHODS: A total of 32 specimens were fabricated with two print orientations (0° and 90°). Half of the specimens in each orientation group contained triethylene glycol dimethacrylate (TEGDMA) as a cross-linker, resulting in four experimental groups: 0° without TEGDMA [0 (-)], 0° with TEGDMA [0 (+)], 90° without TEGDMA [90 (-)], and 90° with TEGDMA [90 (+)]. The mechanical properties evaluated included flexural strength (FS), flexural modulus (FM), and fracture ratio (FR; the ratio of fractured specimens among all tested specimens). For fracture toughness (KIC) evaluation, 32 specimens were additionally fabricated for single-edge notched bend test. FS and FM were analyzed using the Kruskal-Wallis test; FR was analyzed using the Chi-squared test; and KIC was analyzed using one-way ANOVA with Tukey's *post hoc* test ($\alpha = 0.05$).

RESULTS: 90 (-) revealed significantly higher FS and FM than 90 (+), whereas there was no significant difference in FS and FM between 0 (-) and 0 (+). Meanwhile, 90 (+) revealed significantly lower FR than 90 (-) ($p = 0.002$), while there was no significant difference between 0 (+) and 0 (-). Additionally, 0 (+) revealed higher KIC than 0 (-) ($p = 0.020$) and 90 (+) ($p = 0.013$).

CONCLUSIONS: The incorporation of TEGDMA as a cross-linker partially influenced the mechanical properties of the additive-manufactured occlusal splint material. While TEGDMA addition led to reduced FS and FM, it may enhance fracture resistance under specific conditions.

Keywords: Additive manufacturing, Cross-linker, Fracture toughness, Mechanical property, Occlusal splint, TEGDMA

SS-229 Prosthetic Rehabilitation of Single-Tooth Deficiencies with Implant-Supported Crowns: A Case Series

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INTRODUCTION: Nowadays, dental implants are considered the ideal treatment option for single-tooth deficiencies due to their high long-term success rates and the advantage of not requiring the preparation of adjacent teeth. Case descriptions: In this case series, four patients who presented to our clinic with complaints of single-tooth loss were evaluated. Intraoral examinations and radiographic assessments confirmed the presence of single-tooth edentulous spaces in each case. Implant-supported fixed prostheses were planned for the edentulous areas. Following implant placement, either a Ti-base or a prefabricated stock abutment was selected based on individual clinical requirements. Zirconia or metal-ceramic restorations were used as the permanent prosthetic materials. Each patient achieved satisfactory functional and aesthetic outcomes with the chosen treatment approach.

DISCUSSION: Implant-supported prostheses have become a well-established treatment option for single-tooth replacement, offering high long-term success rates and predictable outcomes. Their ability to restore function and aesthetics without compromising adjacent teeth makes them a preferred choice over conventional fixed prostheses. In this cases, the choice between Ti-base and prefabricated stock abutments allowed for flexibility in addressing individual anatomical and restorative needs. Similarly, selecting between zirconia and metal-ceramic restorations ensured that both aesthetic and functional demands were met based on the location and visibility of the implant site. These cases underscore the importance of personalized treatment planning, where careful abutment and material selection play a crucial role in the long-term success of implant therapy. The absence of biological or technical complications during early follow-up supports the predictability of this approach when performed under appropriate clinical protocols.

Keywords: Prosthetic rehabilitation, dental implant, implant-supported crowns, single-tooth replacement

SS-230 Virtual Fit Of Occlusal Devices: A Comparative Analysis Of Exocad And InLab Software Programs

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OBJECTIVE: To digitally compare the virtual offset values of occlusal devices designed with two dental design software programs.

MATERIALS AND METHODS: Ten occlusal devices were designed on a reference model using either Exocad or inLab Splint (n=10). The model was digitized using a laboratory scanner (inEos X5). All designs were standardized along the gingival margin, and the virtual offset values were evaluated with the triple scan protocol using a 3-dimensional analysis software program (Geomagic Control X). Average gap values were recorded in microns, and an independent t-test was performed to compare the software programs (α =0.05).

RESULTS: The independent t-test revealed a statistically significant difference between tested software programs ($p < 0.001$). The mean average gap of the devices designed in Exocad was 145.4 ± 1.5 µm, while that of the devices designed in inLab was 159.8 ±1.9 µm.

CONCLUSION: The devices designed with the Exocad software program had lower virtual offset values, potentially indicating a tighter fit when tested designs are used for the fabrication. However, the statistically significant mean difference between tested software programs were small and therefore, this hypothesis needs clinical corroboration.

Keywords: Occlusal Splints, Dental Internal Fit, Software

SS-232 Follow-up of endo-crown restorations manufactured from fine-structured feldspathic ceramic and advanced lithium disiliate ceramic materials

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OBJECTIVE: The aim of this prospective observational cohort study was to evaluate the 1-year clinical follow-up results of endo-crown restorations fabricated from two different all-ceramic materials.

MATERIALS-METHODS: The study included 44 patients with Class 1 and Class 2 cavity types who were restored with endo-crown restorations using fine-structured feldspathic ceramics (CEREC Blocs) or advanced lithium disilicate ceramics (CEREC Tessera) (n=22). All restorations were cemented with dual-curing resin cement (Variolink Esthetic DC). Patients were evaluated according to modified USPHS criteria, gingival and plaque index and patient satisfaction questionnaire at the end of the first week, 6th month and 1st year. Data were analysed using Mann-Whitney U, Friedman and Chi-square tests.

RESULTS: It was found that for both all-ceramic types and 3 different evaluation times, there was no difference between the anatomical form, colour matching, secondary caries and surface roughness parameter values of the groups (p>0.05). In the CEREC Blocs group, at baseline for all patients, the restoration was assessed as compatible with the existing anatomical form, whereas at 6 months and 1 year, 1 patient was assessed as probe insertion but no gap. When compared in terms of plaque index and gingival index and patient satisfaction, no difference was found between the groups for the exact ceramic type and evaluation times (p>0.05). At the end of one year, the survival rate for both all-ceramic types was 100% (p>0.05).

CONCLUSION: According to the 1-year follow-up results of the restorations, it is considered that both materials can be considered reliable.

This study is supported by Gaziantep University Scientific Research Projects Coordination Unit (DHF.UT.24.01).

Keywords: CAD/CAM, endo-crown, feldspathic ceramic, lithium disilicate ceramic

SS-233 “Comparison of gnathological parameters in edentulous patients using conventional methods and 3D-CBCT.”

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OBJECTIVES: Accuracy comparison of gnathological parameters recorded by mean values,semi-adjustable articulator,and face-bow registration with CBCT, through 3D graphical modelling.

MATERIALS-METHODS: Ten edentulous patients to receive complete dentures (5f, 5m; age: 35–69; mean age: 52±2) were included after ethical committee approval and randomly assigned into 2 groups:control (mean values – MV) and the experimental group (face-bow – FB) with a face-bow (UTS 3D, Ivoclar Vivadent,Liechtenstein) transfer to a semi-adjustable articulator (Stratos 200, Ivoclar Vivadent).MV settings (Bonwill triangle: 108 mm, Balkwill angle: 15°, protrusion angle: 30°, Bennett angle: 15°,retrusion angle: 35°,condylar height: 35 mm) were recorded. Face-bow transfer with gothic arch tracing (Gnathometer M,Ivoclar Vivadent) was performed, and final measurements on the right and left sides (Bonwill arm and height, condyle to second mandibular molar distobuccal cusp,second molar to incisal point, intermolar distance, and Balkwill angle)were obtained after alignment of artificial teeth (SR Vivodent-Gnathostar,Ivoclar Vivadent). CBCT scans (NewTom 5G, QR Srl, Italy) were conducted by placing markers at landmarks: the distobuccal cusps of the mandibular second molars and the midpoint of the mandibular incisors.The data were processed using a software (MIMICS, Materialise, Belgium) and converted into PDF models. Statistical analysis was performed (SPSS 22.0, p=0.05, Wilcoxon Signed-Ranks,Friedman).

RESULTS: Balkwill angles significantly differed in the FB group (right: 24.25°±1.98°; left: 23.50°±3.17°) compared to the MV group (right-left: 15°) (p<0.05). Bonwill heights in the FB group (right: 44±3.46 mm; left: 42.4±5.68 mm) were significantly higher than in the MV group (right-left: 35 mm) (p<0.05). No significant differences were observed in other parameters or between left and right sides (p>0.05).

CONCLUSIONS: Significant variability in Balkwill angle and Bonwill height highlights the limitations of using mean values in all clinical cases. Individualized articulation parameters are recommended to enhance precision in prosthodontic rehabilitation.

Keywords: Bonwill triangle, Balkwill angle, face-bow, semi-adjustable articulator, occlusal plane

SS-234 The Impact of Different Cavity Design Parameters on Intraoral Scanner Accuracy in Endocrown Restorations

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OBJECTIVE: This study aimed to evaluate the effects of different tooth structure thicknesses and cavity depths on the accuracy of intraoral scanners (IOS) in endocrown restorations.

MATERIALS-METHODS: A mandibular typodont model was used, with the left mandibular first molar replaced by an extracted real human tooth. Endocrown cavities with varying depths (3.5 mm and 5 mm) and remaining tooth structure thicknesses (1.5 mm and 0.5 mm) were prepared. Master models were scanned using a high-precision extraoral scanner, and the data were exported in STL format. Ten intraoral scans were performed for each group using the Trios 3 IOS. Scanning accuracy was analyzed using the Root Mean Square (RMS) value for trueness and the Interquartile Range (IQR) for precision in Geomagic Design X software.

RESULTS: Significant differences in RMS and IQR values were observed between groups with different cavity depths and remaining tooth structure thicknesses ($p < 0.001$). Groups with thinner remaining tooth structures and deeper cavities exhibited greater deviations, indicating reduced scanning accuracy.

CONCLUSION: Cavity depth and tooth structure thickness significantly influence the accuracy of intraoral scanners in endocrown restorations.

Keywords: Endocrown, intraoral scanner, cavity design, accuracy.

SS-235 Influence of surface-conditioning strategies on the optical properties of 3D-printed and milled zirconia

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OBJECTIVES: It was aimed to evaluate the influence of surface-conditioning (SC) strategies on the optical properties of zirconia specimens fabricated with subtractive and additive techniques.

MATERIALS-METHOD: A total of 88 rectangular specimens (12 × 14 × 1 mm) were fabricated, comprising 44 specimens milled from a prefabricated CAD/CAM block and 44 specimens 3D-printed from a zirconia slurry. The specimens were separated into 4 groups according to the SC strategy applied: Control–no conditioning (C), air-borne particle abrasion (APA), tribochemical silica-coating (TSC), and grinding (G). The color coordinates were recorded in a viewing booth by using a digital spectrophotometer mode according to CIE D65 illuminant and CIE 2° Standard Observer. For ΔE00 analysis, color coordinates were measured over gray backing for the quantitative representation of color differences between control and experimental groups. For relative translucency (RTP00) analysis, color coordinates were measured over black and then over white backings. Two-way ANOVA with the Tukey's *post hoc* test were used for statistical analysis (α=0.05).

RESULTS: RTP_{00} values were significantly influenced by the fabrication technique ($P=0.006$), the SC strategy ($P<0.001$), and their interaction term ($P<0.001$). ΔE00 values were also significantly influenced by the SC strategy ($P<0.001$) and the interaction term ($P<0.001$). Considering the interaction, the highest and lowest mean ΔE00 values were obtained at subtractive-TSC (2.59 ±0.77) and additive-TSC (1.16 ±0.77) groups, respectively. The highest and lowest mean RTP00 values were detected at additive-control (11.16 ±1.60) and subtractive-control (8.69 ±1.02), respectively. Lightness decreased in the surface-conditioned groups of both the milled and 3D-printed specimens, except for the additive-TBC group.

CONCLUSION: The fabrication technique and SC strategy influence the optical properties of zirconia specimens. Therefore, clinicians should exercise caution when selecting these parameters.

Keywords: Surface Properties, Printing,Three-Dimensional, Computer-Aided Manufacturing, Zirconium, Optical Properties

SS-236 Comparison of Photogrammetry, Intraoral Scanning, and Conventional Impression Techniques Across Varying Implant Configurations in the Edentulous Maxilla: An In Vitro Study

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Background: Complete edentulism treatment with implant-supported prostheses requires accurate impressions for passive fit. This study compared the accuracy of photogrammetry, intraoral scanning, and conventional impression techniques across different implant configurations in the edentulous maxilla.

Methods: Three maxillary models with 4, 6, and 8 implants were 3D-printed and tested via five techniques: conventional splinted open-tray impression (CI), photogrammetry (PG), and three intraoral scanners (IOS) (Primescan, Medit i700, Trios 5). Each technique was repeated 10 times per model (n=150). STL files were analyzed via Geomagic Control X software. The primary outcomes were trueness and precision measured by linear (ΔEUC), angular (ΔANGLE), and 3D deviation values. Statistical analysis included ANOVA, the Kruskal-Wallis test, and *post hoc* tests.

RESULTS: The impression method significantly affected both trueness and precision ($p<0.001$). CI and PG demonstrated superior accuracy across all configurations. Intraoral scanners showed greater variability, particularly in 8-implant scenarios. Compared with the 4- and 8-implant configurations, the 6-implant configuration resulted in lower deviation values ($p<0.001$). Angular deviations remained within clinically acceptable limits (<1°) for all methods. All the techniques were within clinically acceptable thresholds.

Conclusions: Conventional impressions and photogrammetry exhibited better accuracy than intraoral scanning for full-arch impressions. Increased implant quantity and interimplant distance adversely affect accuracy, particularly with intraoral scanning. Technique selection should consider arch complexity to achieve passive fit in full-arch implant prostheses.

Keywords: Full arch rehabilitation, Photogrammetry, Intraoral scanning, Accuracy, Conventional impressions, Digital dentistry, Implant prosthodontics

SS-237 Retention Enhancement in Complete Dentures Using Octopus-Inspired Suction Cups with various Directional Forces

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Retention remains a key challenge in complete denture performance, directly impacting patient satisfaction and functionality. This study investigates the effect of force direction on denture retention, with and without a peripheral seal, and evaluates the enhancement provided by innovative bio-inspired suction cup designs. Force-angle testing revealed that without a peripheral seal, retention significantly decreased at angles above 20°, indicating vulnerability to dislodgement under off-axis loads. In contrast, the presence of a peripheral seal reversed this trend, with retention improving notably at steeper angles, highlighting its stabilizing role in resisting lateral displacing forces.

Building on these findings, octopus-inspired suction cup (SC) topographies were integrated into denture surfaces particularly at the peripheries to optimise the peripheral seal effect and mimic natural adhesion mechanisms of the octopus. Results showed that SC designs significantly improved retention under wet conditions with a preload of 4N. The suction cups enhanced the interface by stabilizing the saliva layer and increasing surface contact, even at higher force angles.

Together, these results underscore the potential of nature-inspired retention mechanisms, particularly in challenging anatomical cases, and highlight the importance of considering force direction and sealing strategies in future denture designs.

Keywords: Force Direction, Octopus Suction Cups, Complete Denture, Peripheral Seal, 3D printing.

SS-238 Occlusion, Function, and Form: The Modern Approach to Full Mouth Rehabilitation Using dynamic recording and Conservative Protocols

Zardasht Najmadine Abdulghafoor, Dr. Zardasht Bradosty

Full mouth rehabilitation is evolving beyond traditional mechanical methods toward a functionally driven and biologically respectful approach. This presentation highlights a modern protocol that combines minimally invasive rehabilitation techniques with dynamic jaw motion analysis to achieve precise, patient-specific outcomes.

The featured case demonstrates the use of an occlusal splint for deprogramming, enabling the neuromuscular system to guide a more accurate assessment of the patient's true centric relation. Following deprogramming, jaw motion analyzer (JMA) recordings were utilized to capture real-time mandibular movements, which enhanced diagnostic clarity and informed a predictable treatment plan.

The case focused on raising the vertical dimension within a conservative framework, preserving as much natural tooth structure as possible. The integration of functional data from JMA allowed for the reconstruction of occlusion that respects the patient's envelope of function, reduces the risk of parafunction, and ensures long-term prosthetic stability.

This presentation emphasizes the synergy between digital functional analysis and minimally invasive restorative principles, illustrating how technology enhances treatment precision without compromising biological integrity. By aligning occlusion, function, and esthetics, this approach sets a new standard for full mouth rehabilitation.

Keywords: Full Mouth Rehabilitation, Vertical Dimension,Dynamic Recording

SS-239 Shear Bond Strength of Orthodontic Brackets to 3D-Printed Permanent Resin Materials: A Pilot Study

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OBJECTIVE: The aim of this pilot study was to compare the shear bond strength (SBS) to orthodontic metal brackets of different permanent crown resins produced by additive manufacturing with that of PMMA produced by subtractive manufacturing.

Material-METHOD: Disc-shaped specimens (10mmX2mm) were prepared by the milling dental block (TetricCAD, IvoclarVivadent AG, Schaan, Liechtenstein, [Group K]) and by the 3D printing resins (Saremco print CROWNTEC resin, Saremco Dental AG, Rebstein, Switzerland, [Group S] - VarseoSmile TriniQ resin, BEGO Herbst GmbH & Co. KG, Bremen, Germany, [Group T]). The prepared discs were embedded in acrylic resins. The surface of each group was etched with 37% orthophosphoric acid and then bond (3M UnitekTransbond XT Light Cure, Monrovia, CA, USA) was applied. After cementation (3M UnitekTransbond XT Light Cure, Monrovia, CA, USA) of the mandibular central brackets, (Glory Brackets, MBT Mini Bondable; DTC Orthodontics, Rebstein, Switzerland) specimens were placed in the universal testing machine (MOD Dental, Esetron Smart Robotechnologies, Ankara, Türkiye). Shear force was applied to the specimen-bracket interface with a crosshead speed of 0.5mm/min. SBS values were calculated and the results were recorded as megapascals (N/mm2). Data were analyzed with Welch's analysis of variance and Tamhane's T2 tests (α=0.05).

Result: Statistical analysis confirmed a statistically significant effect of material type on SBS (p=0.003). Tamhane's T2 test revealed a significant difference between Group K and Group T (p=0.004) with Group K exhibiting superior bonding performance. No other intergroup comparisons reached statistical significance. All tested materials achieved mean bond strength values exceeding the clinically acceptable threshold of 10 MPa, indicating adequate performance for clinical use regardless of material type.

CONCLUSION: The success of orthodontic treatment involving bracket bonding to restorations is highly dependent on adhesive compatibility. Newly introduced permanent crown resins have also demonstrated comparable performance to materials produced by milling.

Keywords: shear strength, orthodontic brackets, 3D printing, CAD-CAM, adhesives

SS-240 Nanoparticles in Denture Liners: Roughness and Color Effects

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Objectives: The aim of this study was to investigate the effect of the addition of different concentrations of biocompatible hexagonal boron nitride nano-powder (h-BN) and hexagonal graphene nano-powder (h-GN) on the surface roughness and color stability of PMMA based soft liner material.

MATERIALS AND METHODS: h-GN at 0.02% and 0.05% (by weight) and h-BN at 1% and 5% by (weight), were added to an acrylic-based soft lining material respectively. A total of 5 subgroups were obtained, including the control group (n=6). Then disk-shaped samples were prepared using these materials (R=15mm, h=3mm). A confocal microscope and a spectrophotometer were used for surface roughness and color measurements. Data was analyzed using ANOVA and post-hoc Tukey's test.

RESULTS: The addition of h-BN provided a statistically significant decrease in surface roughness and this effect increased with increasing h-BN concentration. No statistically significant difference was observed between the control group and 0.02% h-GN and 0.05% h-GN ($p > 0.05$). The highest color change was observed in the 0.05% h-GN group and this was statistically significant. Both the 1% h-BN and 5% h-BN group samples exhibited acceptable color changes. The lowest color change was obtained in the 1% h-BN group.

CONCLUSION: Boron nitride nanopowder reduces surface roughness. This feature shows how valuable further research can be for soft lining materials that start to have an irritating effect on patients after a certain period of time. Color change is also within acceptable limits in this group.

Keywords: soft denture liners, nanoparticles, color stability, surface roughness

SS-241 Accuracy of Intraoral Scanners and a Spectrophotometer in Shade Determination

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OBJECTIVES: The objective of this study was to evaluate the accuracy of 2 different intraoral digital scanners and a spectrophotometer in shade determination.

MATERIALS-METHODS: The color measurements of all shade tabs (0M1–5M3) in the Vita 3D-Master shade guide were performed using the 3Shape Trios 3 (T3), 3Shape Trios 5 (T5), and a spectrophotometer (VE, Vita Easyshade V). The respective device was positioned at the middle third of the shade tabs, and 5 measurements were taken for each region. The mean L*, a*, and b* values of all specimens and the reference optical parameters in the conversion table were used to calculate the color difference (ΔE_{00}) values. The statistical analysis of the obtained data were performed using the Shapiro-Wilk test, one-way analysis of variance (ANOVA), and Tukey HSD test.

RESULTS: According to the ANOVA, significant differences were observed among the devices in terms of mean L* ($P<0.001$), a* ($P=0.006$), and b* ($P=0.011$) values, while no significant difference was observed in ΔE00 values. The mean ΔE00 values of the devices were ranked from lowest to highest as follows: T3 (ΔE00=2.73±1.69), T5 (ΔE00=3.14±1.45), and VE (ΔE00=3.40±0.98). The highest mean L* value (L*=73.84±6.42) was obtained in the VE group, while the lowest mean b* value (b*=15.09±3.36) was observed in the T3 group.

CONCLUSIONS: There were no significant differences in color measurement accuracy among the 3 examined devices, although the lowest ΔE00 value was obtained with T3. However, the significant differences observed in L*, a*, and b* parameters indicate that the color perception characteristics of the devices differ from each other, which may affect the clinical shade detemination process. Intraoral scanners and spectrophotometers can be used for clinical color selection, but it would be beneficial to verify the desicion with visual color detection method.

Keywords: Intraoral scanner, Spectrophotometer, Color determination, Shade guide, Digital dentistry

SS-242 Fracture Resistance of Ceramic Crowns Cemented on Different Types of Abutments

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OBJECTIVE: This study aimed to evaluate the fracture strength of monolithic zirconia crowns and monolithic lithium disilicate crowns cemented on multiunit abutments, ti-base abutments and titanium copings on multiunit abutments.

METHODS: In this study, 66 dental implants were embedded in auto-polymerizing acrylic resin. Three different types of abutments were used: Ti-base abutments, multi-unit abutments, and titanium coping abutments placed on multi-unit bases. In total, six groups (n = 6) with 66 mandibular second premolar crowns were fabricated using two different materials: monolithic zirconia and monolithic lithium disilicate (n=33/ per group). All crowns were cemented onto the abutments using resin cement. Thereafter the screw access holes were sealed first with Teflon tape and then with composite resin. Subsequently, the load profile was always in contact with the occlusal surface of the crowns at 200 N, using 100.000 cycles at 1 Hz in distilled water at 37°C. Following this, the maximum load at fracture (N) was measured by loading the samples statically with a universal testing machine, with a 6-mm stainless steel sphere resting on the buccal and palatal cusps. Finally, fracture patterns were examined under a stereomicroscope. Statistical analysis was conducted using ANOVA, followed by Tukey's *post hoc* test.

RESULTS: According to the results, there was a statistically significant difference between the types of abutments ($p < 0.05$). Additionally, significant differences were detected between the types of crown materials ($p < 0.05$), with zirconia showing higher values than lithium silicate.

CONCLUSION: Within the limitations of this in vitro study, both the abutment type and the restorative material influenced the mechanical behavior of implant-supported crowns. Monolithic zirconia crowns showed superior fracture resistance compared to lithium disilicate crowns. Furthermore, differences in abutment design affected the structural integrity of the restorations, highlighting the importance of component selection in clinical decision-making.

Keywords: Abutment, fracture strength, lithium disilicate, zirconia

SS-243 Effect of thermal cycling and printing angulation on the flexural strength of 3d-printed denture base resins: A pilot study

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OBJECTIVES: This study aimed to compare the flexural strength of 3D-printed denture base material produced with two different production angles by aging with thermal cycle test.

MATERIAL-METHODS: Bar-shaped specimens were produced in a 3D printer (Phrozen Sonic Mini, Phrozen 3D, Hsinchu City, Taiwan) 0° and 45° printing angles were produced using denture base resin materials (Senertek, İzmir, Turkey). These specimens were manufactured at different angles were divided into 2 subgroups as those with or without thermal cycling, and a total of 4 study groups (G1: 0 ° unaged, G2: 0 ° aged, G3: 45° unaged, G4: 45° aged) were obtained (N=40, n=10). The samples to be aged (G2 and G4) were subjected to a thermal ageing process consisting of 10,000 cycles, each involving 30 seconds of immersion in water at temperatures of 5°C and 55°C. Unaged samples(G1 and G3) were incubated at 37°C for 50 hours to simulate intraoral conditions. After the flexural strength tests all samples with and without aging treatment was evaluated using a three-point bending test on a universal testing machine (AGS-X, SHIMADZU, Kyoto, Japan). Flexural strength test values were calculated using Trapezium software. Statistical analysis was performed using one-way and two-way ANOVA with Tukey's multiple comparion tests and independent samples t-test and Tamhane's T2 Post-hoc test ($p<0,05$).

RESULTS: The highest flexural strength was observed in G4, while the lowest was in G1. Although aged groups showed higher average strength than unaged ones, the difference was not statistically significant ($p>0.05$). Two-way ANOVA revealed that printing angle significantly affected flexural strength ($p<0.05$), whereas thermal aging and its interaction with printing angle were not significant ($p>0.05$).

CONCLUSIONS: Printing angulation significantly affected the flexural strength of the 3D-printed denture base resin. Although thermal aging tended to increase flexural strength, this effect was not statistically significant.

Keywords: Denture base resins, flexural strenght, thermal cycling, 3d printing, printing angulation

SS-244 Managing developmental enamel defects with minimally invasive prosthetics: case series

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INTRODUCTION: Enamel anomalies are defects that occur during tooth development, leading to changes in the quantity or quality of enamel. The prosthetic management of enamel anomalies presents both aesthetic and functional challenges, requiring an individualized treatment plan.

Case description: This report describes the cases of three young Tunisian women who presented to the Fixed Prosthodontics Department at the Monastir Dental Clinic, complaining of tooth discoloration. In the first case, the patient was diagnosed with moderate fluorosis according to the TFI index. She received four lithium disilicate ceramic veneers covering the incisor-to-canine segment and zirconia crowns on the four upper premolars. (2-year follow-up) In the second case, a diagnosis of molar-incisor hypomineralization (MIH) was made. Microabrasion was performed on the lesions to remove extrinsic discoloration, followed by the placement of lithium disilicate ceramic veneers from canine to canine. (10-year follow-up) In the third case, due to severely compromised enamel, full-contour zirconia crowns were indicated. (1-year follow-up)

Digital Smile Design (DSD) was used to simulate esthetic outcomes and facilitate communication and consent with the patients. A virtual wax-up based on the smile design and occlusal scheme was 3D-printed to create a mock-up. Tooth preparation was guided by the mock-up.

DISCUSSION: This case series highlights several structural enamel defects. In North Africa, fluorosis is particularly prevalent, largely due to high fluoride concentrations in underground water sources. These enamel defects represent a clinical challenge. While mild cases can often be managed conservatively, severe forms typically require prosthetic interventions that balance esthetic demands with tissue preservation. Early diagnosis and multidisciplinary collaboration are key to achieving optimal and sustainable outcomes.

Keywords: Dental esthetics, fluorosis, Veneer

SS-245 Patient Satisfaction in Implant Supported Prosthesis Treatments of Kırıkkale University Faculty of Dentistry between 2021-2025

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OBJECTIVE: The aim of this study was to evaluate the post-treatment satisfaction of individuals who received implant prosthesis treatment at Kırıkkale University Faculty of Dentistry between 2021 and 2025 and to identify common clinical problems. The relationship between factors such as aesthetics, function, comfort, ease of care and readmission with patient satisfaction was analysed.

MATERIALS-METHODS: In this retrospective, descriptive, cross-sectional study, 88 of 130 patients with clinical records were interviewed by telephone using a structured questionnaire. Participants were divided into implant crown-bridge, full arch fixed and removable prosthesis groups. The questionnaire was based on a 5-point Likert scale and assessed esthetic perception, chewing and speech function, ease of care and complications. Data were anonymised and digitally analysed.

RESULTS: 63.6% of patients were very satisfied with the treatment, while 10% were dissatisfied. Aesthetic expectations were met by 69.3%, while 4.5% were dissatisfied. While 92% of participants had no problems with speech function, 77% reported chewing problems. The overall satisfaction rate was 64.4%. The rate of those who experienced no post-treatment complications was 47.1% and the most commonly reported problems were desimantation (13.8%), screw loosening (11.5%) and screw fracture (4.5%). 55.7% of patients reported having received hygiene education.

CONCLUSIONS: Implant prostheses provide high patient satisfaction in terms of esthetics and speech. However, there is a need for improvement in areas such as chewing function, technical problems and hygiene management. The results suggest that improving post-treatment counselling and long-term care processes will contribute to patient satisfaction.

Keywords: implant supported prosthesis, Patient Satisfaction, Retrospective Analysis

SS-246 Optical properties of modern cad/cam dental ceramics

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As esthetics become a priority in restorative dentistry, the optical behavior of ceramic materials is gaining clinical importance. The objective of this in vitro study was to evaluate and compare the translucency and opalescence of five CAD/CAM ceramic systems, including three types of monolithic zirconia and one polymer-infiltrated hybrid ceramic, using lithium disilicate as the reference material.

MATERIALS-METHODS: A total of 100 rectangular specimens (14 × 12 × 1 mm, shade A2) were fabricated from the following groups: CERASMART 270 (a hybrid ceramic), GC Initial Zirconia Disk (standard translucency), High-translucent zirconia, Ultra high-translucent zirconia, and GC Initial LiSi Block (lithium disilicate). The translucency parameter (TP) and opalescence parameter (OP) were measured using the Vita Easyshade V spectrophotometer, with readings taken against standardized black and white backgrounds according to the CIELAB color system. One-way ANOVA and Bonferroni *post hoc* tests were used for statistical analysis ($p < 0.05$).

RESULTS: Lithium disilicate showed the highest TP and OP values (TP ≈ 21.5; OP ≈ 13.8), significantly outperforming all other materials. The hybrid ceramic exhibited intermediate values (TP ≈ 19.9; OP ≈ 12.5), followed by Ultra high-translucent zirconia (TP ≈ 18.1; OP ≈ 11.9), High-translucent zirconia (TP ≈ 16.0; OP ≈ 10.7), and Standard translucency zirconia (TP ≈ 14.9; OP ≈ 10.1). Statistically significant differences were observed between all tested groups ($p < 0.05$).

CONCLUSION: Lithium disilicate provides the most favorable optical properties and is recommended for highly esthetic regions. Hybrid ceramics may serve as a viable alternative, while monolithic zirconia, particularly lower-translucency types, may be better suited for posterior areas where strength is prioritized over esthetics.

Keywords: Optical properties, CAD/CAM ceramics, Translucency parameter, CIELAB, Lithium disilicate

SS-247 Assessment of Removable Partial Denture Complications in Relation to Classification Systems: A Pilot Study

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OBJECTIVES: Removable partial dentures (RPDs) are commonly used in patients with long edentulous spaces, particularly when implants are contraindicated. This study aimed to evaluate the prevalence of mechanical and biological complications that may affect the survival of RPDs and to investigate their association with different classification systems and denture age.

MATERIALS-METHODS: A total of 205 RPDs from 134 patients were examined. The distribution of dentures by jaw, Eicher and Kennedy classifications, denture age and both mechanical and biological complications were recorded. The relationship between complications and denture age, Eichner classification, Kennedy classification, as well as the correlation between denture age and the classification systems, was analyzed using one-way ANOVA and the chi-square test, with significance set at $p<0.05$.

RESULTS: No association was found between denture age and either classification system. Among the complications, only ulcerations showed a significant difference between the jaws, being more common in mandibular dentures. Mechanical complications were most frequently observed, with the most common being the loss or fracture of artificial teeth. Of all complication types, only mechanical complications were significantly associated with denture age, occurring more frequently in mandibular dentures aged 10 years or older and maxillary dentures aged 15 years or older. Denture stomatitis was significantly associated with Kennedy Class III, and inflammatory papillary hyperplasia with Kennedy Class II, both observed in mandibular dentures; in the maxilla, epulis fissuratum was more frequent in Eichner groups A3 and C1.

CONCLUSIONS: The frequency of mechanical complications increased with denture age, supporting the need for regular follow-up, especially after 10-15 years. While certain associations were found between complication types and classification systems, their predictive value in assesing complication risk appears limited, emphasizing the importance of individualized evaluation in RPD maintenance.

Keywords: Removable partial dentures, Kennedy classification, Eichner classification, Denture complication, Denture age

SS-248 Evaluation of the Effect of Edentulism on Condylar Trabecular Structure Using Fractal Analysis (Retrospective Study)

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OBJECTIVES: This retrospective study aimed to evaluate changes in the trabecular bone structure of the mandibular condyles in edentulous patients over time with complete denture use.

MATERIALS-METHODS: Ethical approval for the study was obtained from the Non-Interventional Clinical Research Ethics Committee of the University. This study was designed as a pilot study for a comprehensive project aimed at evaluating all edentulous patients in the database of the Faculty of Dentistry. Seventy-six edentulous patients (35 males, 41 females) with complete dentures were included. Each patient had two panoramic radiographs taken at least three years apart. The trabecular structure of both mandibular condyles was assessed on each radiograph using fractal analysis. Patient age, gender, and the interval between radiographs were recorded. Because the fractal data were not normally distributed (Kolmogorov-Smirnov test), the nonparametric Mann-Whitney U test was used for comparisons, with significance set at $p<0.05$.

RESULTS: The mean age of patients was 64.23 ± 8.68 years. Fractal values from the second radiograph were significantly lower than those from the first radiograph for both the right and left condyles ($p<0.05$). Subgroup analysis by time interval revealed a significant decrease in left condyle fractal value among patients with a 3-4 year interval between radiographs, and a significant decrease in right condyle fractal value among those with a 5-10 year interval.

CONCLUSIONS: Edentulism and long-term complete denture use led to detectable changes in mandibular condylar trabecular bone structure over time, with more pronounced changes observed in female patients. Fractal analysis of panoramic radiographs proved to be an effective method for detecting and monitoring these trabecular changes.

Keywords: Mandibular condyle, Fractal analysis, Panoramic radiograph.

SS-249 Assessment of Dental Students Knowledge, Attitudes, and Experiences Concerning 3D Printing Technologies

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OBJECTIVES: The integration of three-dimensional (3D) printing technologies into dental practice has significantly transformed clinical and educational applications. However, there is limited research on the readiness and competence of dental students in this area. This study aims to assess the knowledge, attitudes, and experiences of dental students in Turkey regarding the use of 3D printing in dentistry.

MATERIALS-METHODS: A descriptive cross-sectional survey was conducted among undergraduate students at the Faculty of Dentistry, Uşak University. The survey instrument consisted of 38 structured items, including demographic variables and questions assessing participants' knowledge, attitudes, and experiences with 3D printing technologies. Responses were recorded on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Data were analyzed using SPSS version 22.0, employing descriptive and non-parametric tests with a significance level of $\alpha = 0.05$.

RESULTS: Among the 218 respondents, most reported limited knowledge and insufficient practical experience with 3D printing. Despite this, they expressed a strong interest and positive attitude toward integrating these technologies into clinical practice. A significant number of participants supported the inclusion of formal education and training on digital technologies within the dental curriculum. The results also revealed a general lack of familiarity with key concepts, including compatible materials and printing techniques.

CONCLUSION: Although dental students currently demonstrate limited competence in 3D printing, they show a strong desire to develop related skills. These findings highlight the need for structured curricular improvements and practical training in digital dentistry. Incorporating such content into undergraduate education could help bridge existing knowledge gaps and better prepare future dental professionals for emerging technological challenges.

Keywords: Three-dimensional printing, dental education, digital dentistry, technological competence, educational technology in dentistry

SS-250 Evaluating and comparing accuracy of google gemini ai and perplexity ai in responding to patients' frequently asked questions in prosthodontics

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PURPOSE: With the increasing integration of artificial intelligence (AI) tools in dental education, it is imperative to evaluate the reliability of the information they generate. This study aims to assess and compare the reliability of generated answers and the reliability of cited sources from two AI chatbots—Google Gemini and Perplexity AI—regarding implant-supported prostheses.

METHODS: Two full-time faculty members developed 30 open-ended questions covering core topics in implant-supported prostheses. These questions were then submitted to Google Gemini (2.5 Pro) and Perplexity AI (Sonar). The resulting answers were independently evaluated by two prosthodontists using Global Quality Score (GQS) to assess accuracy, value, precision and clarity. Paired T-test, Normality Test (Shapiro-Wilk) and Wilcoxon Signed-Rank Test were performed to statistically analyse the scores.

RESULTS: Out of 30 evaluated responses regarding implant-supported prostheses, Gemini demonstrated superior performance in answer accuracy with a significantly higher mean Global Quality Score (GQS) compared to Perplexity (4.33 vs. 3.57; $p < 0.001$). While Gemini also yielded slightly more reliable sources (mean score: 2.93 vs. 2.73), this difference was not statistically significant ($p = 0.415$). The correlation between source reliability and answer accuracy was weak for both models, indicating that higher source quality did not consistently predict higher response accuracy.

CONCLUSION: Our study found that for specialized dental topics, Google Gemini provides more accurate information than Perplexity AI. A key finding was that for both AIs, strong source citations did not guarantee a correct answer, or correct answers did not necessarily have strong source citations. This shows that you cannot trust an AI's response simply because it lists good references. Therefore, while AI tools are potentially useful in professional fields like dentistry, they must be used with caution. Professionals should always critically review and verify the information before relying on it.

Keywords: Artificial Intelligence, Google Gemini, Perplexity, Implant Supported Prosthesis, Patient Education, Prosthodontics

SS-251 Video-Assisted Learning on YouTube in Dentistry Education: The Impact of Overdenture Videos on Dentistry Students

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OBJECTIVES: This study aimed to evaluate the effectiveness of video-assisted learning on the knowledge and perceptions of dental students regarding implant-supported overdentures, which represent a challenging but essential aspect of prosthodontic treatment. The increasing use of digital platforms for educational purposes motivated this research.

MATERIALS-METHODS: A prospective pretest–posttest intervention study was conducted involving 4th- and 5th-year dental students at Istanbul Health and Technology University. Participants initially completed a 15-item multiple-choice test designed to assess their baseline theoretical knowledge of implant-supported overdenture procedures. Students watched the selected educational video demonstrating key clinical steps, including implant positioning, abutment selection, impression-taking techniques, and prosthesis fitting. After the video session, students completed the same knowledge test to evaluate knowledge gain, as well as a 10-item Likert-scale survey to assess their perceptions about the video's clarity, educational value, engagement, and motivational impact. Data were statistically analyzed using paired t-tests for knowledge score comparisons and descriptive statistics for survey results.Students complete the survey via Google Forms.

RESULTS: Analysis revealed a statistically significant increase in post-intervention test scores, indicating an improvement in students' understanding of overdenture concepts and clinical procedures. Survey responses reflected positive student attitudes toward video-assisted learning, highlighting increased clarity, engagement, and confidence in managing implant-supported overdentures. Most students expressed a preference for integrating similar video modules into their formal prosthodontic education.

CONCLUSION: Video-assisted learning through widely accessible platforms such as YouTube serves as an effective supplementary educational tool in dental training. It enhances both theoretical knowledge and practical confidence in complex prosthodontic procedures like implant-supported overdentures. Incorporating such multimedia resources into dental curricula is strongly recommended to enrich student learning experiences and outcomes.

Keywords: Social Media, Educational Technology, Overdenture, Dental Prosthesis, Implant-Supported

SS-252 "Prosthodontic driven full-mouth rehabilitation of a class III malocclusion with orthodontics, orthognathic surgery and implant supported restorations: A multidisciplinary case report"

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This case report describes a comprehensive interdisciplinary approach to the full-mouth rehabilitation of a patient with an Angle Class III skeletal malocclusion, missing posterior dentition and compromised anterior esthetics. The treatment began with orthodontic therapy to align the dental arches, decompensate the anterior teeth and establish an ideal occlusal scheme in preparation for the surgical and prosthetic phases. Following orthodontic treatment, a Le Fort I osteotomy was performed to advance the maxilla and correct the skeletal discrepancy. During the same surgical session, bilateral maxillary sinus lift augmentation increased vertical bone height in the posterior maxilla. Simultaneously, dental implants were placed into the grafted sites, taking advantage of the enhanced surgical access provided by the osteotomy. The prosthetic phase was initiated after a healing period, which confirmed successful osseointegration and skeletal stability. Posterior teeth were restored using metal-ceramic crowns for strength and durability under functional loading. The anterior teeth were restored with highly esthetic all-ceramic crowns to achieve optimal translucency and a natural appearance. This case highlights the importance of interdisciplinary collaboration and carefully sequenced treatment in managing complex dental rehabilitations. The simultaneous performance of orthognathic surgery, sinus augmentation, and implant placement reduced overall treatment time and minimized surgical morbidity. The final outcome demonstrated restored function, facial harmony, and excellent esthetics. Long-term follow-up showed stable occlusion, healthy peri-implant tissues, and high patient satisfaction, underscoring the success of this integrated treatment approach.

Keywords: full mouth rehabilitation, osteotomy, interdisciplinary treatment, implants

SS-253 Tooth Shade Diversity: A Study of Age, Gender, and Ethnic Differences

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OBJECTİVE: The aim of this study was to evaluate the color of natural maxillary central, lateral, and canine teeth from four different ethnic groups and age groups 18-85 years.

MATERIALS AND METHODS: Six subjects of equal sex from four racial/ethnic groups (White, Black, Asian, Pacific Islander, and others) were recruited from each of the following age groups: 18-29 years, 30-39 years, 40-49 years, 50-59 years, and 60-85 years. Potential subjects were clinically screened to ensure that the three specific anterior teeth selected (maxillary central, lateral, and canine) were non-restored and natural permanent teeth free of external staining or bleaching. ShadeScan (Cynovad, Canada) was used to measure tooth color.

RESULTS: This study identified significant correlations between tooth color and demographic factors, including age, gender, and race. In individuals classified as "other race," central tooth color showed an age-related shift from lighter shades (A1) in younger individuals to darker shades (C3/C4) in older adults ($p<0.05$, effect size=0.724). No significant age-related changes were observed in lateral or canine teeth across all races or in central teeth among Asian, Black, or White individuals. Gender differences were found in canine tooth color among black individuals ($p<0.05$, effect size=0.745), with A3 being more common in females and A3.5 in males. Age also significantly affected central and lateral tooth color in women ($p<0.05$, effect size =0.548 and 0.538, respectively) and central tooth color in men ($p<0.05$, effect size=0.584). Racial differences were only significant in central teeth among women ($p<0.05$, effect size=0.543), with A2 more prevalent in White individuals, A3 in Asian and Black individuals, and C3 in those categorized as "other race."

CONCLUSION: Understanding the natural distribution of tooth shade is essential for accurate shade matching in esthetic dentistry. These results highlight the importance of incorporating demographic factors into clinical decision making to enhance personalized dental care.

Keywords: Tooth, color, ethic groups, age factors, gender, dental equipment

SS-254 Beyond Aesthetic Demand: A Validated Instrument for Identifying Body Dysmorphic Disorder in Dental Settings

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Design: Concerns about the appearance of teeth and mouth, which play a key role in communication and first impressions, are natural to some extent. However, excessive concern over these areas should raise suspicion of Body Dysmorphic Disorder (BDD). The use of a validated and standardized screening tool in dental settings may improve the identification of BDD. This study aims to develop a validated tool to alert dentists to potential BDD cases among patients seeking cosmetic dental procedures.

METHODS: The research team conducted a literature review and initially created a pool of 26 items. A qualitative evaluation of the scale items was conducted by the researchers, during which each question was analyzed and discussed, resulting in the reduction of the number of items to 21. During the content validity process, two items were removed using the Lawshe technique, and three items were excluded during the exploratory factor analysis, finalizing the scale with 16 items. Both exploratory and confirmatory factor analyses were executed to affirm the scale's construct validity, and reliability was measured through Cronbach's alpha.After rigorous item analysis and exploratory factor analyses across two testing rounds, a finalized version of the questionnaire emerged

RESULTS: Only individuals presenting to the university hospital dental clinic for cosmetic reasons were included in the study. The final version of the scale, comprising 16 items across three factors, demonstrated adequate validity and reliability. Factor analysis accounted for 53.72% of the variance, with the factors labeled as follows: "Impairment in Functionality,""Dental Appearance Satisfaction," and"Preoccupation."Confirmatory factor analysis supported the structural integrity of the scale, and overall reliability, as indicated by a Cronbach's alpha of 0.90, confirmed its consistency.

CONCLUSION: The Dental Appearance Perception Scale (DAPS) is a reliable and valid tool with the potential to screen for Body Dysmorphic Disorder risks and enhance treatment satisfaction in dental settings.

Keywords: Esthetics, Perception, Body Dysmorphic Disorder, dental satisfaction, distress, scale.

SS-255 Making the Right Choice: Clinical Insights into Extraoral vs. Intraoral Photogrammetry for Full-Arch Implant Cases

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INTRODUCTION: It is imperative that implant positions are transferred accurately to facilitate passive adaptation in full arch implant-supported prostheses. Photogrammetry-based systems are gaining popularity as an alternative to traditional impressions or intraoral scanning. This case report compares an extraoral photogrammetry system (EPS) with a new intraoral photogrammetry system (IPS) in terms of clinical efficiency and passive adaptation accuracy.

Case description: The male patient, who had had all his teeth extracted due to mobility, was planned to receive four implants in the upper jaw and six in the lower jaw, along with titanium bar-supported monolithic zirconium hybrid prostheses. Two different photogrammetry systems were used independently to record the implant positions of the patient: extraoral (EPS, iCam4D) and intraoral (IPS, Aoralscan Elite). The same intraoral scanner (Aoralscan Elite) was used for the taking of soft tissue impressions in accordance with both methods. Prior to the final prosthesis, 3D-printed try-in restorations were prepared for each dataset. The designs were made consistent using intraoral scans of the patient's immediate prostheses. Passive fit and occlusion were assessed in the patient's mouth. In the mandibular arch, the restoration fabricated from EPS did not achieve passive fit. The Sheffield test was then repeated on the model using a high-precision desktop laboratory scanner. The STL data were superimposed on the original designs to assess accuracy through deviation mapping. Following intraoral, radiological and numerical evaluations, the data obtained with IPS was used for permanent restorations.

DISCUSSION: In this case report, while both systems were successful in the upper jaw, only IPS systems were found to be clinically successful in the lower jaw. There are a number of potential reasons for this, including the data processing, recording, and 3D printing stages. While IPS systems show great promise, further detailed in vitro and clinical studies are required to generate definitive data.

Keywords: CAD/CAM, Passive Fit, Photogrammetry, Digital Workflow, Accuracy, Intraoral Scanning

SS-256 Influence of Implant Angulation on Stress Distribution in Mandibular Overdentures with Locator and Ball Attachments

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OBJECTIVE: This study aimed to investigate the effects of different implant angulations on stress distribution in mandibular overdentures supported by two attachment systems (Locator and Ball) under oblique loading conditions using finite element analysis (FEA).

MATERIALS AND METHODS: A three-dimensional mandibular model was generated based on Visible Human Project CT data and processed using 3DSlicer and Blender. Two implants (Ø4.1 mm × 10 mm) were positioned bilaterally in the canine regions with angulations of 0°, 2°, 4°, and 7.5°. Both Locator and Ball attachment systems, including abutment, matrix, and housing components, were modeled for each angulation. All structures were meshed with tria and tetrahedral elements using ALTAIR Hypermesh. Material properties were assigned as linear elastic. A 300 N oblique load at 45° was applied at the canine and first molar regions. Boundary conditions restricted all degrees of freedom at the mandibular base. Non-linear frictional contacts were defined between attachment parts and between the prosthesis and mucosa. Analyses were conducted using ALTAIR Optistruct.

RESULTS: Implant angulation significantly influenced stress distribution in both attachment systems. In general, stress concentrations increased with higher implant angulations. The Ball abutment showed localized stress concentration at the neck region, while the Locator abutment, due to its thicker cross-section, exhibited lower stress levels overall. Importantly, stress values on the titanium implants remained within the material's yield strength limits across all models.

CONCLUSION: Implant angulation and attachment system type critically affect the biomechanical performance of mandibular overdenture prostheses. Locator attachments provided more favorable stress distribution in the attachments and prosthesis under oblique loading, while Ball attachments transmitted less stress to peri-implant bone. These findings can guide clinical decisions in implant positioning and attachment selection for edentulous patients.

Keywords: implant angulation, mandibular overdenture, Locator attachment, Ball attachment, finite element analysis, oblique loading

SS-257 Phase transformation and biaxial flexural strength of additively and subtractively manufactured zirconia: Effect of grinding and regeneration firing

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Objectives: To evaluate the effects of grinding and regeneration firing (RF) on phase transformation and biaxial flexural strength (BFS) of additively (AM) or subtractively (SM) manufactured 3 mol% ytttria stabilized tetragonal zirconia polycrystal (3Y-TZP). Material and methods. A total of 108 disk-shaped (Ø15×1.5 mm) 3Y-TZP zirconia specimens were fabricated using either SM (IPS e.max ZirCAD; Ivoclar Vivadent AG) or AM (INNI Cera; AON Co.) (n=54). Grinding was performed using a 150 µm diamond bur with a high-speed handpiece and water cooling. RF was applied at 1000°C for 15 minutes in a sintering furnace. The crystalline phases were analyzed using X-ray powder diffraction (XRD) analyses. A biaxial flexural strength test was performed at a crosshead speed of 1 mm/min. Microstructure and fracture surfaces were examined using scanning electron microscopy. BFS data were statistically analyzed using one-way ANOVA, followed by Tukey's post-hoc test for pairwise comparisons. (α=.05). The Weibull modulus and characteristic strength were calculated to assess the reliability of strength data.

RESULTS: Tetragonal-to-monoclinic phase transformation was detected solely in the AM and SM groups subjected to grinding, whereas only the tetragonal phase was identified in all other groups. The highest BFS (1427.2 MPa) was observed in the AMG group specimens (P<.001). Grinding and RF did not significantly affect the BFS of SM zirconia (P=.927 and P=.999, respectively) but significantly increased the BFS of AM zirconia (P<.001). RF increased the Weibull modulus in both AM (from m=6.98 to 12.25) and SM (from m=5.91 to 8.35) zirconia.

CONCLUSIONS: The implementation of RF treatment post-grinding does not significantly affect the BFS value; rather, it enhances the material's reliability by increasing the Weibull modulus and removing the monoclinic phase.

Keywords: Biaxial Flexural Strength, Grinding, Regeneration Firing, Reliability, X-Ray Diffraction, 3D-Printed Zirconia

SS-258 Occlusal splint therapy in a patient with tremor: a case report

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INTRODUCTION: Tremor is a common motor disorder that can affect orofacial muscles and complicate oral functions such as chewing and speaking. Although occlusal splints are commonly utilized in prosthodontic treatment for managing temporomandibular disorders and bruxism, their use in patients with tremor has been limitedly reported in the literature.

Case description: A 65-year-old female presented with complaints of jaw discomfort and traumatic tooth contact caused by involuntary mandibular movements, particularly during sleep. Although her mother had been diagnosed with Parkinson's disease, the patient had not received a formal diagnosis herself, but exhibited signs of essential tremor. Clinical examination revealed irregular occlusal contacts and tenderness in the masticatory muscles, presumed to be secondary to tremor-induced mandibular instability. A maxillary hard acrylic occlusal splint was fabricated to minimize traumatic contacts, provide mandibular stabilization, and reduce discomfort. The patient was instructed to wear an occlusal splint at night and was scheduled for follow up evaluations. At the six-month follow-up, the patient reported a notable reduction in jaw pain and improved comfort during sleep. She also perceived a subjective decrease in tremor intensity. The splint was well tolerated, with no adverse effects or need for adjustment.

DISCUSSION: This case suggests that occlusal splint therapy may be beneficial in managing mandibular dysfunction and associated symptoms in patients with essential tremor. Beyond mechanical protection, splints may offer neuromuscular support, improve quality of life, and warrant further investigation in neurologically compromised patient groups.

Keywords: Tremor, Occlusal Splint, Prosthodontic Dentistry, Mandibular Stabilization, Oral Motor Function

SS-259 Effect of Repeated Sterilization and Scan Body Type on Digital Impression Trueness

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OBJECTIVES: This study aimed to evaluate the effect of repeated sterilization on the trueness of digital impressions at both the implant and abutment levels using polyetheretherketone (PEEK) and titanium scan bodies (SBs).

MATERIALS-METHODS: Titanium and PEEK SBs, each available in two types—implant-level (I-SB) and multi-unit-level (MU-SB) (Bilimplant)—were used for digital impressions. SBs were attached to master models containing two implants and scanned using a laboratory scanner to generate reference datasets. Test scans were repeated 25 times per group using Cerec Primescan. Between each scan, SBs were sterilized in an autoclave at 134 °C for 5 minutes. After each sterilization cycle, trueness was assessed by superimposing the test scan onto the reference data and computing the corresponding root mean square (RMS) deviation. Two-way ANOVA was used to analyze differences based on SB material and SB type.

RESULTS: PEEK SBs (12.53 ±3.29) had significantly higher RMS values than titanium SBs (10.52 ±3.12; P<.05). MU-SBs (12.21 ±2.93) had significantly higher RMS values than I-SBs (10.83 ±3.62; P<.05). However, the interaction between SB material and type was not statistically significant (P = .305).

CONCLUSIONS: Repeated sterilization and use of SBs negatively affected the trueness of digital impressions, with PEEK SBs being more affected than titanium ones, and MU-SBs exhibiting greater deviation than I-SBs.

Keywords: Digital implant impression, scan body, polyetheretherketone, titanium, sterilization

SS-260 Definitive Restoration Fabrication Using the Superimposition Technique in Full-Arch Implant-Supported Prostheses

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The incorporation of intraoral scanners (IOS) into clinical workflows has enabled the realization of a completely digital approach in prosthodontic treatment. Among the key advantages of this digital workflow are enhanced patient comfort, simplification of clinical and disinfection procedures, elimination of the need for conventional stone cast fabrication,

and improved communication and collaboration between the clinician and the dental laboratory technician. However, the optimal protocol to achieve maximum accuracy in full-arch intraoral scanning has yet to be clearly established.

The accuracy of IOS is influenced by multiple intraoral and material-related factors, including the presence of saliva, mobility of soft tissues, lack of keratinized mucosa, and high reflectivity of restorative surfaces. Moreover, variables such as the stitching algorithm used for image data alignment, the absence of stable anatomic landmarks in edentulous spans, and the geometric design of scan bodies (SBs) significantly impact the precision of digital impressions in long-span, implant-supported fixed restorations. These challenges render the digital acquisition of full-arch edentulous arches one of the most demanding scenarios in digital prosthodontics.

This technical report introduces a time-efficient and reproducible technique that enhances scan accuracy and minimizes data stitching errors by utilizing readily available methylene blue dye. In this method, one reference mark is applied to the buccal frenulum and two to each maxillary tuberosity region using methylene blue. These three-dimensionally distributed reference points facilitate improved alignment during the stitching process and contribute to enhanced accuracy in full-arch intraoral scanning.

Keywords: Dental implants, intraoral scanning, scan body, scan accuracy

SS-261 Immediate loading and digital planning: new standards in implant prosthodontics

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The evolution of digital technologies has fundamentally changed traditional implant prosthodontics, establishing new standards focused on efficiency, precision, and patient satisfaction. Immediate loading, once limited to carefully selected cases, is now increasingly adopted thanks to the integration of digital planning, customized surgical guides, and CAD/CAM protocols. Using computed tomography and 3D planning software, clinicians can accurately assess bone volume, anatomical structures, and force vectors, significantly reducing intra- and postoperative risks. The fabrication of surgical guides enables highly precise implant placement, which is critical for the success of immediate loading. Additionally, digital prototyping of provisional restorations allows for rapid delivery and immediate esthetic integration. The benefits of this approach include shorter overall treatment time, minimized surgical trauma, and higher patient acceptance. However, the success of immediate loading still depends on biomechanical factors, bone quality, primary implant stability, and clinician expertise. This presentation explores current clinical evidence on immediate loading and digital planning, highlights the advantages and limitations of each stage, and proposes an integrated vision for the future of implant prosthodontics, where digital technology redefines treatment standards and personalization. In conclusion, the synergy between digital workflows and immediate loading protocols is reshaping clinical decision-making and enabling faster, more predictable outcomes. As digital tools become more accessible and intuitive, their integration into daily practice is no longer optional, but essential for modern implant prosthodontics.

Keywords: implants, immediate loading, digital, planning, prosthodontics

SS-262 Screw-retained monolithic zirconia restorations on Ti-base abutments in limited vertical space: a case report

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INTRODUCTION: Implant-supported fixed prosthetic restorations designed with various configurations have been successfully implemented in the rehabilitation of natural tooth loss. Depending on the clinical indication, different types of abutments and connection systems are selected for these restorations. Particularly in cases where the edentulous space is limited, screw-retained restorations supported by Ti-base abutments offer a contemporary and effective solution. Compared to cement-retained systems, screw-retained restorations are often preferred due to their advantages, including the prevention of cement-related complications, preservation of peri-implant soft tissue health, and the retrievability of the prosthesis when needed. Furthermore, in situations with reduced vertical space, shortened cemented abutments may result in inadequate retention, leading to recurrent dislodgement of the restoration. The aim of this case report is to present the clinical follow-up

results of screw-retained implant-supported fixed prosthetic restorations designed with Ti-base abutments and monolithic zirconia superstructures.

Case description: A 42-year-old female patient, who had received dental implants (CTECH, Italy) in the regions of teeth #14, #16, and #36, presented to the Department of Prosthodontics at Çankırı Karatekin University seeking implant-supported fixed prosthetic restorations. Clinical examination revealed reduced gingivo-occlusal space in the upper right posterior region. Due to the insufficient vertical clearance for both the abutment and prosthetic infrastructure, Ti-base abutments and monolithic zirconia superstructures were selected.This approach enabled a screw-retained connection of the restorations to the implants. Following occlusal adjustments, the restorations were torqued to the implants at 25–30 Ncm. Clinical follow-ups revealed patient satisfaction with the esthetic and functional outcomes.

DISCUSSION: In cases where vertical space is insufficient for implant-supported fixed prosthetic restorations, the use of Ti-base abutments and monolithic zirconia superstructures provides a practical and minimally invasive solution without requiring any preparation of adjacent natural teeth. This approach enables successful outcomes both functionally and esthetically.

Keywords: Abutment design, Zirconium, Prosthesis retention, Dental prosthesis ımplant-supported.

SS-263 Effect of Shear Bond Strength of Glass Ceramic Treated with Different Primers After Thermal Cycling

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AIM: This study aimed to evaluate the effect of using a universal adhesive alone, silane alone, or their combination on the shear bond strength (SBS) of three different lithium disilicate ceramic (LDC) materials.

MATERIALS-METHODS: Specimens (n = 99, 1.5 mm thickness) prepared from three different CAD/CAM materials (Cerec Tessera, IPS e.max CAD, GC Initial LiSi) were etched with hydrofluoric (HF) acid (20 s). The specimens were divided into three groups, and the following surface treatments were applied, respectively: (1) silane only, (2) silane + MDP-containing universal adhesive, and (3) MDP-containing universal adhesive only. Light-cured resin cement was applied to the ceramic surface using teflon mold. SBS testing was performed after 5,000 cycles thermocycling. Surfaces were analyzed with stereomicroscope for failure mode and with scanning-electron microscopy (SEM) for microstructure of the LDCs. Statistical analysis of the data was performed with parametric tests at α = 0.005.

RESULTS: No significant difference in SBS values of surface treatments were found for IPS e.max CAD (P>0.05). Conventional silane application resulted in statistically higher SBS values only for GC Initial LiSi. In CEREC Tessera, the group treated with silane + MDP-containing universal adhesive showed the highest SBS values, with significant differences. Failure mode was mostly mixed, except for IPS e.max CAD group treated with an MDP-containing universal adhesive.

CONCLUSION: Bond strengths are affected by the type of LDC and their microstructures. Although some universal adhesives contain silane, applying a separate silane after HF is essential for effective bonding. For CEREC Tessera, silane + MDP-containing universal adhesive is recommended. Surface treatment protocols should be tailored to the ceramic material to optimize bonding.

Keywords: Lithium disilicate glass ceramic, SBS, MDP, universal adhesive, silane, CAD/CAM

SS-264 Using PEEK Coping Beneath an E.max Crown for Stress Absorption and Discoloration Masking in a Structurally Compromised Central Incisor

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A 36-year-old female patient presented with the desire to improve her smile, particularly concerned about severe discoloration of the right maxillary central incisor. The tooth had previously undergone root canal treatment and composite build-up, followed by placement of a zirconia crown. However, esthetic issues such as gingival recession and shade mismatch with the adjacent incisor persisted.

Upon removal of the zirconia crown, the tooth was restored using a fiber-reinforced composite (FRC) post and composite core. Considering severe tooth loss and in orde to effectively mask the discolouration and provide stress modulation, a PEEK coping was fabricated due to its favorable opacity and elastic modulus, which approximates that of dentin. The PEEK surface was conditioned to enhance adhesion, and an E.max

crown was subsequently bonded over the coping after proper conditioning protocols.

Restoring endodontically treated anterior teeth with extensive structural loss presents both mechanical and esthetic challenges. In such cases, post selection plays a critical role. While metal posts provide strength, their high modulus of elasticity leads to stress concentration and esthetic limitations. FRC posts, with their dentin-like elasticity and compatibility with composite build-ups, offer a more favorable biomechanical profile.

The use of a PEEK coping in this case addressed multiple concerns: it masked the underlying discoloration, reduced the required thickness of the E.max crown for better integration with adjacent veneers, and improved stress distribution to protect the compromised tooth structure. However, the addition of multiple restorative interfaces requires meticulous attention to bonding protocols to ensure long-term success which will be discussed.

Keywords: PEEK,Color,Stress, Veneers

SS-265 Using 3D printing technology for autotransplantation of teeth: a case report

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INTRODUCTION: Although various treatment options such as orthodontics, removable or fixed dentures, and dental implants exist for managing tooth loss, these may be challenging for young patients due to high costs and ongoing jaw development. Autotransplantation, the repositioning of a tooth within the same patient, is a viable alternative but requires clinical expertise to increase the chances of tooth survival. Using a 3D-printed donor tooth replica from CBCT data can guide socket preparation, simplifying the procedure for both the clinician and the patient. This approach shortens adaptation time, preserves periapical tissues, reduces the risk of complications such as apical periodontitis or root resorption, and improves tooth survival. This case report aims to demonstrate a simplified, guided autotransplantation technique as an alternative to implants, particularly in young patients.

Case description: A healthy 17-year-old female patient, since restoration of the mandibular right first molar tooth was not possible, it was decided to extract this tooth and replace it with an autotransplantation of the third molar tooth in the same jaw. A prothesis acrylic resin model of the donor tooth was prepared with a 3D printer to guide socket preparation during surgery. The first molar was extracted atraumatically and the extraction cavity was shaped with the produced model tooth. Then, the third molar was extracted and placed in the prepared socket.

DISCUSSION: Autotransplantation is a successful treatment method that can serve as a viable option to replace a missing tooth, especially in young patients. The use of surgical templates produced with CBCT and 3D printers in the clinic shortened the duration of this procedure and increased the probability of survival in our patient in a one-year follow-up.

Keywords: AUTOTRANSPLANTATION, CBCT, 3D PRINTER

SS-266 Cost, safety, ethics: rethinking implant component reuse— a systematic review

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OBJECTIVES: This systematic review aims to evaluate the effectiveness of sterilization protocols in eliminating biological contaminants and the mechanical consequences of repeated reuse of implant components such as healing abutments, impression transfers, scan bodies, and analogs within the context of rising interest in sustainable and cost-effective dental practices.

MATERIALS-METHODS: A systematic search was conducted in the PubMed and Scopus databases to identify studies addressing the microbiological and/or mechanical outcomes related to the sterilization and reuse of implant prosthetic components. Inclusion and exclusion criteria were applied to select relevant peer-reviewed articles published between 2000 and 2025. The risk of bias was assessed using the Cochrane Collaboration tool.

RESULTS: Out of 104 initially identified records, 68 were screened by title and abstract, and 32 studies were included in the final analysis. Of these, 24 studies evaluated both microbiological and mechanical aspects of sterilization, while 10 focused on the mechanical effects of reuse. Results indicated that only a combined sterilization protocol—chemical-electrochemical cleaning followed by autoclaving—was consistently effective

in eliminating all biological residues. In contrast, disinfection with sodium chloride alone proved insufficient. Regarding mechanical performance, repeated reuse of implant fittings led to significant wear and deformation, particularly in titanium screws and certain implant analogues, compromising their structural integrity and long-term clinical performance, and thereby limiting the number of safe reuse cycles.

CONCLUSIONS: The reuse of implant prosthetic components may be feasible under strict sterilization protocols. The chemical-electrochemical plus autoclave method shows the highest efficacy in decontamination. However, mechanical degradation remains a critical limitation, suggesting that the number of safe reuse cycles should be strictly controlled, especially for load-bearing components.

Keywords: Reuse, Sterilization, Decontamination, Impression coping, Healing abutment, Implant analog

SS-267 Investigation of the Awareness Levels of Patients Applying to Atatürk University Faculty of Dentistry Regarding Implant-Supported Prostheses and the Factors Influencing This Awareness

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OBJECTIVES: The aim of this study is to evaluate the level of awareness regarding dental implants among patients applying to the Department of Prosthodontics, Faculty of Dentistry, Atatürk University, and to investigate the factors influencing the formation of this awareness.

MATERIALS-METHODS: The study was conducted with 250 voluntary participants aged 18 and above. Participants completed a standardized multiple-choice questionnaire, which included demographic information and assessed their awareness of dental implants, sources of information, and reasons for not preferring implant treatment. The data were analyzed using the chi-square test.

RESULTS: It was found that 53.6% of the participants had awareness of dental implants. A significant relationship was observed between the level of awareness about dental implants and the educational level of the individuals ($p<0.05$). Among those with awareness of dental implants, 54.8% reported that their source of information was the dentist. Additionally, 40.24% of participants indicated that the primary reason for not choosing implant treatment was its high cost.

CONCLUSIONS: The results show that while awareness of dental implants has increased in the population, there are still gaps and misconceptions. In the future, it is crucial for dentists and healthcare institutions to provide more education and information about implant treatment. Addressing the information gap regarding costs and increasing overall awareness are essential. The findings of this study emphasize the need for more structured educational programs.

Keywords: dental implants, implant-supported denture, awareness

SS-268 Effect of Thermal Aging on the Microhardness and Color Stability of CAD/CAM Composite-Based Blocks: A Pilot Study

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OBJECTIVES: The aim of this in vitro study was to evaluate the effect of thermal aging on the microhardness and color stability of computer-aided design-computer-aided manufacturing (CAD/CAM) composite-based blocks.

MATERIALS-METHODS: A composite-based CAD/CAM block (Coltene Brilliant A1 HT 14) was sectioned using a low-speed cutting device, and a total of 10 rectangular-shaped specimens (12 mmx14 mm) were prepared, each with a thickness of 1 mm (n=10). The surfaces of all specimenss were standardized using abrasive papers, then Vickers microhardness values (V1) and optical parameters (L*, a*, b*) were measured. Subsequently, all specimens were subjected to 5000 thermal cycles. After the aging process, Vickers microhardness values (V2) and color measurements were repeated. The color difference (ΔE_{00}) value was determined using the CIEDE2000 formula with the obtained L*, a*, and b* parameters. Statistical analyses were performed using the Shapiro-Wilk test and paired samples t-test. Pearson correlation analysis was conducted between ΔE_{00} and V2 values.

RESULTS: After aging, a statistically significant decrease was observed in the microhardness values (V1=71.52±2.47; V2=64.19±1.83; $p<0.001$). Among the color parameters, only the L* value showed a significant decrease after aging ($p<0.001$). The correlation analysis between ΔE_{00} and V2 values revealed the values of r=-0.278, p=0.437. The mean ΔE_{00} value obtained after aging (ΔE_{00}=1.19±0.34) was found to be below the clinically acceptable threshold (ΔE_{00}=1.8).

CONCLUSIONS: Artificial aging caused a significant decrease in both the microhardness and L* values of CAD/CAM composite-based block. These findings should be considered in terms of the long term esthetic and mechanical performance of the test material in clinical applications.

Keywords: Microhardness, Color stability, Thermal aging, Composite block, CAD/CAM material

SS-269 Immediate Prosthetic Loading in Fully Edentulous Jaws: A Case Series

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INTRODUCTION: Immediate loading of implant-supported prostheses is a contemporary approach in dentistry that enables rapid aesthetic and functional rehabilitation for edentulous patients. This protocol involves the placement of a provisional fixed prosthesis within 48 hours after implant surgery. In this case series, immediate loading was applied in four fully edentulous patients using the All-on-4 and All-on-6 treatment concepts. The study aims to evaluate the clinical effectiveness of immediate loading protocols.

Case description: Four ASA I patients presenting to Fırat University Faculty of Dentistry were included. Comprehensive clinical and radiological evaluations, including CBCT analysis and digital smile design, confirmed suitability for implant therapy. Following multidisciplinary planning, patients were informed about the procedures and potential risks; informed consent was obtained. Two different immediate loading techniques were employed. In the first two patients, conventional complete dentures were fabricated preoperatively. These dentures were adapted and converted into immediate provisional prostheses on the day of surgery. In the other two cases, a splinted impression was taken immediately after implant placement. PMMA provisional prostheses were fabricated on the resulting casts and delivered within 24 hours.

DISCUSSION: Postoperative follow-ups were performed on days 1, 3, 7, 15, and at 1 month. Clinical parameters such as pain, swelling, bleeding, and prosthesis adaptation were assessed. Throughout the 3-month observation period, no biological or mechanical complications—such as peri-implantitis, implant failure, or prosthesis fracture—were observed. This case series indicates that immediate loading is a safe and predictable option in carefully selected patients when clinical protocols are strictly followed. However, further studies with larger sample sizes and longer follow-up periods are required to assess long-term outcomes.

Keywords: Immediate loading, edentulous jaw, All-on-4,All-on-6,Implant-supported fixed prosthesis, PMMA provisional prosthesis

SS-271 The Influence of Demographic Factors on Tooth Translucency: Variations by Race, Gender, and Age

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OBJECTIVE: This study examines the potential association between tooth translucency patterns and demographic variables (age, gender, and race).

MATERIALS-METHODS: This cross-sectional study included 120 participants who were stratified by age, gender, and ethnicity. The sample included five age groups (18–29, 30–39, 40–49, 50–59, and 60–85 years) and equal representation from four ethnic categories (white, black, Asian, and other). Participants were selected based on strict inclusion criteria; all subjects had untreated permanent teeth and no history of bleaching procedures or visible extrinsic or intrinsic discoloration. The statistical evaluation of the findings was performed using a chi-square test with the SPSS 11.0 software program.

RESULTS: According to the results obtained in this study, a significant relationship was found between translucency and ethnicity ($\chi^2(39) = 278.03$, $p < 0.001$). A significant relationship was also found between translucency and gender, although with a weak effect size (Cramer's V = 0.178). A significant relationship was found between translucency and age, with an effect size of Cramer's V = 0.307, indicating a moderate strength of the relationship between age group and translucency.

CONCLUSION: In this study, the translucency values of natural teeth have a significant relationship with the variables of age, gender, and ethnicity. This should not be overlooked when selecting colors and planning treatments in aesthetic dentistry.

Keywords: Dentition, Color, Age Factors,

SS-272 Functional and Esthetic Rehabilitation Using Digital Planning in a Case with Deep Bite and Gummy Smile

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INTRODUCTION: A 42-year-old systemically healthy female presented with multiple missing posterior teeth. The initial treatment plan involved regional fixed prosthetic rehabilitation. However, following cusp fractures on teeth 24 and 25, the approach was revised to include the maxillary anterior teeth to restore harmony and esthetics. To achieve optimal anterior guidance and overjet–overbite relationships, mandibular anterior teeth were subsequently incorporated, resulting in a comprehensive full-mouth rehabilitation strategy. Importantly, the fracture pattern did not indicate parafunctional etiology, and clinical examination of the temporomandibular joints revealed no signs of dysfunction.

Case description: To restore functional balance and reduce excessive gingival display, a vertical dimension increase was proposed. An integrated esthetic-functional protocol was implemented, including gingivoplasty from canine to canine in both arches. The maxillary lateral incisors (exhibiting microdontia) and central incisors underwent endodontic therapy to accommodate prosthetic requirements.

Digital smile design and facially guided wax-up techniques were employed to determine incisal edge positions and smile dynamics. Over an 8-week period, the vertical dimension was gradually elevated using a blueprint occlusal appliance to monitor the patient's adaptation. The patient reported no temporomandibular discomfort or adverse symptoms during this phase.

DISCUSSION: Final prosthetic rehabilitation was achieved using monolithic full-arch restorations, yielding esthetically and functionally stable outcomes. This clinical report underscores the value of adaptive, interdisciplinary treatment planning augmented by digital technologies. The strategic combination of esthetic procedures, vertical dimension management, and precise digital planning facilitated predictable and satisfactory results in both appearance and function.

Keywords: Digital smile design, vertical dimension, gummy smile, deep bite, full-mouth rehabilitation

SS-273 Temporomandibular Disorder and Current Treatment Methods

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INTRODUCTION: Temporomandibular disorders involve the masticatory muscles, temporomandibular joint, and related anatomical structures and include disorders of these anatomical regions.Temporomandibular disorders are the most common type of non-odontogenic orofacial pain and have the potential to produce persistent (chronic) pain. TMJ pathophysiology significantly impacts individuals' ability to perform basic daily life activities and vital functions.Aim of the study the aim this study is to collect and organize information on the diagnosis and treatment of pain in TMD through a literature review.

Material/METHODS: the study was conducted by searching scientifc databases PubMed and Google Scholar for documents published from 2015–2025.The following keywords were used to build the full list of references: TMD, temporomandibular joint, TMJ disorders, relaxing splints, classifications in TMJ, treatment with botox, diagnostic criteria for TMD. The literature review included 42 selected manuscripts, the content of which was important for diagnosis and clinical treatment of TMD.

RESULTS: An accurate diagnosis of TMD forms the basis for appropriate treatment. The most commonly described treatments are occlusal splint treatment and pharmacologic treatment adapted according to the type of TMD. Although current treatments such as botox, arthrocentesis and arthroscopic surgery were preferred for a while, today this approach has been moved away from this approach and protective treatments have been directed. In the treatment of TMJ disorders, it has been observed that splint types are not categorized and a single type of splint (stabilization splint) is adopted.

CONCLUSIONS: Based on the literature review the authors concluded that there is no single ideal form of pain or painless therapy for TMD. Treatment of TMD should be based on a thorough diagnostic process, including the TMD examination protocol, psychological evaluation, and CBCT or MR imaging. Following the diagnostic process, once a diagnosis is established, a treatment plan can be constructed to address the patient's complaints.

Keywords: TMD, temporomandibular joint, TMJ disorders, relaxing splints, classifications in TMJ, TMJ treatment with botox

SS-274 Digitally Driven, Esthetically Defined: Conservative, Predictable, and Functional Solutions with Porcelain Veneers

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This clinical series showcases a range of porcelain veneer applications with varying complexity, illustrating how modern digital technologies enhance both treatment planning and execution. All cases utilized contemporary digital tools to enable accurate visualization and predictable outcomes. Treatments ranged from ultraconservative non-prep veneers to full-arch rehabilitations integrating laminate and occlusal veneer restorations, with particular attention to enamel preservation through minimal or partial preparation protocols. The restorations, fabricated from high-strength ceramics such as lithium disilicate, achieved functional and esthetic success through guided planning, mock-ups, and digital previews that facilitated patient involvement and clinical precision.

This series highlights a shift in porcelain veneer applications from exclusively cosmetic solutions to comprehensive rehabilitative interventions, made possible by the integration of digital workflows. Compared to traditional methods, these approaches offer superior control, consistency, and interdisciplinary coordination. As prosthodontics evolves from conventional protocols to a fully digitized standard, such technology-driven strategies are poised to become an integral part of everyday clinical practice.

Keywords: Lithium Disilicate, Digital Workflow, Minimal Invasive Dentistry, Computer Aided Design

SS-275 Full-Arch Rehabilitation of a Severely Atrophic Edentulous Jaws Using the All-on-Four Protocol: A Case Report

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Implant-supported fixed restorations represent a widely accepted and predictably successful treatment modality for the rehabilitation of completely edentulous patients. However, the long-term success of such interventions is critically dependent on the presence of adequate bone volume and quality. In cases of severe alveolar bone resorption, advanced surgical procedures such as bone augmentation and sinus lift procedures may be required to facilitate implant placement and ensure prosthetic stability. These additional surgical interventions, however, are associated with increased patient morbidity, prolonged treatment duration, elevated financial burden, and a heightened risk of postoperative complications.

To avoid the need for invasive pre-implant surgeries, the “All-on-Four” treatment concept was introduced as a strategic alternative. This protocol entails the placement of two anterior implants in a axial orientation and two posterior implants angulated up to 45 degrees, thereby enabling the support of a full-arch fixed prosthesis. By minimizing cantilever length, this approach allows for the fabrication of a prosthetic restoration comprising 12 teeth. The posterior angulation facilitates optimal engagement of the available anterior bone, thereby eliminating the need for bone grafting while allowing optimal utilization of the residual alveolar bone.

The aim of this case report is to present the successful prosthetic rehabilitation of both the maxilla and mandible in a patient with severe alveolar bone resorption following total tooth loss, utilizing the All-on-4 implant prosthetic concept. This approach involves the strategic placement of four implants in fully edentulous arches to support a fixed full-arch restoration. In the present case, the definitive prosthesis was designed as a porcelain-fused-to-metal (PFM) fixed prosthetic restoration, providing both functional and aesthetic outcomes.

Keywords: Prosthesis, Implant-Supported, Jaw, Edentulous, Prosthodontics

SS-276 Oral rehabilitation of a complicated case with malposed teeth and implants using full digital workflow: A case report

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İNTRODUCTİON: Tooth loss has significant consequences, primarily the phonetic, aesthetic and functional deficiencies and interrelated problems such as the eruption-tilting of adjacent-opposing teeth, malocclusion, interferences, hard-soft tissue loss and periodontal diseases. Edentulism-related problems should be rehabilitated by some removable partial denture and tooth-implant supported fixed partial denture (ISFPD) options. However, a delayed rehabilitation process with advanced tissue loss, such as in the present case, may complicate dental implant placement, restoring malposed teeth using conventional FPDs.

CASE DESCRİPTİON: This case report describes the rehabilitation of a partially edentulous patient who referred to our clinic with complaints of pain, oral hygiene problems, aesthetic and function. Tooth and implant-supported full arch FPDs with digital workflow have been applied using contemporary hybrid monolithic zirconia materials-restorations with the help of real view photography (2D) and preoperative additional scan data (3D) guidance. A hybrid cement-screw retained zirconia ISFPDs (Toronto Bridge) were fabricated for the malposed implants in the buccal-apical position.

DİSCUSSİON: Digital workflow applications with additional scanning and image guidance are highly successful in achieving predictable aesthetic and functional results in complex full-mouth restorations with malposed, worn, discoloured teeth and malpositioned implants. Monolithic zirconia with polychromatic-layered and hybrid content is an aesthetically and functionally satisfactory restorative material with easy and predictable results in the rehabilitation of complicated cases.

Keywords: Partial edentulism, digital workflow, hybrid restoration, Toronto bridge, monolithic zirconia.

SS-277 Diagnosis and Individualized Management of TMJ Synovitis with Secondary Symptoms: A Case Report

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INTRODUCTION: Temporomandibular disorders (TMD) affect about one-third of the adult population and represent a broad group of musculoskeletal conditions involving the temporomandibular joint (TMJ) and associated structures. Inflammatory joint disorders arise when the TMJ and adjacent tissues become inflamed due to trauma, functional disturbances, or systemic diseases. Synovitis, characterized by inflammation of the synovial membrane, typically causes significant pain, swelling, and restricted jaw movements. This case report discusses the diagnosis and management of two distinct patients presenting with synovitis, accompanied by chronic disc displacement without reduction and secondary myalgic pain.

Case description: This case report presents two female patients with persistent, severe unilateral TMJ pain and restricted jaw function lasting more than one month. Diagnosis was made through diagnostic criteria temporomandibular disorders (DC/TMD) questionnaire and magnetic resonance imaging (MRI) findings, confirming synovitis with chronic disc displacement without reduction and myalgic pain. Both patients underwent a three-month treatment protocol, combining pharmacological and occlusal splint therapy. After three months, clinical reassessment and questionnaire evaluations were performed. While one patient showed significant improvement, the other had limited relief and restricted functional movements necessitating arthrocentesis. Splint therapy continued after the procedure. At the six-month follow-up, clinical and radiological outcomes were re-evaluated.

DISCUSSION: MRIs and the DC/TMD form are crucial for the accurate diagnosis of arthrogenic TMDs. The presence of secondary conditions like myalgic pain complicates the management and emphasizes the need for continuous follow-up with different treatment combinations. Conservative therapy should be the first-line treatment. When insufficient, minimally invasive interventions like arthrocentesis should be considered. Even among patients with similar clinical findings, individualized treatment plans are essential. In this case series, the patient who showed limited response to conservative therapy benefited from arthrocentesis. The combination of pharmacological treatment, arthrocentesis and continued occlusal splint therapy enhanced treatment effectiveness, reduced symptoms, and improved patient satisfaction over time.

Keywords: synovitis, temporomandibular disorders, arthrocentesis, occlusal splint

SS-278 Effect of Dietary Solvents and Cleansers on Color Stability of Denture Teeth

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OBJECTIVES: This study aimed to evaluate the degree of discoloration in different denture teeth materials following exposure to various dietary solvents and to assess the effectiveness of two denture cleansers—sodium hypochlorite and Corega—in restoring color.

MATERIALS-METHODS: A total of 120 samples were prepared, comprising 40 specimens each of porcelain, isosit, and acrylic denture teeth. Initial color measurements (T0) were obtained using a spectrophotometer following a 24-hour immersion of all samples in distilled water at room temperature. The samples were subsequently randomized into four subgroups and exposed to distinct dietary solvents: distilled water, heptane, citric acid, and an ethanol-water mixture. After a 24-hour incubation period at 37°C, subsequent measurements (T1) were recorded. The samples were then further subdivided and subjected to cleaning using either Corega denture cleanser or sodium hypochlorite prior to the final measurements (T2). Color differences were calculated utilizing the CIEDE2000 formula to determine the values of ΔE1-0, ΔE2-0, and ΔE2-1. A statistical significance threshold was established at $p < 0.05$.

RESULTS: The type of dietary solvent, the material of denture teeth, and their interaction exhibited statistically significant effects on ΔE1-0 ($p < 0.05$). The highest level of discoloration (ΔE1-0 = 1.562) was recorded in acrylic teeth subjected to ethanol exposure, while the lowest level (ΔE1-0 = 0.506) was observed in porcelain teeth maintained in distilled water. In terms of cleaning efficacy, the minimum ΔE2-0 value (0.240) was noted in porcelain teeth exposed to ethanol and subsequently cleaned with Corega.

CONCLUSIONS: The levels of discoloration exhibited variability that was contingent upon both dietary exposure and the material composition of the denture teeth. Porcelain denture teeth demonstrated a greater degree of color stability. Additionally, the Corega cleanser was found to be particularly effective in mitigating discoloration, especially in samples exposed to ethanol.

Keywords: denture teeth, dietary solvents, denture cleansers

SS-279 Evaluating Reliability, Usefulness, and Quality of Chatbots in Temporomandibular Disorders

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OBJECTIVES: This study aimed to evaluate the reliability, utility, and overall quality of responses generated by five distinct chatbots—ChatGPT, Gemini, Copilot, DeepSeek, and Grok—regarding temporomandibular disorder (TMD)-related inquiries presented by patients to dental professionals and artificial intelligence tools.

MATERIALS-METHODS: Two independent researchers administered a set of ten identical temporomandibular disorder (TMD)-related inquiries to each chatbot, derived from actual patient questions posed to dental professionals and artificial intelligence. These inquiries were presented over a period of three distinct days (Day 1, Day 2, and Day 3). The responses were assessed utilizing the Likert-type Reliability Score Scale (RSS), the Usefulness Score Scale (USS), and the Modified Global Quality Scale (mGQS). Each response was evaluated independently, and aggregate scores were computed for each scale and chatbot at each time interval. Statistical analysis was performed with a predetermined significance level set at $p < 0.05$.

RESULTS: A notable variation in the reliability scores was identified across the three evaluation time points ($p<0.05$). The highest Reliability Scale Score (RSS) of 60 was recorded on Day 1 in responses provided by Grok to inquiries originally addressed to dentists. Conversely, the lowest Usefulness Scale Score (USS) of 19 was observed on Day 3 in Copilot's responses to questions directed towards artificial intelligence. Throughout the three-day evaluation period, DeepSeek consistently attained the highest modified global quality scores, with statistically significant distinctions in comparison to other chatbots.

CONCLUSIONS: The study highlights the temporal variability in the reliability of chatbot responses. Grok exhibited the highest reliability for responses that emulate professional dental advice, whereas DeepSeek surpassed all other platforms in terms of overall response quality. These findings indicate that, while AI tools are advancing, their performance regarding healthcare-related inquiries is inconsistent and must be interpreted with caution, contingent on the specific platform utilized and the timing of the interaction.

Keywords: chatbots, temporomandibular disorders, reliability

SS-280 Immediate loading of implants placed by guided surgery with maxillary and mandibular all-on-4 technique: a case report

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INTRODUCTION: Guided implant surgery ensures precise implant placement using 3D imaging and computer planning, enhancing outcomes. The All-on-4 technique optimizes support with two axial and two tilted implants, enabling immediate loading for rapid functional results.

Case description: A 49 years old male patient with edentulous maxillae and mandible with two existing dental implants is presented. Maxillary and mandibular dentures were used for surgical guide planning. Composite radiopaque markers on the polished surfaces and light-body silicone in the intaglio surface of the dentures were extraorally scanned at the same time. Subsequently, CBCT scans were taken with the dentures. All scan data and CBCT images were digitally superimposed to accurately align soft tissue, denture position, and bone anatomy. Based on this hybrid dataset, surgical guides were designed and 3D printed. The printed guides were prepared for clinical use. Following the All-on-4 concept, four maxillary implants were placed using the 3D-printed guides, while the two existing implants in the mandible were utilized and two tilted mandibular implants were placed. All implants achieved primary stability over 35 Ncm. For immediate loading, the patient's existing dentures were converted into screw-retained provisional prostheses.

DISCUSSION: Complete dentures with optimal tooth set-up and vertical dimension served as references for surgical guide design. In cases that have anatomically limited bone structure, this approach ensures optimal implant positioning and minimizes prosthetic and surgical complications. Guided implant surgery offers precise, minimally invasive treatment with high survival rates and minimal bone loss. Computer-assisted implant placement enhances predictability, reducing patient discomfort and improving outcomes. The CBCT data, combined with dentures, enabled precise virtual planning and guide fabrication. The flapless approach reduced tissue trauma and postoperative problems. Immediate loading further enhanced efficiency and patient satisfaction, eliminating removable prostheses.

Keywords: immediate loading, guided surgery, implant

SS-281 Evaluation of complete dentures fabricated by second-year dental students in preclinical laboratory: A quantitative analysis based on eight criteria

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AIM: This study aimed to evaluate the quality of complete dentures fabricated by second-year dental students in a preclinical setting using specific criterias and to determine whether there were statistically significant differences among the criteria and between upper and lower dentures.

MATERIALS-METHODS: A total of 100 complete dentures were scored on a 5-point Likert scale (1 = insufficient, 5 = competent) based on the following criteria:

1. Tooth size selection
2. Esthetics of anterior teeth
3. Homogeneous and appropriate base plate thickness
4. Base border extension
5. Tooth arrangement accuracy
6. Absence of porosities
7. Polishing and finishing quality
8. Anatomical conformity of the denture base

Mean scores, success rates and statistical comparisons were conducted. Mann-Whitney U test was used for comparing upper and lower denture scores.

RESULTS: The overall mean scores varied across criteria, the highest mean score was recorded for the criterion of base plate thickness (6.82), while the lowest mean score was observed in the esthetic arrangement of anterior teeth (3.64). Success rates (scores 3-4–5) ranged from 13.33% to 45.19% depending on the criterion. No statistically significant differences were found among the criteria. However, a significant difference was found between upper and lower dentures in the "tooth arrangement" criterion ($p = 0.0024$).

CONCLUSION: The findings show that students performed better in selecting appropriate tooth sizes. However, tooth arrangement was a major challenge, especially in maxillary dentures. Higher scores in mandibular dentures may be due to the anatomical uniformity and clearer morphology of the mandibular arch, which aids alignment. According to this study, students need further improvement in tooth arrangement skills.

Keywords: Complete denture fabrication, dental education, preclinical laboratory training, tooth arrangement accuracy, prosthodontics assessment

SS-282 Prosthetic Rehabilitation of an Edentulous Maxilla Using an Intra-Bar Reinforced Monolithic Zirconia Restoration: A Case Report

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INTRODUCTION: Patients with high occlusal forces pose a significant challenge in implant-supported prosthetic rehabilitation due to an increased risk of complications such as fractures and wear of artificial teeth. Monolithic zirconia restorations are widely used for their high strength and aesthetic properties; however, their inherent brittleness makes them a concern in such cases. Recent studies have shown that monolithic zirconia, while exhibiting excellent strength, may still be susceptible to failure under extreme masticatory forces if not properly supported.

Case description: A 52-year-old male patient with no systemic conditions presented to the clinic with the complaint of edentulism in the maxilla. Clinical examination revealed that the only remaining tooth in the maxilla was tooth #17. The patient had previously used a removable partial denture but experienced recurrent fractures and wear in the prosthetic teeth and denture base, attributed to high occlusal forces. Following clinical and radiographic evaluations, a fixed implant-supported prosthesis was planned. Four implants were placed in the maxilla, and a full-contour monolithic zirconia prosthesis was designed. Conventional impressions were taken, and the workflow continued digitally. A virtual design was created to fulfill the patient's esthetic demands. To enhance structural integrity, a custom-designed intra-bar was added beneath the zirconia framework during the digital design phase. The bar was carefully adapted within the internal contours of the prosthesis, supporting even occlusal load distribution. Following occlusal adjustments, the prosthesis was torqued into place. At the one-year follow-up, no complications were observed.

DISCUSSION: This case demonstrates that reinforcing monolithic zirconia restorations with an intra-bar provides an effective strategy for managing high occlusal forces in edentulous patients. The combination of digital precision, esthetics, and structural reinforcement may support long-term clinical success, especially in patients with parafunctional habits.

Keywords: Monolithic zirconia, intra-bar, bruxism.

SS-283 Prosthetic Rehabilitation of Patients with Reduced Vertical Occlusal Dimension: Three Case Report

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INTRODUCTION: Reduction in vertical occlusal dimension is a complex clinical condition that usually occurs due to excessive attrition, abrasion or long-term tooth loss. This condition may negatively affect the patient's jaw structure, speech and facial aesthetics. Rehabilitation with prosthetic restorations offers an effective solution to restore the lost function and form in such patients.

Case Presentations: Case 1: A 45-year-old-female patient presented to the Department of Prosthodontics at Inonu University. Clinical and radiographic evaluation revealed a fully dentate maxilla and a completely edentulous mandible. Six-implants were inserted in the mandibular arch, followed by the placement of an implant-supported fixed dental prosthesis. The reduced vertical dimension was successfully reestablished. Case 2: A 48-year-old-male patient presented with concerns regarding aesthetics and function. Clinical and radiographic examinations revealed partial tooth loss, deep bite and decreased vertical dimension. Full arch fixed restorations were planned for both jaws. After tooth preparation, temporary restorations were placed for 6 weeks until the final restorations were delivered. Permanent restorations were made. The patient experienced improvement in both aesthetics and vertical dimension. Case 3: A 70-year-old-male patient presented with both functional and aesthetic complaints, including partial edentulism in the maxilla and pronounced occlusal wear on the remaining dentition in both arches. Considering the posterior tooth loss and the patient's preference, a treatment approach incorporating both fixed and removable partial dentures was formulated. During preparation, severely worn teeth were brought to ideal size with composite restorations to achieve appropriate crown height. The patient was rehabilitated with provisional dentures for 8 weeks and then fixed and removable final dentures were applied. Lost functions and esthetics were restored.

CONCLUSION: The restoration of vertical occlusal dimension represents a critical component of comprehensive prosthetic rehabilitation. Well-designed prosthetic restorations that fulfill both functional and aesthetic requirements can substantially enhance oral equilibrium and quality of life.

Keywords: Occlusal vertical dimension, implant-supported fixed prosthesis, full-arch fixed prosthesis

SS-284 Multidisciplinary Management of Amelogenesis Imperfecta: A Comprehensive Case Report

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INTRODUCTION: Amelogenesis imperfecta (AI) is a rare hereditary developmental condition characterized by defective or absent enamel formation in both primary and permanent dentition, resulting from abnormal differentiation or function of ameloblasts. The reported prevalence in Turkey was 0.43% and 0.08%. AI can be classified into three categories: hypoplastic, hypomaturation and hypocalcified types. Case Description. A 19-year-old female patient presented to the Erciyes University Faculty of Dentistry Department of Orthodontics with a chief complaint of dental crowding and discoloration. Following clinical examination, the patient was diagnosed with amelogenesis imperfecta, hypomaturation type. Panoramic X-ray revealed an enamel layer that was difficult to distinguish from the dentin due to similar radiopacity. There was no relevant family history. After the restoration of caries, fixed orthodontic treatment including extraction of the maxillary second premolars was performed to correct the malocclusion(Angle Class-II). Upon completion of orthodontic therapy, metal-ceramic crowns were planned for all teeth due to the patient's aesthetic concerns and the structural loss of several teeth resulting from abrasion and caries. Crown lengthening was performed on the molar teeth to compensate for the reduced crown heights caused by abrasion. The posterior teeth were restored first, followed by the anterior teeth to maintain the existing occlusal relationship, as the vertical dimension of occlusion was within the normal range. The patient found the final restorations satisfactory. At the one-year follow-up, the restorations were clinically successful. Discussion. Successful fixed orthodontic treatment requires a well-prepared tooth surface to ensure adequate adhesive bond strength. However, the fragile enamel characteristics and reduced crown height complicate the bonding of brackets or bands. In addition to tooth defects, AI is associated with skeletal anomalies such as Angle Class-II and Class-III. Treating patients with AI not only enhances functional and aesthetic outcomes but also contributes positively to their psychological well-being.

Keywords: Amelogenesis Imperfecta, enamel defect, fixed dentures

SS-285 Prosthetic rehabilitation of patients with maxillary defects

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INTRODUCTION: Three patients were referred to the prosthodontic clinic; two of them had palatal defects following tumor resection, and one had a palatal defect associated with congenital cleft lip and palate.Patients are having problems with eating, speaking and aesthetic due to the defect.

Case Reports: The first case was a 74-year-old male patient who presented with a defect resulting from tumor resection in the palatinal region. Based on the first impression, a custom tray was fabricated for the patient. The borders of the tray were extended by border molding to include the defect, and a secondary impression was taken. A baseplate was constructed on the master cast. Teeth were arranged in accordance with the patient's vertical dimension. The dentures was finalized and provided to the patient following try-ins. The second case was a 64-year-old female patient with a complex palatinal defect following tumor resection. The first impression was taken using the smallest impression tray used in pediatric dentistry. The secondary impression was made with a custom tray, the borders of which were extended. Baseplate were prepared on the master cast to determine the vertical dimension, followed by tooth arrangement. The dentures was completed and delivered. The third case was a 71-year-old male patient with congenital cleft lip and palate. Treatment began with the preparation of the lower teeth. A custom tray was fabricated based on the upper jaw impression. Border molding was used to take the secondary impression, followed by the construction of the baseplate. Teeth were arranged according to the patient's vertical dimension.The dentures was completed after try-ins.

DISCUSSION: No complications were encountered during the follow-up of the three treated patients. Successful rehabilitation in patients with maxillary defects is possible through careful impression techniques, individualized planning.

Keywords: maxillary defect, impression, function

SS-286 Dry Needle Treatment for Acute Temporomandibular Disorders (TMD): A Clinical Perspective

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OBJECTIVE: This study aims to evaluate the short-term effects of dry needling treatment on masticatory muscle activity in patients with acute temporomandibular disorders (TMD). Electromyographic (EMG) signals were recorded bilaterally from the temporal (TR, TL) and masseter (MR, ML) muscles under REST and CLENCH conditions before and after treatment.

METHODS: A total of 20 patients diagnosed with acute TMD underwent a single-session dry needling intervention. EMG data were collected before and after treatment, focusing on TR, TL, MR, and ML muscle activity. Wilcoxon signed-rank tests were employed to determine the significance of changes in muscle activity post-intervention under both REST and CLENCH conditions.

RESULTS: No statistically significant differences were found between the 'Before' and 'After' measurements in any muscle under REST or CLENCH conditions ($p > 0.05$ for all comparisons). For example, in the TR muscle under REST condition, the mean EMG activity slightly increased from 2.11 to 2.19 ($p = 0.658$). In the TR muscle during CLENCH, the mean decreased from 178.84 to 83.31 ($p = 0.128$), suggesting a trend toward improvement, but not reaching statistical significance.

CONCLUSION: Although numerical differences were observed in EMG readings after dry needling, these changes were not statistically significant. These findings suggest that a single dry needling session may not yield immediate measurable effects on muscle activity in acute TMD cases. Future research with larger sample sizes and multi-session interventions may provide further insights into the efficacy of dry needling in TMD management.

Keywords: Temporomandibular Disorders, Dry Needling, Electromyography, Masseter, Temporal Muscle, Muscle Activity

SS-287 Evaluation of Undergraduate Dental Students' Awareness of Intraoral Scanners and 3D Printing Technologies

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OBJECTIVES: Digital innovations are rapidly transforming dental practice. However, a comprehensive understanding of students' familiarity with and knowledge of these technologies across different educational levels remains limited. This study aims to assess the awareness, knowledge, and perceptions of undergraduate dental students regarding intraoral scanners and three-dimensional printing (3DP) technologies.

MATERIALS-METHODS: A cross-sectional study design was employed to gather data from dental undergraduates at Lokman Hekim University, Faculty of Dentistry, following ethical approval (Approval Code: 2024272, Decision No: 2024/280, Date: 29.11.2024). A Google Forms survey link was distributed via email to 4th and 5th year students (n=146), all of whom completed the questionnaire. A validated 24-item online questionnaire assessed demographics, theoretical knowledge, practical experience, and perceptions of the future relevance of these technologies. The collected data were subjected to descriptive statistical analysis, and chi-square testing was conducted to assess correlations based on academic year, knowledge, and practice.

RESULTS: The analysis of 146 responses revealed variability in awareness and knowledge levels. Both 4th and 5th year students demonstrated moderate knowledge of intraoral scanners, with statistical analysis indicating no significant difference between these groups ($p>0.05$). However, overall knowledge of 3DP technology was low. 5th year students had significantly higher participation in digital technology courses and seminars ($p<0.05$). Regarding keeping up to date with the literature, a significant difference was observed ($p<0.05$): 61.8% of 4th year students reported "never" reading related articles, whereas 51.4% of 5th year students reported "rarely" doing so. Despite these gaps, all participants acknowledged the high importance of these technologies in modern dentistry.

CONCLUSIONS: These findings highlight the need to enhance educational content and clinical exposure related to digital technologies in dental curricula. Strengthening both theoretical instruction and hands-on experience is essential to prepare students for real-world applications and to support curriculum development in line with technological advancements.

Keywords: Three-dimensional printing, intraoral scanners, digital dentistry, knowledge, dental education, student perception

SS-288 Prosthetically Driven Digital Implant Workflow with 3D Evaluation of Contact and Seating Position

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INTRODUCTION: Prosthetically driven implant planning is a well-established modern dental approach that optimizes implant positioning according to restorative needs. When guided by a precise prosthetic plan, correct implant placement can minimize biological and mechanical complications, provide appropriate occlusion, and improve long-term functional and esthetic outcomes.

Case description: A 58-year-old female patient presented with an edentulous gap at the site of a maxillary left first premolar. Clinical examination and cone beam computed tomography (CBCT) confirmed the feasibility of implant placement. To facilitate treatment and reduce clinic visits, a fully digital, multidisciplinary workflow was implemented, including guided implant surgery and immediate provisional placement. Intraoral scans and a virtual provisional crown design were obtained during the initial appointment. Based on the prosthetic design and CBCT data, a static surgical guide was generated digitally to guide implant placement. A screw-retained polymethylmethacrylate crown was milled and cemented onto a titanium abutment to prepare the provisional restoration. During the second visit, a 4.0 x 10.0 mm bone-level implant (NeoBiotech) was placed with a torque of 35 N·cm, followed by the immediate loading of the provisional crown. Postoperative radiographic imaging confirmed ideal three-dimensional implant positioning. The interproximal contacts and occlusion were evaluated through a combination of clinical and digital methodologies. Quantitative analysis was performed using reverse engineering software (Geomagic Control X). The analyses revealed clinically acceptable proximal contact between the fabricated crown and the designed crown data.

DISCUSSION: This case demonstrates that guided implant surgery combined with immediate provisional placement in the posterior maxilla can increase treatment predictability, reduce the treatment time, and improve patient comfort. In addition, 3D analysis methods enable the meticulous evaluation of contact precision and prosthetic congruence, thereby substantiating the merits of a comprehensive digital methodology in implant dentistry.

Keywords: Digital Workflow, Computer-Assisted Surgery, Immediate Dental Implant Loading, Three-Dimensional Imaging, Prosthodontics, Dental Prosthesis Design

SS-289 Evaluation of Trainers Perspective on Metaverse Applications in TMJ Education

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The use of metaverse-based applications for educational purposes is increasingly growing today. With the development of technology, simulation-based education have replaced traditional methods. Some 3D structures, such as anatomy, neuroanatomy, and temporomandibular joint anatomy are challenging to learn through traditional educational methods. The aim of this study is to examine the perspective of instructors on metaverse applications in TMJ (Temporomandibular joint) education and to examine the change of perspectives before and after trying a TMJ training application produced in a metaverse environment with virtual reality headset (Oculus Meta Quest 2, Reality Labs, Meta Platforms Inc., California, ABD). For this purpose, the groups participating in the study were determined by Power analysis, and the sample size was set to n=40. A feedback questionnaire and a metaverse application opinion questionnaire were applied to the instructor group from four different disciplines (orthodontics,prosthodontics, oral and maxillofacial surgery, radiology). The metaverse-based temporomandibular joint training used in study was developed by Medeasoft (TMJ models, Medeasoft, Turkey) and created with eight persons of group including researcher. The feedback and metaverse application opinion surveys used at the end of the training were designed based on references from flight simulation and neuroanatomy education in virtual reality, as there were no other studies using metaverse in TMJ education in the dental field. The analysis results showed that instructor had a positive view of using metaverse-based applications in education. Instructors in the prosthodontics department, as the training included more topics related to their field, had a more favorable opinion of the application compared to others. The most frequent negative feedback regarding the use of the application was that the virtual reality headset caused discomfort due to its weight.Due to technical limitations and costs, metaverse-based applications will not replace traditional education. However, they will offer significant benefits when used as a complementary educational tool alongside traditional methods in dental education.

Keywords: TMJ, Metaverse, Education

SS-290 Effects of Repeated Firings on Color Stability of CAD-CAM Ceramics

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The aim of this in vitro study was to investigate the effect of repeated firing on color differences (ΔE_{00}) with lithium disilicate glass ceramics. Fourty eight rectangular specimens (14 mm x 16 mm, 1.2 mm thickness) were cut from pre-crystalize computer-aided design-computer-aided manufacturing (CAD-CAM) blocks (Vita Suprinity (VS), VITA Zahnfabrik BAD Sackingen, Germany; IPS e.max CAD (EM), Ivoclar Vivadent, Schaan, Liechstein and Amber Mill (ABM), Haas Corp., South Korea). All specimens were subjected to glazing procedure and they were divided into four groups according to the numbers of firings (control group, 2F, 3F and 5F). After finishing firing cycles for each group, all specimens ultrasonically cleaned. The Commission Internationale de I' Eclairage (CIE) L*, a* and b* values were measured using a digital spectrophotometer. Each specimen was measured at 3 different locations and the mean value calculated. Normal distribution was examined with skewness and kurtosis (±3) coefficients. To evaluate the effects of material type and firing protocol on color change values that deviated from normal distribution, a Two-Way Robust ANOVA was used. While the effects of material type and number of firings on the ΔE values were statistically significant (p<005), the interaction between material type and number of firings was not found to be statistically significant (p>005). ΔE_{00} values were EM=0,27±0,211, VS=1,15 ±0,683, and AMB=1,2 ±0,728. Except for EM, the color change of all material groups was exceeded thevisually perceptible threshold value (ΔE_{00}>0.81). ΔE00 values were lower than the clinically acceptable limit (ΔE_{00} < 1.77). The repeated firings can affect the ΔE of CAD-CAM materials. Therefore, unnecessary firing cycles should be avoided, all intraoral adjustments should be completed prior to the final firing.

Keywords: lithium disilicate, repeated firings, color differences

SS-291 Evaluation of tensile bond strength between impression materials and custom-tray resins fabricated by different methods

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OBJECTIVES: Sufficient tensile bond strength (TBS) between the tray and the impression material is a critical factor for a successful restoration. The aim of the study was to evaluate the TBS of different elastomeric impression materials to custom tray materials fabricated by different techniques.

MATERIALS-METHODS: Three different tray materials, 3D-printed tray resin (3DP), self-cure acrylic resin (SC) and light-cured acrylic resin (LC), were produced as rectangular prisms (10×10×20mm³). Two additional silicone materials (Variotime Monophase, Kulzer GmbH (KS) and Express XT Penta Putty, 3M ESPE (PS)) and two polyether materials (Impregum Penta; 3M ESPE (IP) and Monophase; 3M ESPE (MP)) with 3 mm thickness were applied between two rectangular prism tray specimens after the recommended tray adhesive (Universal Adhesive, Kulzer GmbH and Polyether Adhesive; 3M ESPE) application. Twelve subgroups were formed with three different tray materials and four different impression materials (n=10). TBS data were recorded by universal testing device (Instron). Generalized linear models, Mann Whitney U test and Kruskal Wallis tests were applied (p<0.05).

RESULTS: Impression materials had a significant effect on the TBS (p<0.001), whereas tray materials (p=0.152) and their interactions (p=0.066) did not. 3DP, SC and LC tray materials did not have significantly different TBS values (p=0.464). Silicone impression materials had significantly higher TBS values than polyether impression materials (p<0.001). There were no significant differences between silicone PS (0.311 MPa) and KS (0.285 MPa) materials (p>0.05), and polyether IP (0.042 MPa) and MP (0.040 MPa) materials (p>0.05).

CONCLUSIONS: Custom tray resin materials did not differ in terms of their impression material adhesion. Additional silicone impression materials had superior tray adhesion compared to polyether impression materials. Both additional silicone materials exerted similar TBS values, as both polyether impression materials had similar TBS values.

Keywords: 3D Printing, Custom Tray, Dental Impression Material, Tensile Bond Strength.

SS-292 Marginal Fit of Laminate Veneers prepared from Various Materials

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PURPOSE: The marginal fit of laminate veneers (LVs) fabricated through digital workflows is a clinical concern. The aim of this study was to evaluate the influence of restorative material and cementation on the marginal fit of LVs. Additionally, the impact of zirconia on the marginal fit of LVs as evaluated.

MATERIALS-METHODS: Fifty maxillary central teeth were prepared, and LVs were fabricated using resin nano-ceramic (Cerasmart), lithium disilicate (IPS e.max CAD), and translucent zirconia (Katana UTML) sintered at three speeds (conventional, speed and high speed) as per manufacturer instructions forming the following groups: Cerasmart (CE), IPS e.max CAD (EM), Katana UTML conventional sintering (KA-CS), Katana UTML speed sintering (KA-SS), and Katana UTML high-speed sintering (KA-HSS). Lithium disilicate specimens were fully crystallized in a porcelain furnace. Before cementation, images of the marginal gap between the LVs and the teeth were captured at standardized locations using a stereomicroscope at ×40 magnification. Cementation of the LVs was performed according to the manufacturer's recommendations using (Panavia Veneer LC) and post-cementation marginal gaps were recorded using the same method. Statistical analysis was conducted using two-way ANOVA and Bonferroni *post hoc* tests (SPSS v24 software, α =.05).

RESULTS: The total mean marginal gap value in the EM group (116.5±17.5μm) was significantly higher than the other groups ($p<.05$) except for the KA-CS group (107.6±6.6μm) ($p=.167$). No significant differences were observed among the CE (101.8±12.3), KA-CS (107.6±6.6μm), KA-SS (101.5±10.7), and KA-HSS (98.8±16.1) groups ($p>.05$). Total mean marginal gap values significantly increased after cementation in all groups ($p<.05$).

CONCLUSION: The marginal fit of LVs was influenced by the manufacturing processes of the dental materials. Sintering speed did not have a significant effect on the marginal fit of zirconia LVs. However, cementation significantly increased the marginal gap in all LVs.

Keywords: Dental materials, Ceramics, Dental Marginal Adaptation, Dental veneers, Sintering Speed

SS-293 Evaluation of Dental Students' Clinical Self-Efficacy and Perceptions About Prosthetic Dentistry Practices

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OBJECTIVES: This study aimed to assess the clinical self-efficacy levels and perceptions of senior dental students regarding prosthetic dentistry practices at Marmara University. The investigation focused on how theoretical knowledge and preclinical training translate into clinical competence and how emotional and cognitive factors—such as anxiety, lack of experience, and fear of unexpected situations—affect students' confidence during clinical internships.

MATERIALS-METHODS: A descriptive, cross-sectional survey was conducted with 100 fifth-year dental students enrolled in the prosthetic dentistry internship program. Data were collected using structured questionnaires developed by the researchers, including sections on sociodemographic variables, self-reported emotional states, perceived clinical competency. Statistical analysis was carried out using t-tests and ANOVA, with a significance level set at $p<0.05$.

RESULTS: Students who found their theoretical knowledge sufficient scored significantly higher than those who did not find it sufficient ($p=0.012$). The scores of students who are not afraid of individual patient treatment are significantly higher than those who are afraid ($p=0.001$). Students who perceived their theoretical knowledge as adequate, who did not experience anxiety during specific procedures, and who were not afraid of performing individual treatments scored significantly higher in self-efficacy. Furthermore, emotional state was a strong predictor: students who reported feeling calm during the internship had the highest performance scores, while those reporting anxiety scored the lowest. Students who did not feel anxiety scored significantly higher compared to those who heard ($p<0.001$).

CONCLUSIONS: The clinical success of dental students is not only depended on technical talents but also emotional preparation. These findings underscore the need for emotionally supportive, feedback-based clinical environments tailored to address students' psychological readiness and skill development.

Keywords: Dental education, clinical self-efficacy, clinical performance

SS-294 Evaluation of the Reasons for Replacement of Fixed Prosthetic Restorations

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OBJECTIVES: Fixed prosthetic restorations aim to meet patients' functional and aesthetic needs. The clinical success of the materials used is closely related to their long-term survival in the oral environment. The aim of this study is to evaluate the reasons for the necessity of replacement in patients who presented to our clinic with an indication for fixed prosthetic restoration replacement.

MATERIALS-METHODS: In this study, fixed prosthetic restorations in 395 patients over 18 who applied to the Departments of Oral and Maxillofacial Radiology and Prosthodontics at Istanbul Medipol University Faculty of Dentistry were evaluated by at least two experienced researchers using the Modified USPHS criteria. Additionally, patients' demographic characteristics and factors related to restoration materials were examined. Statistical analysis was performed, and the Chi-square test applied to identify variables related to the restoration and the patient.

RESULTS: Of the 395 patients included in the study, 61% were female and 39% were male. It was found that the need for restoration replacement was higher in women aged 46–65 with lower educational levels. According to the evaluation based on the dentists' level of specialization, the highest rate of restoration replacement indication(44%) was found in restorations performed by general dentists without specialization ($p = 0.045$). According to the data obtained, bridge restorations had the highest replacement rate at 54% ($p = 0.013$). In terms of location, restorations in the posterior mandible showed a higher number of replacement indications.

CONCLUSION: Demographic characteristics of patients should be considered in prosthetic treatment planning. Patients with prosthetic restorations should be regularly monitored through cooperation between the dentist and the patient. Additional recommendations should be provided due to the high bite forces in the posterior region and the difficulty of accessing this area despite regular brushing.

Keywords: bridge replacement, crown replacement, modified USPHS criteria, fixed prosthetic restoration

SS-295 Attitudes and Perceptions of Dentists Towards Artificial Intelligence in Türkiye: An Online Survey Study

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OBJECTIVES: Artificial intelligence (AI) is a current and rapidly growing topic, with its popularity and daily use increasing steadily. This study aimed to evaluate the attitudes and perceptions of dentists in Türkiye toward AI, and to provide insight into their opinions and the frequency of its use in clinical practice.

MATERIALS-METHODS: A 26-question survey was developed using Google Forms and distributed online to dentists. It included sections designed to assess their knowledge and attitudes regarding AI and its potential applications in dentistry. Participation was voluntary, and anonymity was maintained.

RESULTS: A total of 428 dentists (288 female, 140 male) participated in the study, with a mean age of 32.7 ± 7.8 years and an average professional experience of 9.4 ± 7.7 years. About 65.4% had basic knowledge of AI technologies ($p < 0.001$), while 51.4% reported awareness of AI use in dentistry ($p = 0.562$). Only 28% actively used AI in practice, primarily for radiographic evaluation (50%), diagnosis (43.3%), and smile design (40%) ($p < 0.001$). ChatGPT and its versions were the most commonly used AI tools (87.2%). Most participants (85%) accessed AI applications via social media. While 88.8% believed AI would contribute significantly to dentistry and medicine ($p < 0.001$), only 11.2% thought it could replace dentists, and 81.3% disagreed ($p < 0.001$). Additionally, 80.4% and 86.9% supported including AI-related content in undergraduate and postgraduate dental education, respectively.

CONCLUSIONS: Although participants have basic knowledge of AI, its use in dental practice remains low. Given the topic's relevance and positive future outlook, AI is expected to become more common in the coming years. Further follow-up and multinational studies are recommended.

Keywords: artificial intelligence, attitudes, awareness, dentist

SS-296 Treatment of Low Vertical Dimension All-One-4 Case with Different Type of Clinical Approach

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PURPOSE: This case report presents the rehabilitation of a previously treated patient with fixed metal-ceramic double full arch rehabilitation with an all-on-4 technique and full digital workflow. It also emphasizes the importance of different methods and rehabilitation in clinical success, apart from the standard conventional and digital workflow. CASE: A 45-year-old male patient applied to our clinic with the request of prosthetic dental treatment with many complaints such as low vertical dimension, headache, esthetics, speech and anxiety. Intraoral examination revealed that both maxilla and mandible were severely atrophic. No pathology was detected in radiographic and clinical evaluation of implants. Both jaws had implant-supported fixed metal-ceramic prostheses made with all-on-4 protocol. Implant system (Megagen ST) impression and prosthesis parts were not available in our clinic and it was learned that there were no prosthesis structures and digital library suitable for the digital workflow of this system. Due to the absence of a digital library, multi-unit abutment diameters and shapes were examined and their measurements were made. The obtained data were compared with digital libraries belonging to different implant companies. It was determined that IT_Zeros data was compatible with the multi-unit library. IT_Zeros intraoral scans were performed using the multi-unit scanning body system. All digital data were used in the design together with face scans and photographs. Resin practice session of the designed restorations were made and the desired esthetics and vertical dimensions were achieved. The treatment was completed with full arch restorations consisting of monolithic zirconium on a titanium bar.

CONCLUSION: In full mouth prosthesis rehabilitation, using digital libraries of different implant brands in the all-on-4 technique and digital workflow can help shorten the treatment time and achieve functional and esthetic results. Changing the type and design of the restoration is also important for clinical success.

Keywords: Implant-Supported Dental Prosthesis, Dental Prosthesis Design, Dental Prosthesis Implantation, Dental Prosthesis Repair

SS-297 Effect of gastric acid exposure on optical and mechanical properties of various denture base materials

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OBJECTIVES: The aim of this study was to assess the effect of gastric acid exposure on the gloss, microhardness, and surface roughness of denture base materials fabricated by different techniques and subjected to various surface treatments.

MATERIALS-METHODS: A total of 90 disc-shaped specimens were fabricated using three different techniques: conventional heat-pressed, subtractive manufacturing, and additive manufacturing. Specimens were then divided into three subgroups based on surface treatment: a control group polished with pumice and a brush, and two groups coated with Optiglaze or Palaseal. All specimens were immersed in gastric acid for 24 hours to simulate a period of eight years of acid exposure. Surface roughness (Ra), gloss (GU), and microhardness (VHN) were measured before and after immersion, and the corresponding changes (ΔRa, ΔGU, ΔVHN) were calculated. The data were evaluated by two-way ANOVA and the Tukey pairwise multiple comparisons method ($p < 0.05$).

RESULTS: Acid exposure led to a decrease in hardness, an increase in roughness, and a loss of gloss across all groups. The heat-pressed and subtractive groups exhibited the smallest changes in ΔRa and ΔVHN after immersion ($p < 0.001$). The additive and subtractive groups demonstrated higher ΔGU compared to the heat-pressed group. No statistically significant differences were detected between the Optiglaze and Palaseal groups concerning the evaluated parameters; both groups resulted in lower ΔRa, ΔGU, and ΔVHN than the control group ($p < 0.05$).

CONCLUSIONS: The additive method demonstrated lower resistance to changes in hardness, roughness, and gloss compared to conventional heat-pressing and subtractive methods. The glaze application resulted in smoother, brighter, and harder surfaces for all production techniques after exposure to gastric acid, compared to polishing.

Keywords: computer-aided design/computer-aided manufacturing, denture base, gastric acid, gloss, microhardness, surface roughness

SS-298 Comparison of Bond Strength of Different Types of Denture Teeth to Two Type Denture Base Materials

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OBJECTIVES: The aim of this study was to comparing the bond strenght between four types of artificial teeth with two types of light curing denture base materials [3D printed and urethane dimethacrylate denture bases (UDMA)].

MATERİALS and METHODS: The Artificial teeth chosen as first maxillary molar in our study are conventional acylic tooth, composite resin based isosit tooth and two types 3D printed denture teeth (Powerresin and Saremco). Denture bases are 3D printed denture base and UDMA. The maxillary molars were bonded with cylindrical denture base resin with a diameter of 5mm and a thickness of 2.5mm (n=10). Thermal cycling was applied to all groups (5–55°C, 5,000 cycles). Then eight subgroups were tested. Shear bond testing was performed by applying a parallel force to the denture teeth-denture base resin interface by using a blade-edge chisel with a crosshead speed of 5 mm/min until failure occurred. Shear bond strenght was recorded in MPa. Tukey test and Man Whitney U test were used in the evaluation of the data obtained and to find the groups that differed.

RESULTS: When 3D and UDMA base groups were compared in terms of bond strength of artificial teeth, the difference between the groups was statistically significant. ($p<0.05$) The Saremco tooth group showed the highest bond strenght with 3D base (8.75 ± 1.04 MPa). The acrylic tooth group showed the highest bond strength with UDMA base (3.94 ± 0.55 MPa). Acrylic and isosite teeth bonded better with the UDMA base, while 3D teeth bonded better to the 3D base.

CONCLUSIONS: Since the bonding of the teeth with the base is also important in the long-term use of removable prostheses, the choice of 3D and Saremco teeth for 3D base material and acrylic teeth for UDMA base material can be preferred primarily.

Keywords: UDMA, 3D Printed base, Artificial teeth, Composite resin

SS-299 Fully Digital Workflow in Rehabilitation of Worn Dentition with 3D-Printed Resin Core Build-ups and Zirconia Crowns

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INTRODUCTION: In severe bruxism cases, a wear pattern due to attrition can be observed, and the consequent sclerotic dentin tissue can compromise the adhesive procedures. In this case report, the prosthetic rehabilitation completed with adhesive methods of a 65-year-old male patient with severe bruxism and pulp exposures is presented.

Case description: A 65-year-old male patient with partial edentulism and severe tooth destruction applied to our clinic for esthetic and functional concerns. Pulp exposures were observed in all incisors during clinical examination; however, all teeth yielded positive results in vitality tests. First, phase I TMJ treatment was applied to the patient with a three-dimensional (3D) printed occlusal splint. Two implants were applied to the edentulous areas. Then, a digital wax-up with the appropriate vertical dimension established for the definitive restorations was printed and the mock-up was used for one month. Afterwards, core build-ups were produced with 3D printed resin (Saremco Print Crowntec) for the reconstruction of the patient's maxillary incisors, and these were cemented to the teeth with sandblasting and adhesive procedures. After the resin coating of the mandibular incisors, all remaining teeth were prepared, and digital impressions were made with Dentsply Sirona Primescan AC. Prosthetic rehabilitation was completed with a three-unit fixed partial denture, two screw-retained and also single layered zirconia crowns.

DISCUSSION: Adhesive techniques enable restoration of teeth with severe tissue loss without root canal treatment and post applications that may cause various biological and mechanical complications. In the present case, tooth wear that progressed to pulp exposure was treated by applying 3D-printed core build-ups accompanied by vital pulp treatments, considering biomechanical parameters. No complications were encountered during 6-month follow-up and follow-ups will be carried out at regular intervals.

Keywords: 3D-printed resin, adhesion, build-up, digital workflow, worn dentition

SS-300 Evaluation of Marginal and Internal Adaptation of Provisional Restorations Fabricated by Different Techniques and Finish Line Designs

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OBJECTIVE: This study aimed to evaluate and compare the marginal and internal adaptation of provisional restorations fabricated using different production techniques (conventional and digital) on teeth prepared with various finish line designs.

MATERIALS-METHODS: Thirty extracted human premolar teeth were prepared with three different finish line designs: chamfer, feather edge, and shoulder. Provisional restorations were fabricated for each tooth using four distinct methods: CAD-CAM milling, 3D printing, direct (chairside) technique, and indirect technique by a dental technician. Marginal and internal fit evaluations were conducted using the silicone replica technique, and measurements were obtained at five standardized points per sample using a stereomicroscope under 50x magnification.

RESULTS: The type of production technique significantly affected both the marginal and internal adaptation of the restorations. Restorations fabricated by a dental technician exhibited the highest marginal and internal gaps, indicating the poorest adaptation. In contrast, digitally produced restorations (CAD-CAM and 3D printing) generally demonstrated superior adaptation. Finish line design did not significantly influence marginal adaptation but did impact internal adaptation, with feather edge preparations showing the highest internal discrepancies.

CONCLUSION: Digital fabrication techniques provided better marginal and internal adaptation compared to conventional methods. Feather edge finish lines are less favorable in terms of internal fit. For improved clinical outcomes, especially in long-term provisional restorations, digital workflows should be preferred due to their superior sensitivity and adaptation characteristics.

Keywords: Provisional restorations, CAD-CAM, 3D printing, marginal adaptation, internal adaptation, finish line design.

SS-301 "Comprehensive Prosthetic Rehabilitation with Multilayered Zirconia Supported by Additional Mono-Implants Following Early Implant Failure: A Clinical Case Report"

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BACKGROUND: Mono-implants, also known as one-piece implants, offer clinical advantages such as reduced treatment time, cost-effectiveness, and immediate loading possibilities. They are particularly beneficial in cases with limited interocclusal space, narrow alveolar ridges, or high esthetic expectations. This case report presents the prosthetic rehabilitation of a patient with previous implant failures using additional mono-implants and multilayered monolithic zirconia restorations.

MATERIALS-METHODS: A 43-year-old male presented with 16 mono-implants—8 in the maxilla and 8 in the mandible—placed in another clinic approximately three months prior. The patient reported persistent pain in several implants. Clinical and radiographic evaluation revealed mobility in 3 maxillary and 2 mandibular implants, indicating failure. Considering the patient's high esthetic expectations, multilayered monolithic zirconia restorations were planned. However, due to insufficient biomechanical load distribution caused by poor implant positioning, 5 additional mono-implants were placed in the maxilla and 2 in the mandible. In the same session, implant abutments were intraorally prepared using carbide burs to create a taper form, and definitive impressions were taken. Given the immediate loading protocol of mono-implants, definitive prostheses were delivered within one week. Occlusal adjustments were performed chairside.

RESULTS: After a 7-month follow-up, no major bone loss or implant mobility was observed. The patient reported high satisfaction with function and esthetics. The additional mono-implants contributed significantly to the redistribution of occlusal loads and improved overall stability.

CONCLUSION: This case highlights the versatility of mono-implants in complex clinical scenarios. Proper diagnosis, surgical planning, and prosthetic execution are crucial for long-term success, especially in cases involving implant retreatment. Mono-implants can be an effective option when immediate loading and esthetic outcomes are priorities.

Keywords: Immediate loading, Implant failure, Mono-implant, Multilayered zirconia, Occlusal load distribution, Prosthetic rehabilitation

SS-302 Comparison of the Accuracy of Models Obtained with Digital and Conventional Workflows with Respect to Arc Length

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OBJECTIVES: The aim of this study is to compare the accuracy of the resin model produced by the digital method and the plaster models produced by the conventional method in short and long arches. Materials and methods; A phantom jaw (Fraseco) was used in the study. The phantom jaw was scanned with a desktop scanner (Smartoptics UXD, X5) as short (Group 1) and long arch (Group 2) to obtain reference images and create a standard tessellation language image (STL) files. For digital production, 10 resin models for both groups were printed from this file using a 3D printer (SprintRay pro55). For the conventional method, 10 plaster models were obtained from the same phantom jaw for each group. Experimental images of all resin and plaster groups were obtained with a desktop scanner. Accuracy comparison of all images with the reference model was performed using Geomagic Control 3D analysis software. To compare the accuracy between resin and plaster models and for the comparison between short and long arches, one-way and two-way analyses of variance (ANOVA) were performed. Results; The lowest accuracy was observed in long arch plaster models (0.156±0.100). The highest accuracy was determined in short arc resin models (0.092±0.024). Although resin models showed higher accuracy than plaster models, this difference was statistically insignificant (p=0.135). The increase in the arc length caused a decrease in the accuracy of plaster and resin models. The effect of arc length on accuracy was statistically significant (p=0.046).

CONCLUSIONS: The effect of arc length on model accuracy is important. Model accuracy in short arcs gives more accurate results than in long arcs.

Keywords: Accuracy, Arc length, 3D printed models

SS-303 Effect of hydrothermal aging on color stability of monolithic zirconium dioxide in different formulations

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OBJECTIVE: The aim of this study is to evaluate the effect of accelerated aging on the color change of monolithic zirconium dioxide ceramics with different formulations.

MATERIALS-METHODS: In this study, three different monolithic zirconium dioxide blocs were used: 3Y-TZP (Vita YZ-HT, VITA Zahnfabrik, Bad Säckingen, Germany), 4Y-TZP (Vita YZ-ST), and 5Y-TZP (Vita YZ-XT). 12 specimens in dimensions of 20×4×1.2 mm were prepared from each material. L, a, and b* values of the each specimen was measured for three times on a neutral grey background using a colorimeter. Then specimens were subjected to hydrothermal aging in an autoclave at 134 °C and 2 bar pressure for 5 hours. Following aging process the L, a, and b* values of the each specimen was measured for three times on a neutral grey background. Average ΔE_{00} values for each specimen were calculated and statistical analyses were performed.

RESULTS: The highest ΔE_{00} values were observed in 4Y-TZP group, whereas the lowest ΔE_{00} values were found in 3Y-TZP.

CONCLUSIONS: According to the results of this study color stability of the monolithic zirconium di oxide restorations could be effected by its formulation.

Keywords: monolithic zirconium dioxide, hydrothermal aging, color stability

SS-304 A game-changer connection: Tensile strength between zirconia and PEEK blocks using two different types of primers

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OBJECTIVES: In hybrid prosthetic restorations, combining different materials aims to optimize both functional and esthetic outcomes. This study aimed to compare the tensile bond strength between zirconia and PEEK blocks with and without the application of surface primers, and to identify the most effective bonding strategy for long-term clinical success.

MATERIALS-METHODS: Thirty Zirconia–PEEK block pairs were randomly divided into three groups (n=10):

• Group 1: No primer was applied to the surfaces; only adhesive resin was used.

• Group 2: PEEK surfaces were sandblasted and treated with Visio.link primer (Bredent); zirconia surfaces remained untreated.

• Group 3: MKZ primer was applied to zirconia and Visio.link primer was applied to PEEK prior to bonding with the same adhesive resin.

Tensile bond strength was measured using the DILLON Quantrol Micro Tensile Tester. Statistical comparisons were performed using ANOVA and post-hoc tests. The aim was to evaluate and compare the bond strength values among the different surface treatment protocols.

RESULTS: ANOVA revealed statistically significant differences between groups (p = 0.0001). Post-hoc analyses confirmed significant pairwise differences among all groups.

Group 3 demonstrated the highest mean tensile strength (97.03 N), indicating superior mechanical performance. Group 2 showed moderate strength (44.13 N), while Group 1 exhibited the lowest (11.90 N), suggesting clinical inadequacy.

CONCLUSIONS: Surface conditioning with primers significantly enhances bond strength between zirconia and PEEK. Dual-primer application (Group 3) yielded the most favorable results, underlining its clinical relevance. Single-surface treatment offered limited improvement, and the absence of primers resulted in insufficient bonding. These findings emphasize the critical role of proper primer selection and protocol in achieving durable hybrid restorations.

Keywords: zirconia, PEEK, tensile bond strength, primer, adhesive resin

SS-305 Minimally Invasive Management of Anterior Esthetic Deficiencies Using Lithium Disilicate Laminate Veneer Fixed Partial Dentures: A Case Series

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INTRODUCTION: Restoring anterior esthetic deficiencies such as diastema or single-tooth loss requires a balance between conservation of dental tissues and optimal esthetic outcomes. In situations where adjacent teeth are intact and invasive interventions are contraindicated or declined, lithium disilicate laminate veneer fixed partial dentures (FPDs) offer a minimally invasive, esthetically driven solution.

Case Series: Three patients presenting with esthetic concerns in the anterior region were treated conservatively at Marmara University.

- Case 1: A 48-year-old female with mandibular midline diastema was treated using a veneer-supported pontic design without altering adjacent teeth.
- Case 2: A 19-year-old female experienced the traumatic avulsion of tooth 11. Due to midline asymmetry and limited mesiodistal space, orthodontic intervention was performed to reposition tooth 12 into the 11 position. A laminate veneer bridge was then fabricated between teeth 12 and 13, and full-coverage ceramic crowns were placed on teeth 21 and 22 to restore midline harmony and address extensive structural loss.
- Case 3: A 25-year-old female with congenital absence of tooth 12 received orthodontic preparation followed by a laminate veneer bridge (11–13) and veneers on 21–23. Minimal enamel preparation was performed after mock-up trials. Digital impressions (Trios 3) guided the CAD/CAM fabrication of lithium disilicate restorations (IPS e.max). Surface conditioning involved hydrofluoric acid etching and silane application. Restorations were bonded using light-cured resin cement (G-Cem Veneer).

DISCUSSION: Compared to conventional full-coverage crowns, laminate veneer FPDs preserve enamel, support pulpal health, and offer superior esthetics—particularly when fabricated with lithium disilicate, known for its translucency and mechanical strength. The integration of digital workflows further enhances treatment efficiency and accuracy. This case series demonstrates that with proper case selection, such conservative approaches yield high patient satisfaction and biologically favorable results.

Keywords: Digital Impression, Anterior Esthetic Rehabilitation, Laminate Veneer, Fixed Partial Dentures

SS-306 Precision in full arch rehabilitation: A digital workflow for the Toronto hybrid prosthesis

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INTRODUCTION: The Toronto prosthesis offers a refined hybrid solution that integrates the advantages of both screw-retained and cement-retained prosthetic systems. It is particularly suitable in edentulous cases characterized by severe alveolar bone resorption and increased interarch space. This approach involves the fabrication of a CAD/CAM designed metallic framework (mesostructure) that is screw-retained on the implants, over which multiple individually fabricated crowns are cemented. The design facilitates superior esthetics, improved passive fit, and retrievability, making it a viable long-term rehabilitation modality.

Case description: Comprehensive clinical and radiographic assessments were conducted to evaluate bone quantity, vertical dimension, interarch relationship, and lip support. Six implants were placed in the maxilla and six in the mandible. Following a four-month osseointegration period, the implants were surgically uncovered, and multi-unit abutments were selected to enable digital intraoral scanning.To establish the vertical dimension and maxillomandibular relationship, a verification bar was fabricated using cobalt–chromium alloy. This bar served to record the occlusal relationship and simultaneously assess the passive fit of the framework, thus confirming the precision of the digital impression. Based on the acquired records, a provisional framework was milled from PMMA and evaluated intraorally. Once clinical accuracy and fit were verified, the definitive substructure was milled from titanium using CAD/CAM technology. Individual monolithic zirconia crowns were then fabricated and a gingival-colored porcelain layer was applied to replicate soft tissue contours. All crowns were cemented intraorally onto the screw-retained titanium substructure, completing the prosthetic rehabilitation.

CONCLUSION: Toronto hybrid prosthesis proved to be an effective solution for full-arch rehabilitation in this case, offering both esthetic and functional success. The combination of a screw-retained titanium framework and individually cemented zirconia crowns ensured precise fit, retrievability, and patient satisfaction. This approach supports predictable long-term outcomes when supported by careful planning and accurate execution.

Keywords: Toronto prosthesis, hybrid implant-supported restoration, full-arch rehabilitation, passive fit verification, CAD/CAM prosthodontics

SS-307 Effect of Activated Charcoal Toothpaste on Surface Roughness of Zirconia: A Toothbrushing Simulation Study

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OBJECTIVES: Activated charcoal-based toothpastes have become widely used in recent years. Even though there are not enough studies showing this toothpaste's abrasive effect on zirconia surfaces, its popularity is increasing. The aim of this study was to determine the effect of activated charcoal toothpaste usage on the surface roughness of zirconia.

MATERIALS-METHODS: Specimens were prepared from zirconia blocks by cutting in a thickness of 2 mm. Surfaces of the specimens were manually polished by the same operator and initial Ra values were measured by a contact profilometer. Then, specimens were divided into three groups (N=24, n=8): Brushed group with activated charcoal toothpaste (AC), brushed group with only distilled water (DW), brushed group with whitening toothpaste (WH). Tooth brushing simulation was applied using tooth brushing simulator (SD Mechatronic) with forward-backward motion in a linear distance of 5 mm, at speed of 25 mm/s, under 200g pressure for 5000 cycles to simulate 6 months of usage. The final roughness values of the specimens were measured after brushed. Data were statistically evaluated by repeated measures ANOVA and post-hoc Tukey test for comparison of all groups (α= 0.05).

RESULTS: Brushing with activated charcoal toothpaste did not induce a statistically significant change in the surface roughness of zirconia specimens when comparing pre- and post-brushing measurements (p=0.467). Furthermore, intergroup analysis demonstrated that the surface roughness values of the specimens brushed with activated charcoal toothpaste did not differ significantly from those of the distilled water and whitening toothpaste groups (p=0.795).

CONCLUSION: Brushing the polished zirconia surface with activated charcoal toothpaste does not cause more significant roughness changes than brushing with distilled water or whitening toothpaste. Therefore, it can be concluded that its short-term use is unlikely to cause adverse effects. However, further studies are needed to recommend its long-term use.

Keywords: Activated charcoal, Toothbrushing, Zirconia, Surface Roughness

SS-308 Effect of Activated Charcoal Toothpaste on the Surface Roughness of Acrylic and Composite-based Denture Teeth

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OBJECTIVES: Activated charcoal-based toothpaste has seen widespread use in recent years. With its increasing popularity, it is important to assess its potential effects on prosthetic materials. The aim of this study was to investigate the effect of using activated charcoal toothpaste on the surface roughness of acrylic and composite-based denture teeth.

MATERIALS-METHODS: A total of 48 prefabricated denture teeth made of two different materials (acrylic and composite-based) were selected and assigned to three groups for each material (n=8): brushed with activated charcoal toothpaste (AC), brushed with whitening toothpaste (WH), and brushed with distilled water (DW). Tooth brushing simulation was applied using tooth brushing simulator (SD Mechatronic) with forward-backward motion in a linear distance of 5 mm, at speed of 25 mm/s, under 200g pressure for 5000 cycles to simulate 6 months of usage. The roughness values of the specimens were measured using a profilometer both before and after brushing. Data were statistically analyzed using two-way repeated measures ANOVA followed by Bonferroni post-hoc test for comparison among all groups (α=0.05).

RESULTS: Intragroup comparisons revealed that the slight increase in surface roughness was statistically significant in the AC group for both acrylic and composite-based teeth when comparing pre- and post-brushing values (p=0.013 and p=0.04, respectively). However, intergroup comparisons showed no statistically significant differences between acrylic and composite-based denture teeth or among the different brushing media after brushing (p > 0.113).

CONCLUSION: Brushing the denture teeth surface with activated charcoal toothpaste does not cause significantly greater changes in roughness compared to brushing with distilled water or whitening toothpaste. Therefore, it can be concluded that its short-term use is unlikely to cause adverse effects. However, further studies are needed to recommend its long-term use.

Keywords: Activated charcoal, Toothbrushing, Denture teeth, Surface Roughness

SS-309 Resin-Bonded Fixed Dental Prostheses for the Treatment of Congenital Lateral Incisor Agenesis: A Multidisciplinary Approach

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INTRODUCTION: Multidisciplinary treatment strategies are essential for achieving optimal and stable long-term outcomes in smile aesthetics. Congenital lateral incisor agenesis and tooth malformations can be managed with minimally invasive orthodontic and prosthetic approaches. This case describes a patient treated with Maryland bridge and zirconia crown following comprehensive orthodontic therapy.

Case description: A 21-year-old female presented with aesthetic concerns. Clinical examination revealed a high smile line, agenesis of tooth #12, and a peg-shaped lateral incisor (#22). Prior to prosthetic treatment, the patient underwent fixed orthodontic therapy to resolve occlusal discrepancies. The periodontal department was consulted for surgical shaping of the edentulous ridge beneath the pontic site of #12. Vertical ridge reduction was performed, and a provisional ovate pontic bridge supported by teeth #11 and #13 was placed. After 8–10 days of healing, the final prosthetic procedure was initiated. A chamfer margin was prepared on the palatal surface of tooth #11, and undercuts on the peg-shaped lateral were corrected. Impressions were taken using A-type silicone, and shade selection was completed with VITA Easyshade V digital spectrophotometer. During the zirconia framework trial, connector thickness and the adaptation of the infrastructure to the preparation were evaluated. At the dentin trial stage, attention was given to shade matching, gingival harmony, and occlusal clearance. Following patient approval, the prosthesis was cemented using Panavia V5 resin cement.

DISCUSSION: This case demonstrates how coordinated interdisciplinary treatment combining orthodontics, periodontics, and prosthodontics can effectively address congenital anomalies and deliver esthetic, functional, and conservative outcomes.

Keywords: Resin-bonded prosthesis, Maryland bridge, Congenital tooth agenesis, Peg lateral incisor, Zirconia

SS-310 Color Change in Occlusal Splints: The Role of Manufacturing Method and Polishing

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OBJECTIVES: Occlusal splints are a gold standard treatment for temporomandibular joint disorders. With advances in digital dentistry, the use of additive manufacturing is increasing. This study compares the color changes of occlusal splints fabricated by conventional and 3D printing methods, both before and after thermal cycling, with and without polishing.

MATERIALS-METHODS: Forty-eight disk-shaped specimens (12 mm x 3 mm) were fabricated using conventional acrylic and 3D printing methods. Each group (n=24) was divided into polished and unpolished subgroups (n=12). Polishing followed manufacturers' recommendations. Baseline color values were measured using a spectrophotometer. Specimens underwent thermal cycling (5000 cycles, 5–55°C, 30 seconds). Post-cycle color values (L*, a*, b*) were remeasured at three points per sample and averaged. Color change (ΔE) was calculated.

RESULTS: In both acrylic and 3D printed groups, no statistically significant difference was found between polished and unpolished samples (p=0.112 for acrylic, p=0.622 for 3D print). However, when comparing material types, acrylic showed significantly higher ΔE values than 3D printed samples in both surface conditions (p=0.001).

CONCLUSION: Acrylic materials exhibited greater color change than 3D printed ones, regardless of polishing. While polishing reduced ΔE values slightly, the reduction was not statistically significant. Acrylic samples exceeded clinically acceptable ΔE thresholds, suggesting lower color stability. In contrast, 3D printed materials demonstrated superior color resistance, making them potentially more suitable for long-term aesthetic use in occlusal splint fabrication.

Keywords: occlusal splint, color stability, 3D printing, acrylic resin, polishing, thermal cycling

SS-311 Digital Smile Design and Veneer Restoration Using a Fully Digital Prosthodontic Workflow: A Case Report

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This case report presents a fully digital approach to esthetic rehabilitation using smile design and minimally invasive veneers. A 32-year-old patient seeking esthetic improvement underwent digital intraoral scanning and facially driven smile design. The approved digital mock-up guided the CAD/CAM fabrication of lithium disilicate veneers without the need for traditional impressions or wax-ups. The final restorations achieved excellent esthetic integration, functional harmony, and patient satisfaction. This case highlights the efficiency, precision, and predictability of a fully digital prosthodontic workflow in modern esthetic dentistry.

Keywords: digital workflow, smile design, CAD/CAM, veneers, prosthodontics

SS-312 Preferences of Dentists for Reuse and Sterilization Protocols of Implant Healing Abutments: A Survey Study

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OBJECTIVE: The aim of this study was to determine the frequency of reuse of implant healing abutments by dentists in Turkey, the preferred cleaning and sterilization methods, and how these practices reflect on clinical practice. This study also aims to analyze practice differences among dentists from various specialties and institutions.

MATERIALS-METHODS: In this cross-sectional study, data were collected from 138 dentists performing implant treatments across Turkey through a questionnaire. The 20-question questionnaire was prepared using Google Forms and distributed via the internet. The questions included both open-ended and closed-ended types, covering demographic information, the frequency of healing abutment reuse, the reasons for reuse, cleaning and sterilization protocols and

knowledge of manufacturer guidelines for these protocols. Data were analyzed using descriptive statistics and chi-square tests with SPSS 22.0 software.

RESULTS: A total of 86.2% of participants reported reusing implant healing abutments on different patients following the sterilization procedure. Most respondents (55.8%) reused healing abutments without a defined upper limit. When asked about the reasons for reuse, 43.5% of participants cited "cost savings," followed by "difficulties in obtaining from the manufacturer" at 36.2%. Mechanical brushing/scraping was the most common cleaning method (38.4%) and autoclave sterilization was overwhelmingly preferred (98.6%). Only 31.2% were aware of manufacturer guidelines. The vast majority (86.2%) believed that reusing healing abutments after proper sterilization is safe.

CONCLUSION: Healing abutments must be free from contaminants during the healing process. The reuse of implant healing abutments is widespread; however, there is a lack of standardization in the cleaning and sterilization processes, leading to significant variations in practices among dentists. Developing a standardized, multi-step cleaning and sterilization protocol for healing abutments is essential to ensure safety and efficacy in clinical and research settings. Based on the results of this study, a standardized protocol can be determined in future studies.

Keywords: implant healing abutment, reuse, sterilization protocols

SS-313 Conservative aesthetic restoration of anterior teeth using digital technology and injectable resin: a case report

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INTRODUCTION: Anterior tooth gaps and defects pose significant challenges in restorative dentistry. With the advent of digital technologies such as digital smile design, CAD/CAM wax-ups and prediagnostic tools clinicians can customize treatment plans, including veneers, crowns or alternative restorations, based on individual dental conditions. Traditional direct resin restorations, although minimally invasive, are time-consuming, technique-sensitive and require manual dexterity. Recent advances in digital workflows offer improved precision and efficiency, streamlining the design and placement of aesthetic anterior tooth restorations.

Case description: A 26-year-old healthy male sought urgent aesthetic improvement due to diastemas from microdontia, requesting a conservative solution to better align his central incisors. After clinical photography, a digital smile design and a prepless wax-up from the upper right to left canine were created. A physical wax-up was then used to fabricate a silicone index for a mock-up, which the patient approved. A transparent PVS index with small perforations guided the intraoral injection of flowable composite resin (G-ænial Universal Injectable). At the one-year follow-up, the restorations remained stable and aesthetically pleasing, with no marginal discoloration, chipping, or wear. Gingival tissues were healthy, and the patient reported high satisfaction.

DISCUSSION: This case highlights the effectiveness of the injectable composite technique within a digital workflow for achieving minimally invasive, aesthetic restorations particularly when ceramic or orthodontic options are limited by time or cost. The use of flowable composites, with superior wettability, marginal adaptation, and stress-buffering capacity, enables efficient interproximal application and high-quality restorations. When combined with a transparent PVS index, the method allows precise intraoral injection and light-curing with enhanced visual control. Digital planning further ensures accurate transfer of the intended morphology to the final restoration. This technique provides a conservative, time-efficient alternative for minor re-anatomizations, offering excellent esthetics, reduced chairside time and improved dentin bonding compared to indirect techniques.

Keywords: Injectable composite resin, digital workflow, anterior esthetic restoration, flowable composite, minimally invasive dentistry, diastema closure

SS-314 Influence of orange juice and an immune-enhancing drink on surface roughness and optical properties of 3D-printed resins produced with various layer thicknesses

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Long-term stability of 3D printable dental resins can be influenced by environmental exposure and print layer thickness. This study aimed to evaluate the influence of orange juice and an immune-enhancing drink on surface roughness and optical characteristics of 3D-printed resins produced with various layer thicknesses. Disc-shaped specimens (n=90; 12×2 mm) were fabricated using Bego VarseoSmile TriniQ resin at three print thicknesses: 25 µm, 50 µm, and 100 µm. Initial color and trancluceny parameters (TP) were measured using a spectrophotometer to calculate color difference (ΔE) and TP values. Surface roughness was measured with a contact profilometer. (Ra) Specimens divided into three subgroups (n=10) and they were immersed for 72 hours in Mucovit C MC (pH 2.2–2.5), orange juice OJ (pH 2.9–4.0) and Distilled water DW at 37°C as control group. Two-way ANOVA with Tukey HSD was used to assess the interaction between thickness and solution type. One-way ANOVA and paired t-tests were applied for within- and between-group comparisons. Significance was set at $p<0.05$. In the DW solution, initial translucency (TP) was significantly higher for the 25 µm group compared to 100 µm ($p=0.006$), but no differences were observed at T1. A significant TP reduction over time occurred only in the 25 µm group ($p=0.024$). Surface roughness increased significantly at T1 in the 25 µm group in both OJ ($p=0.025$) and MC ($p=0.002$). For color change (ΔE), significant differences among thicknesses were found in OJ ($p=0.037$) and MC ($p=0.002$), with 50 µm showing greater ΔE than 100 µm. No significant ΔE differences were found in the distiled water group or between solution types. Decreased print layer thickness led to increased surface roughness and color change. Additionally, translucency was inversely related to specimen thickness. These findings suggest that layer thickness is a critical factor affecting the long-term aesthetic stability of 3D printed resins.

Keywords: Translucency parameter, 3D printing resin,Additive manufacturing,layer thickness

SS-315 The impact of different surface treatments on bond strength of resin cement to 3D-printed permanent crown material

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Objective: This study aimed to evaluate the effects of sandblasting and laser irradiation on the shear bond strength of dual-cured resin cement to 3D-printed permanent crown material. Materials and methods. Thirty 3D-printed permanent crown material were randomly divided into three groups according to the surface treatment: control, sandblasted and laser-irradiated (n=10). The control group specimens were polished with silicon carbide abrasive paper. In the sandblasting group, the specimens were roughened with 50 µm aluminium oxide. The laser-irradiated group was treated with an Erbium: Yttrium Aluminium Garnet laser and a non-contact handpiece. The laser parameters were as follows: SP mode, 150 mJ, 20 Hz, 3W, water + and air +. Following surface treatment, the surfaces were examined using a surface profilometer, a scanning electron microscope and energy-dispersive X-ray spectroscopy for elemental mapping. Resin cement was then applied to the specimens' surfaces. A shear bond strength test was performed using a universal testing machine at a speed of 0.5 mm/min. The fractured surfaces of the specimens were then examined using a stereomicroscope. The results were analyzed using one-way analysis of variance and Tukey's honest significance difference tests (α=0.05).

RESULTS: Surface treatment has significantly affected surface roughness and bond strength results ($p<0.001$). The control group exhibited the lowest surface roughness and bond strength values ($p<0.001$). Sandblasted specimens have bond strength values similar to those of the laser group, which has the highest surface roughness values ($p<0.001$). Unlike specimens roughened with the laser, sandblasted specimens exhibited a homogeneous micro-rough surface morphology. Cohesive failure in the 3D-printed material was observed in all specimens except for five specimens in the control group, which showed mix failure.

CONCLUSION: Sandblasting is recommended to increase the bond strength of resin cement to 3D-printed permanent crown materials.

Keywords: 3D-printed permanent crown material, surface roughness, sandblasting, Er: YAG laser, shear bond strength.

SS-316 Evaluation of surface treatment effects on the color stability of high-translucent zirconia under acidic and thermocycling conditions

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OBJECTIVE: This in vitro study aimed to investigate the relationship between surface roughness and color stability of high-translucent zirconia ceramics subjected to various surface treatments. The effects of polishing and glazing on esthetic durability were also evaluated under acidic staining, and thermal aging conditions.

MATERIALS-METHODS: A total of 140 high-translucent zirconia specimens were fabricated and randomly assigned to seven groups based on surface treatment protocols: control (sintered only), diamond bur roughening, diamond bur followed by polishing, diamond bur followed by glazing, zirconia bur roughening, zirconia bur followed by polishing, and zirconia bur followed by glazing. Each group was further divided into two subgroups (n = 10), immersed in either a cola–coffee solution or distilled water for 14 days. All specimens underwent thermal aging involving 5000 thermal cycles between 5 °C and 55 °C. Color measurements were performed using a spectrophotometer, and color differences (ΔE) were calculated based on the CIE Lab* system. Surface roughness was evaluated using a digital profilometer, with Ra and Rq values recorded. One-way ANOVA and Tukey HSD tests ($\alpha = 0.05$) were used for statistical analysis, and Spearman's correlation test assessed the relationship between roughness and color change.

RESULTS: The diamond bur group exhibited the highest surface roughness (1.171 ± 0.502 µm), while the glazing group showed the lowest (0.381 ± 0.124 µm). All groups displayed increased ΔE values after aging, with statistically significant differences in non-glazed groups. Glazed specimens maintained color changes within clinically acceptable limits. A significant positive correlation was found between surface roughness and color change ($p < 0.05$).

CONCLUSION: Glazing proved to be the most effective treatment for preserving color stability of high-translucent zirconia under simulated oral conditions. Although polishing reduced roughness, it was less reliable in ensuring long-term esthetic outcomes. Glazing is therefore recommended for optimal esthetic performance.

Keywords: High-translucent zirconia, Surface treatment methods, Color stability analysis, Surface roughness evaluation

SS-318 Investigation of the long-term effects of polishing protocols on mechanical and aesthetic properties of polyetheretherketone

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OBJECTIVE: To evaluate the long-term effects of different polishing protocols on the surface roughness and topography, hardness, color stability, and gloss change of polyetheretherketone (PEEK) material.

MATERIALS-METHODS: 108 samples produced from PEEK material were divided into 6 different groups according to polishing protocol: control (CN), Abraso-Starglanz polishing paste (A), Yıldız polishing paste (Y), Enhance polishing system (EN), Super snap polishing kit (SS) and silicone polisher (SP). Surface roughness, hardness values, gloss changes, color stability and surface topography of the samples at the beginning and after 90-day coffee immersion protocol were examined. Color stability was calculated according to the CIEDE2000 (ΔE00) formulation. Data were examined using Kruskal-Wallis analysis, and significance was evaluated at $p<0.05$.

RESULTS: As a result of the initial and 90-day measurements, significant differences were found in all groups in terms of roughness, hardness, gloss and ΔE00 values ($p=0.001$ for all comparisons). It was observed that the roughness data remained above the threshold value in CN and SP groups in both initial and 90-day measurements (0.20µm). It was found that EN and A groups were statistically superior to the other groups in terms of color stability; Y and A groups were superior to the other groups in terms of hardness; and A group was superior to the other groups in terms of roughness and gloss. In terms of ΔE00 values, a significant difference was found between the CN group and the A, En, and SP groups; and between the EN group and the SP, SS, and Y groups ($p=0.001$ for all comparisons).

CONCLUSION: It can be said that PEEK material definitely needs a polishing protocol in terms of surface roughness, however, the SP protocol alone is insufficient in maintaining the long-term mechanical and aesthetic properties of PEEK material, while the A material offers the most successful result.

Keywords: surface properties, hardness, color stability, gloss, polyetheretherketone

SS-320 Effect of Resin Cement Type on Shear Bond Strength to Lithium Disilicate and Leucite-Reinforced Ceramics

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OBJECTIVES: This study aimed to evaluate the influence of resin cement type on shear bond strength to lithium disilicate and leucite-reinforced ceramics.

MATERIALS-METHODS: Forty ceramic specimens (n=10 per group) were prepared from lithium disilicate (GC LiSi) and leucite-reinforced feldspathic ceramic (GC LRF). Each was embedded in acrylic resin blocks. Surfaces were standardized using silicon carbide abrasive papers under water cooling, then ultrasonically cleaned. GC LiSi was etched with 9% hydrofluoric acid for 20 seconds; GC LRF for 60 seconds. Following silanization, either a dual-cure resin cement (G-CEM ONE) or a light-cure resin cement (G-CEM Veneer) was applied and light-cured for 20 seconds. Shear bond strength (SBS) values were recorded in MPa using a universal testing machine. Data were analyzed using one-way ANOVA and Tukey HSD test (α=0.05).

RESULTS: ANOVA revealed significant differences among the four groups (F=6.90, p=0.0009). Tukey HSD showed that GC LRF bonded with G-CEM ONE exhibited significantly higher SBS than GC LRF bonded with G-CEM Veneer (p<0.05). Similarly, GC LiSi + G-CEM ONE showed higher SBS than GC LRF + G-CEM Veneer. The highest mean SBS was found in the GC LRF + G-CEM ONE group (13.20 ± 2.31 MPa), while the lowest was in the GC LRF + G-CEM Veneer group (7.58 ± 3.23 MPa).

CONCLUSIONS: The type of resin cement plays a critical role in bonding efficiency. Dual-cure G-CEM ONE demonstrated superior performance, particularly with feldspathic ceramics. Matching resin cement chemistry with ceramic substrate is essential for achieving durable clinical adhesion. Funding: This study was supported by the Scientific and Technological Research Council of Turkey (TUBITAK) under Grant Number 223S549. The authors thank TUBITAK for their support.

Keywords: Shear bond strength, resin cement, lithium disilicate, leucite-reinforced ceramic

SS-321 The effect of oral care solutions and thermocycling on the color stability of monolithic zirconia restorations with different surface treatments

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OBJECTIVE: The aim of this in vitro study was to evaluate the color stability of next-generation monolithic zirconia (6Y-TZP) materials following different surface treatments, after exposure to oral care solutions with varying pH levels and subsequent thermocycling. In addition, the influence of surface roughness on color change was analyzed.

MATERIALS AND METHODS: A total of 160 monolithic 6Y-TZP zirconia discs were divided into four groups based on surface treatment: sintered, milled, milled and polished, and glazed. Initial color measurements (ΔE1) were performed using the VITA Easyshade device based on the CIE Lab system. Surface roughness values (Ra and Rq) were determined using a digital profilometer. Each group was immersed in 0.12% chlorhexidine, Listerine White, Colgate, or distilled water for two weeks, followed by a second set of color measurements (ΔE2). All specimens then underwent thermocycling for 5000 cycles between 5–55 °C, after which final color measurements (ΔE3) were recorded. Data were analyzed using the Kruskal–Wallis test with Dunn's post-hoc analysis. The Mann–Whitney U test was used for pairwise comparisons, and the Spearman correlation test was employed to evaluate associations ($p < 0.05$).

RESULTS: The highest ΔE3 values were observed in the groups subjected to milling and exposed to chlorhexidine. The lowest color changes were noted in the sintered specimens stored in distilled water. Chlorhexidine caused the most significant discoloration across all groups. A statistically significant positive correlation was found between surface roughness and ΔE3 values ($p < 0.05$).

CONCLUSION: The type of surface treatment and the type of oral care solution have a significant impact on the color stability of monolithic zirconia. Surfaces with higher roughness and exposure to chlorhexidine-containing solutions notably increase discoloration. For optimal clinical outcomes, oral care products should be selected in accordance with the surface characteristics of zirconia restorations.

Keywords: Monolithic zirconia, Color stability, Surface treatment, Oral care solutions

SS-322 Implant Supported Hybrit Prothesis In A Post-Myxoma Resection Patient: A Prosthodontic Perspective

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INTRODUCTION: Odontogenic myxoma is a rare benign tumor of ectomesenchymal odontogenic origin, known for its locally aggressive behavior. It is often asymptomatic and typically detected incidentally on routine radiographs, most commonly in the mandible. Radiographically, it appears as a multilocular radiolucent lesion, and diagnosis is confirmed histopathologically. Surgical resection is the primary treatment. Postoperative tissue loss and edentulism create functional and aesthetic challenges. Implantsupported hybrid prostheses are commonly preferred in such cases. This case presents the rehabilitation of a patient diagnosed with odontogenic myxoma, treated with implant-supported hybrid prostheses in both arches following mandibular resection.

Case description: A 56-year-old male presented with discomfort from existing prostheses. A panoramic radiograph revealed a radiolucent lesion in the anterior mandible. He was referred to our Department of Oral and Maxillofacial Surgery, where biopsy confirmed odontogenic myxoma. Informed consent was obtained, and mandibular resection was performed in 2021.After healing, 12 implants were placed. Due to failure of one mandibular implant, a hybrid prosthesis was planned using five mandibular and six maxillary implants. A baseplate and custom tray were prepared. Multi-unit abutments were selected intraorally. For impression accuracy, open-tray copings were splinted with pattern resin. Metal-ceramic prostheses were chosen for their durability and affordability. At the metal try-in, passive fit was verified with the Sheffield test; vertical dimension was checked using the Niswonger method. The case proceeded through dentin try-in to final placement. No complications were observed at the 8-month follow-up.

DISCUSSION: Implant-supported hybrid prostheses offer predictable functional and esthetic outcomes in post-resection cases. Despite one implant failure, sufficient stability was achieved with modified support. Passive fit and vertical dimension controls contributed to prosthetic success. The absence of complications at 8 months demonstrates the clinical viability of this approach in patients undergoing mandibular resection due to odontogenic myxoma.

Keywords: odontogenic myxoma, hybrid prothesis, mandibular resection

SS-323 Comparative Evaluation of Optical Properties of Nano-Lithium Disilicate Ceramics with Different Crystallization Types after Various Polishing Protocols and Coffee Staining

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AIM: To comparatively evaluate the color stability (ΔE_{00}), translucency parameter (TP), and contrast ratio (CR) of nano-lithium disilicate glass ceramics with different crystallization types, following different polishing procedures and coffee staining.

MATERIALS-METHODS: Twenty-four specimens were prepared from Amber Mill and Amber Mill Direct CAD/CAM blocks. Half of the specimens were mechanically polished, and the other half were glazed. Baseline color parameters were measured using a spectrophotometer over grey, white, and black backgrounds to calculate baseline ΔE_{00}, TP, and CR values. The specimens were then immersed in either distilled water or a coffee solution for 12 days (n=6). After immersion, the same optical measurements were repeated to evaluate the effects of staining. Mann-Whitney U test was used due to non-normal distribution ($p < 0.05$).

RESULTS: Glazed Amber Mill Direct group (0.63±0.54) showed significantly better color stability than mechanical polishing (1.18±0.25; p=0.004) when immersed in coffee. Mechanical polishing resulted in higher TP values for Amber Mill, whereas glazing provided slightly increased TP for Amber Mill Direct. Coffee-stained glazed Amber Mill specimens exhibited a ΔTP exceeding the clinically acceptable limit ($\Delta TP > 2$). At baseline and after immersion in distilled water, mechanically polished Amber Mill Direct specimens exhibited significantly higher CR than Amber Mill (p=0.024 and p=0.009, respectively). Although glazed Amber Mill specimens showed a significant contrast increase after distilled water immersion (p = 0.009), all ΔCR values were clinically negligible ($\Delta CR < 0.1$).

CONCLUSION: Nano-lithium disilicate ceramics with different crystallization types demonstrated distinct optical properties influenced by the polishing protocols and immersion media. These results highlight the importance of selecting appropriate finishing procedures based on the material type and anticipated exposure conditions to maintain long-term optical stability.

Keywords: Nano-lithium disilicate glass ceramics, Color stability, Translucency parameter, Contrast ratio, Mechanical polishing, Glazing

SS-324 The Effect of Various Surface Treatments on the Tensile Bond Strength of Denture Base Materials

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OBJECTIVES: The aim of this study was to evaluate the tensile bond strength of silicone-based soft lining material to denture base materials with different surface treatments (sandblasting, Nd:YAG laser, Er:YAG laser).

MATERIALS-METHODS: In this in-vitro study, denture base materials were fabricated using three techniques: conventional, CAD/CAM milling, and 3D printing. Dumbbell-shaped specimens were prepared accordingly and randomly divided into four groups (n = 10) based on surface treatment: control (no treatment), sandblasting, Er:YAG laser, and Nd:YAG laser. After applying surface treatments, specimens were bonded with a 3 mm thick layer of silicone-based soft liner (Molloplast-B). All samples were stored in distilled water at 37°C for 24 hours prior to testing. Tensile bond strength was measured using a universal testing machine at a crosshead speed of 5 mm/min. The maximum tensile bond strength was noted in MPa. Data were analyzed using Shapiro-Wilk and ANOVA tests at a significance level of p =.05.

RESULTS: The findings showed that the Nd:YAG laser significantly improved bond strength in conventionally fabricated denture base resins. For milled resins, surface treatments did not result in a statistically significant difference. However, for 3D-printed resins, all surface treatments significantly increased the bond strength compared to the control group ($p < 0.05$). Among all groups, 3D-printed samples showed the highest tensile bond strength, regardless of the treatment applied.

CONCLUSIONS: Surface treatments increase the tensile bond strength between silicone-based liners and denture base resins. The most effective method was the Nd:YAG laser, particularly for conventional and 3D-printed bases. For milled bases, surface treatment had limited impact. Overall, applying surface treatment especially Nd:YAG laser to 3D-printed bases is highly recommended to achieve optimal bonding.

Keywords: Nd:YAG Laser, Er:YAG Laser, Denture bases, 3D-Printing, CAD/CAM, Soft Lining Material

SS-326 Comparison of I-physio Profile Designer Concept with Standard Gingiva Former: A Randomized Controlled Prospective Study

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OBJECTIVE: The i-Physio is used for forming gingiva and also functions as a scan body. To evaluate the influence of the i-Physio Profile Designer on marginal bone loss and soft tissue health and contour around platform switched implants. Furthermore, the secondary aim of the study is to evaluate the reliability of impression technique with i-Physio Profile Designer

MATERIALS-METHODS: A randomized prospective single blind split mouth study design has been planned. 17 patients with bilateral teeth loss were treated with bilateral implants. Control side of every patient have had standart healing abutment during osteointegration phase. i-Physio Profile Designer were applied to study side of patients. Radiographic examination was used to evaluate marginal bone loss. Stability values,bleeding on probing and pocket depths were evaluated. Reliability of impression technique with i-Physio Profile Designer have been evaluated with marginal adaptation of the restoration via clinical examination of prosthodontist. Paired t test was used for numeric data.

RESULTS: There was no significant difference regarding ISQ values at time of insertion, at 4th and 6th months. Pocket depths were significantly deeper in control group in mesial and distal sides of implants. (p=.014, p=.047, respectively). There was no significant differerence regarding impression reliability between conventional impression and digital impression with i-Physio Profile Designer. Mesial marginal bone loss was significantly higher in group with standart gingiva former than that of the group with i Physio Profile Designer. (p=.07).

CONCLUSION: i-Physio Profile Designer serve a better periodontal health during osteointegration phase. Similar results could be obtained with digital impression with i-Physio and conventional techniques. Compared to traditional gingiva formers,the digital i-Physio Profile Designer approach: Reduced clinical procedures, increased clinical efficiency, offered a faster and more patient-friendly protocol. It may offer a clinically advantageous alternative to standard gingiva formers in implant therapy.

Keywords: i-Physio Profile Designer, Marginal Bone Loss, Digital Impression Technique, Peri-implant Soft Tissue Health

SS-327 Aesthetic and Functional Rehabilitation with Zirconia-Based Restorations on Teeth and Implants: A Clinical Case Report

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INTRODUCTION: Zirconia-based restorations are extensively used in contemporary prosthodontics to achieve superior aesthetics, biocompatibility, and mechanical durability. Especially in full-mouth rehabilitations, zirconia offers an optimal balance of strength and translucency for both tooth- and implant-supported restorations.

Case description: This case presents the full-mouth aesthetic rehabilitation of a 37-year-old patient (I.E.) utilizing zirconia restorations. The patient presented with fractured zirconia crowns on teeth #11 and #21; discolored, morphologically inadequate composite restorations on teeth #13, #14, #22, #23, and #24; and ill-fitting, unaesthetic zirconia crowns on implants at positions #16, #25, #26, #35, #36, #37, #44, and #46. Additionally, open embrasures, food impaction, and compromised composite fillings were observed on endodontically treated teeth #34 and #43.

Intraoral scanning was performed using the Shining 3D® scanner, followed by a digital smile design. A mock-up based on the design was evaluated intraorally and finalized upon patient approval. Preparations were guided by the mock-up. Due to the absence of compatible scan bodies for older Camlog® implants, conventional impressions were taken.

A zirconia hybrid abutment was fabricated for implant site #22, while custom titanium abutments were designed for other implants. Final zirconia restorations were cemented with CEM Implant® dual-cure resin cement on implants, and Riva Luting Plus® resin-modified glass ionomer cement on natural teeth.

DISCUSSION: The treatment resulted in a highly satisfactory outcome in terms of function, aesthetics, and patient comfort. The integration of digital planning and material selection, especially for challenging implant scenarios, was critical to achieving a predictable and natural-looking result.

Keywords: Zirconia, rehabilitation, implant, DSD, aesthetic

SS-328 Prosthetic Rehabilitation with Bar-Supported Telescopic Crowns: A Case Report

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This case report outlines the prosthetic rehabilitation of an 88-year-old male patient who presented with ill-fitting complete maxillary and partial mandibular dentures. Clinical and radiographic evaluation revealed complete edentulism in the maxilla and partially edentulous mandible, with severely carious mandibular canines.

Given the patient's desire to retain his natural dentition, a mandibular overdenture supported by telescopic crowns was planned, utilizing the mandibular canines as abutments. A conventional complete maxillary denture was also fabricated.

Endodontic treatment and restorations were performed on the abutment teeth. Tooth preparations followed the knife-edge technique with 1.5–2 mm reduction on the axial and occlusal surfaces, maintaining a low convergence angle (0°–6°) to enhance retention. C-type silicone impression material was used to obtain accurate impressions for primary crowns. These metal primary copings were splinted with a bar to provide increased stability and even distribution of occlusal loads, and were cemented using glass ionomer cement.

Secondary impressions were made with the primary crowns in place, allowing for the fabrication of a removable prosthesis with integrated secondary crowns. Vertical dimension was recorded using a wax-up, and tooth try-in confirmed esthetics and function. The final prosthesis was designed to manage axial forces efficiently.

The bar-supported telescopic system demonstrated excellent retention, functional stability, and patient comfort without the need for surgical intervention. Improvements were noted in masticatory efficiency, speech, and soft tissue health during follow-up evaluations. No pathological mobility or complications were observed.

In conclusion, bar-supported telescopic crowns offer a viable and cost-effective alternative to implant-retained overdentures, particularly in elderly patients. This technique preserves periodontal proprioception, enhances force distribution, and supports long-term prosthetic success.

Keywords: Telescopic crowns, bar-splinted abutments, overdenture

SS-329 AI-generated patient guidance on maxillofacial prosthetics: a pilot study comparing chatgpt-4 and copilot

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OBJECTIVES: Artificial intelligence (AI) tools are increasingly used in healthcare, but their ability to provide accurate and complete information on maxillofacial prosthetics—particularly obturators—remains unclear. This pilot study aims to compare the response quality of two large language models, ChatGPT-4 and Microsoft Copilot, in addressing patient-centered questions in maxillofacial rehabilitation.

MATERIALS-METHODS: A total of 25 open-ended questions were developed based on clinical experience and frequently asked patient concerns. Each question was submitted to both AI models in a new chat session, with the instruction "short answer only" to standardize response length. Two prosthodontists independently evaluated each response using a five-point Likert scale based on two parameters: accuracy and completeness. Additionally, each response was reviewed for a referral to a dental or medical professional. Evaluations were based on authoritative prosthodontics textbooks and recent systematic reviews. Descriptive statistics were calculated. Wilcoxon signed-rank tests were used to compare the models across each evaluation parameter, and Cohen's d was calculated to estimate effect sizes.

RESULTS: While no statistically significant difference was found between the models in terms of accuracy scores (Copilot: 4.80, ChatGPT-4: 4.52; p = 0.190), Copilot yielded significantly higher completeness scores compared to ChatGPT-4 (Copilot: 3.76, ChatGPT-4: 2.80; p = 0.009). According to the effect size analysis, this difference was of moderate magnitude (Cohen's d = 0.566).

CONCLUSIONS: This study provides a valuable example for evaluating the current capabilities and potential of AI-powered chatbots in healthcare. It highlights that, particularly in complex and detail-oriented topics, the level of completeness is as critical a performance indicator as accuracy.

Keywords: Maxillofacial Prosthesis, Artificial Intelligence, Large Language Models, Patient Education as Topic, Prosthodontics

SS-330 TikTok Videos and Smile Design: Evaluation of Content, Reliability, and Quality

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OBJECTIVES: Social media platforms, in particular, have significant potential for information dissemination, enabling physicians and patients to share their experiences and knowledge on health-related issues, as well as facilitating instant information sharing. Recently, TikTok has become increasingly popular, particularly among young people. TikTok has over a billion users, with more than 60% of its users falling within the 10 -29 age range; this age group corresponds to the majority of young patients who are particularly concerned with aesthetics. However, no comprehensive study has been conducted to evaluate the quality of TikTok videos. This study aims to evaluate the reliability and quality of smile design-related content shared on the social media platform TikTok.

MATERIALS-METHODS: A search was conducted using the two terms "#smile design" and "#laminate veneer" to identify relevant videos. Video source, view count, video duration, likes, and comments were documented. A 5-point information domain score was applied to classify videos as "not useful," "slightly useful," "moderately useful," "useful," and "very useful." The DISCERN tool and Global Quality Score (GQS) were used to assess the reliability and quality of the videos. Analyses were performed in the IBM SPSS 27 program.

RESULTS: Of the 153 videos that met the inclusion criteria, most were uploaded by dental clinics (56.9%) and dentists (32.0%) and had an average of over 5 million views. The video type was predominantly product advertising (56.9%) and, to a lesser extent, informational (23.5%). Statistically significant, positive, and weak correlations were found between TikTok video characteristics and Duration with Total Content Score, VIQI, and GQS ($p < 0.05$).

CONCLUSIONS: The content and information quality of smile design videos on TikTok is insufficient. To overcome these deficiencies, dentists should create and upload informative, high-quality content to TikTok in the form of short videos for their patients.

Keywords: TikTok, smile design, laminate veneer, Quality of information, social media

SS-332 Clinical Applications of Different Screw-Retained Abutment Selections in Implant-supported Fixed Prostheses: Four Case Reports

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INTRODUCTION: The selection and application of screw-retained abutments are critical to the success of implant-supported fixed prosthetic treatments, particularly when faced with varying clinical demands and challenges. This presentation evaluates the clinical use and decision-making process surrounding screw-retained abutments across four distinct cases.

Case Descriptions: A 45-year-old female patient presented with limited interocclusal space and covered occlusion in the right maxillary canine region. A zirconia crown was fabricated over a Ti-base abutment. A 30-year-old female patient received screw-retained metal-ceramic crowns on the right maxillary first and second premolars due to restricted interocclusal space. A 60-year-old female patient with multiple missing teeth retained maxillary anterior dentition, and existing restorations were replaced. Six implants were placed bilaterally in the posterior maxilla, followed by cement-retained implant-supported bridges. In the edentulous mandible, six implants were placed, and a screw-retained All-on-Six hybrid prosthesis was delivered. Multi-unit abutments were utilized to manage implant angulation discrepancies. A 58-year-old edentulous female patient received twelve implants. One posterior maxillary implant failed due to insufficient osseointegration, and several implants were placed at angulated positions due to anatomical limitations. A full-arch hybrid prosthesis was fabricated using multi-unit abutments to compensate for implant angulation and support soft tissue.

DISCUSSION: These cases highlight the clinical versatility of screw-retained abutments, which facilitate passive fit by accommodating implant angulation, offer advantages in restricted interocclusal spaces, and enable both functional and esthetic restorations. The use of multi-unit abutments proves to be an effective solution in complex prosthetic rehabilitations, contributing to improved biomechanical harmony and soft tissue integration. Appropriate selection and use of screw-retained abutments enhance the success and predictability of implant-supported fixed prostheses across various clinical situations. This case series demonstrates the broad applicability and effectiveness of this prosthetic approach in contemporary implant dentistry.

Keywords: Screw-retained abutment, Ti-base, multi-unit abutment, implant-supported fixed prosthesis, hybrid prosthesis

SS-333 3D-Assessment and Accuracy of Different AI-Based and Conventional CAD for Crowns and Fixed Prostheses

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OBJECTIVES: With the increasing integration of artificial intelligence (AI) into digital dental workflows, it is essential to assess the performance of AI-based prosthetic design softwares compared to conventional CAD methods. This in vitro study investigates the 3D surface morphology and internal fit accuracy of single crowns (SCs) and fixed dental prostheses (FDPs) designed by two AI systems and a conventional CAD workflow. The aim is to determine whether AI-based designs can provide comparable or improved outcomes in terms of adaptation and design quality.

MATERIALS-METHODS: Two maxillary models were used: (1) teeth #13, #16 were prepared with chamfer finish lines for SCs; (2) teeth #11, #13 were prepared similarly, with tooth #12 serving as the pontic for a 3-unit FDP. Digital impressions were obtained using an intraoral scanner and exported in PLY format. A technician with over 10 years of experience created the conventional group's designs. For the AI groups (AI-DB and AI-experimental/AI-E), the same PLY files were imported into the software, and restorations were generated autonomously without user input. Each protocol was repeated 15 times. The duration from the initial to design completion was recorded. STL files were analyzed using metrology software to evaluate intaglio and external surface deviations, recorded as Root-Mean-Square (RMS). Two-way ANOVA and Bonferroni post-hoc tests were applied ($p=0.05$).

RESULTS: In SCs, both tooth type and design system significantly affected internal fit ($p<0.05$). AI-E showed superior accuracy than AI-DB on all surfaces($p<0.05$). Canine SC showed higher trueness values than molar SC, though slight over-contouring was noted in AI-E molars ($p<0.05$). In FDPs, AI-DB designs were clinically unacceptable, whereas AI-E demonstrated superior internal-fit ($p<0.05$). Regarding the time efficiency, AI-experimental was fastest, followed by AI-DB ($p<0.05$). The conventional workflow required the longest time than AI groups ($p<0.05$).

CONCLUSIONS: AI-E achieved better adaptation and accuracy than AI-DB in both SCs and FDPs, emphasizing AI's potential in digital prosthodontics.

Keywords: Deep Learning, Artificial intelligence, Computer aided design, Tooth morphology, Internal Fit, Time efficiency

SS-334 Investigation of the Effect of Different Grit Diamond Burs on Surface Roughness After Tooth Preparation

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PURPOSE: The aim of this study is to evaluate tooth preparations performed with burs of different grit sizes in terms of surface roughness and preparation time.

MATERIAL-METHODS: seventy-six maxillary premolar teeth without carious lesions, restorations, or substance loss were obtained from the Faculty of Dentistry, Ankara University. A total of 76 teeth were embedded in acrylic blocks for standardization. The samples were divided into four different group of 19 specimens.The diamond burs were coded red, green, blue, and black to represent increasing grit sizes. The duration was recorded during the shoulder-type tooth preparation. Surface roughness was measured using a profilometer (Mahr Perthometer M2; feed rate: 0.5 mm/s) and examined visually under a light microscope (Leica MZ 12; 100× magnification).

RESULTS: A statistically significant difference was observed between the groups in terms of Ra values ($p<0.05$). The blue bur group exhibited significantly higher surface roughness compared to all other groups ($p<0.05$). The green group had higher roughness values than the black group ($p<0.05$), while no significant difference was found between the red and green groups. There was also a significant difference between the groups regarding preparation time ($p<0.05$), with the blue group requiring the longest duration ($p<0.05$).

CONCLUSION: Within the limitations of this in vitro study, the grit size of diamond burs significantly influenced both surface roughness and preparation time. Medium-grit blue burs resulted in the highest roughness and longest duration. Coarse black burs yielded unexpectedly lower roughness, likely due to greater cutting efficiency and shorter contact time. Bur selection should consider both surface quality and clinical efficiency. Further studies are needed to explore the long-term impact of surface roughness on restoration success.

Keywords: Diamond burs, Grit size,Surface roughness

SS-335 Comparison of Maxillary Impression Techniques in Completely Edentulous Patients: An Analysis of Internal Prosthesis Fit Using Digital and Conventional Methods

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INTRODUCTION: Accurate maxillary impressions are essential for the success and prognosis of complete dentures in edentulous patients. With the rise of digital technologies, conventional impression techniques can be assessed using digital reference models.

OBJECTIVE: This study aimed to compare the internal surface adaptation of maxillary complete dentures fabricated using two impression techniques—closed-mouth functional impressions and the intaglio surfaces of the final prostheses—and to identify which method provides better congruence with digital reference models.

METHODS: Four completely edentulous patients' maxillae were scanned using a 3Shape 5 intraoral scanner to generate STL-format digital reference models. These were trimmed 2 mm inside the functional borders. Conventional impressions were taken using custom trays, followed by record bases and closed-mouth functional impressions with eugenol-based material. The resulting casts and the intaglio surfaces of the delivered dentures were digitized. All models were analyzed using Geomagic Control X software, with initial and best-fit alignment performed between test and reference models. Surface deviations were evaluated within a ±0.5 mm tolerance using color mapping, and RMS (root mean square) values were calculated.

RESULTS: Models obtained from closed-mouth functional impressions showed lower RMS values than those of the scanned denture intaglio surfaces, indicating better adaptation to the reference. Specifically, RMS values for the intaglio surfaces were 0.3186, 0.3389, 0.2782, and 0.2963, while those for the closed-mouth impression models were 0.2101, 0.2691, 0.1801, and 0.1699, respectively.

CONCLUSION: Closed-mouth functional impressions using eugenol-based material demonstrated closer adaptation to the digital reference model than the internal surfaces of the final dentures. These findings support the continued relevance of conventional functional impression techniques in maxillary edentulous cases, particularly when accurate mucosal detail is essential.

Keywords: Complete edentulism, Maxillary impression techniques, Digital prosthodontics, Closed-mouth impression, Internal fit of dentures

SS-336 Influence of Finishing and Storage Media on Color and Surface Roughness of 3D-Printed Permanent Resin

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OBJECTIVE: This in-vitro study aimed to evaluate the color stability (ΔE_{00}) and surface roughness (Ra) of a 3D-printed permanent resin subjected to different surface finishing protocols and aged in various storage media.

MATERIALS-METHODS: Eighty-four resin specimens (Saremco Crowntec) were fabricated using a DLP 3D-printer (Solflex 250, W2P) and assigned to 12 subgroups (n=7) according to surface finishing method and aging medium. The surface finishing protocols included no treatment (control), glaze (GC Optiglaze Clear), and multi-step polishing (Sof-Lex discs, 3M ESPE). Specimens were stored in one of four media—artificial saliva, energy drink, cola, or coffee—at 37°C. ΔE_{00} and Ra (μm) were measured at baseline (T0), 1 week (T7), and 2 weeks (T14), simulating approximately 6 months and 1 year of clinical aging. Data were analyzed using three-way mixed ANOVA, two-way ANOVA, and Tukey's HSD post-hoc tests (α=0.05).

RESULTS: Significant changes in both ΔE_{00} and Ra were found over time (p<0.001). Glazed specimens exhibited the highest ΔE_{00} values, especially after immersion in coffee, followed by polished and control groups (p<0.001). Both surface finish and storage medium significantly affected color stability (p<0.001), with a significant interaction between the two factors (p<0.001). Ra increased significantly over time (p<0.001), and significant interaction effects were observed between surface finish and time (p=0.002), medium and time (p<0.001), and the three-way interaction (p<0.001). The greatest increase in surface roughness was recorded in glazed samples stored in acidic media such as cola and energy drink.

CONCLUSION: Surface finishing protocol and storage medium significantly influence the color stability and surface roughness of 3D-printed permanent resin. Coffee caused the most pronounced discoloration, while cola led to the highest increase in surface roughness, particularly in glazed specimens. These findings highlight the relevance of proper finishing techniques and the effects of daily dietary exposures on the clinical longevity of resin-based restorations.

Keywords: 3-D Printing, Permanent Dental Restorations, Dental Polishing

SS-340 Mechanical performance of additively manufactured ceramic-filled hybrid resin FDPs following various thermocycling durations

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OBJECTIVE: This study aimed to evaluate the effect of various thermocycling durations on the fracture resistance of 3-unit bar-type specimens fabricated from a 3D-printed ceramic-filled hybrid permanent resin, subjected to three-point bending tests.

MATERIALS-METHODS: A total of 48 bar-shaped specimens (5×5×30 mm) were fabricated and divided into four groups according to thermocycling duration: Non-Aging, 1-month, 3-month, and 12-month thermocycling. Each bar consisted of three 10 mm segments connected via 4×4 mm² U-shaped connector areas. Specimens were loaded directly using a universal testing machine (crosshead speed of 1 mm/min) until fracture. Fracture loads (N) were recorded and statistically analyzed using non-parametric tests due to normality violations, with and without outlier values identified by the IQR method. In addition, effect sizes (Cliff's delta) and regression analysis were conducted to explore clinical trends.

RESULTS: No statistically significant differences were observed between groups in either the full or trimmed datasets (Kruskal-Wallis, p> 0.05). However, moderate to large effect sizes were detected between the Non-Aging and aged groups. Linear regression revealed a statistically significant negative trend in fracture resistance with increased thermocycling duration (p < 0.05).

CONCLUSION: Although groupwise differences were not statistically significant, moderate effect sizes and a significant negative regression trend suggest a potential weakening effect of prolonged thermocycling. These results underline the importance of long-term thermocycling simulations in evaluating the mechanical performance of additively manufactured hybrid resin materials.

Keywords: additive manufacturing, ceramic-filled hybrid resin, fracture resistance, thermocycling

SS-341 Bond Strength Between Denture Lining Materials and Different Manufactured Denture Base Materials: A Systematic Review

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OBJECTIVES: Long-term use of complete dentures can lead to changes in the alveolar ridges, compromising tissue adaptation, which is clinically managed by applying soft or hard relining materials to improve the functional and biomechanical fit of the denture base. The aim of this systematic review is to evaluate studies investigating the bond strength between soft and hard denture lining materials and denture base materials produced using different fabrication techniques.

METHODS: A comprehensive literature search was conducted in the PubMed and Google Scholar databases for the period between 2019 and 2025 using the **Keywords:** lining material, denture base material, bond strength, and additive manufacturing. Studies published in English and Turkish that examined the bond strength of soft and hard relining materials to complete denture base materials produced by various techniques were reviewed and summarized.

RESULTS: The initial search yielded 853 articles related to lining materials, 1,038 on denture base materials, 13,777 on bond strength, and 12,908 on additive manufacturing. After screening titles and abstracts, inclusion and eligibility criteria were applied, and 13 articles were selected for full-text review. Of these, 6 studies fully met the inclusion criteria. Upon evaluating the data, it was determined that denture base materials fabricated using conventional, subtractive, additive, compression molding, milling, 3D printing, and injection techniques exhibited different levels of bond strength with soft and hard lining materials.

CONCLUSION: All combinations of denture base and lining materials demonstrated bond strength values considered clinically acceptable. The reviewed studies indicate that the success of bonding between soft and hard lining materials and denture base materials is directly influenced by the manufacturing technique and chemical composition of the base material. The findings suggest that bond strength significantly varies depending on the type of base and lining materials used.

Keywords: Lining Material, Denture Base Material, Bond Strength, Additive Manufacturing

SS-342 Effect of Post-Polymerization Time on Flexural Strength and Surface Roughness of PMMA Materials Fabricated by Conventional and Additive Manufacturing Techniques: An In Vitro Study

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OBJECTIVES: The aim of this in vitro study is to evaluate the effects of different fabrication methods (additive and conventional) and varying post-polymerization durations on the flexural strength and surface roughness of PMMA used as a temporary restorative material.

MATERIALS-METHODS: A total of 30 specimens were prepared with dimensions of 3 mm × 3 mm × 25 mm. The specimens were produced using two different methods and subjected to varying post-polymerization durations:

Group A: Additive manufacturing (Formlabs 3D printer)

Group B: Conventional fabrication using a mold made of Type A silicone. Each group was further divided based on three different post-polymerization durations. Flexural strength was measured using a universal testing machine. Surface roughness was evaluated with a profilometer.

A G-Power analysis was conducted to ensure the reliability of the study findings.

RESULTS: Specimens produced using the conventional method exhibited higher flexural strength compared to those manufactured through additive techniques. In the additive manufacturing group, a positive trend in flexural strength was observed with increasing post-polymerization duration. In the same group, surface roughness remained higher in specimens with shorter post-polymerization times.

CONCLUSION: The findings of this study demonstrate that both the fabrication technique and post-polymerization duration have significant effects on the flexural strength and surface roughness of PMMA used in provisional restorations. Conventional method combined with extended post-polymerization produced specimens with the highest mechanical strength and lowest surface roughness. In additive manufacturing, increasing the post-polymerization time resulted in improved material performance. These results highlight the importance of applying adequate

post-polymerization protocols for achieving optimal esthetic and mechanical outcomes in temporary restorations fabricated using digital techniques. Particularly in additive manufacturing systems, optimized post-polymerization can enhance clinical success.

Keywords: PMMA (Polymethyl Methacrylate), 3D Printing, Post-Polymerization,CAD/CAM

SS-344 Investigation of bonding strength of minimally invasive and aesthetic adhesive attachments

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OBJECTIVES: This study explored whether monolithic zirconia, a strong and esthetic dental ceramic, can serve as a reliable alternative to metal attachments in removable partial dentures. The effects of different surface treatments on the bonding strength of zirconia attachments were evaluated.

MATERIALS-METHODS: Using CAD/CAM technology, we designed and milled zirconia-based resin-bonded attachments (RBAs). Four groups were tested each containing 10 samples: Untreated (control) (Group C), treated with graphene oxide (Group Gr), treated with Z-PrimePlus (Group ZP), and a group with a modified occlusal veneer design (Group OV). Surface treatment of the specimens started with air abrasion using aluminum oxide particles, additional applications according to each group performed subsequently. To evaluate the Shear Bond Strength (SBS) between the RBAs and resin cement the adhesive interface of each specimen was loaded into a jig of the universal testing machine until failure occurred. The corresponding software recorded the maximum load (Newton) required to produce a failure. According to the Kolmogorov-Smirnov test result, the Oneway Anova test was applied because the data were normally distributed and the Post-hoc Tukey test was applied to determine which groups differed.

RESULTS: The Kolmogorov-Smirnov test indicates that the data are normally distributed ($p = 0.116$). The One-Way ANOVA test shows a statistically significant difference between the groups ($p < 0.05$). The *post hoc* Tukey test reveals that the OV group has a higher bond strength compared to the C and Gr groups.

CONCLUSION: Zirconia attachments, especially when an occlusal veneer design added or treated with primers like Z-PrimePlus, offer a durable and esthetically pleasing alternative to metal clasps in partial dentures. They also support more conservative, less invasive treatment—making them an excellent option for patients who cannot undergo implant therapy.

Keywords: zirconia, precision-retained removable partial dental prostheses, adhesive attachments

SS-345 Minimizing Occlusal Adjustments: The Clinical Impact of AI, Jaw Motion and Digital Design Tools

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OBJECTIVES: The primary objective of this study was to evaluate and compare the clinical adaptation and occlusal adjustment requirements of occlusal splints fabricated using three distinct digital workflows. These workflows included: (1) artificial intelligence (AI)-assisted design, (2) integration of individual jaw motion tracking data into the digital design process, and (3) conventional digital design based on average values. The study aimed to determine which method offers superior occlusal contacts and minimizes chairside adjustment time.

MATERIALS-METHODS: Twelve healthy adult volunteers participated in the study. Intraoral digital impressions were acquired using a high-resolution intraoral scanner. For each participant, three occlusal splints were fabricated using different workflows: Group 1 utilized an AI-based dental CAD software to generate designs; Group 2 incorporated jaw motion tracking records using a jaw tracking system to guide the splint design within a CAD program; and Group 3 relied solely on the design software using standard average values. The fabricated splints were evaluated intraorally, and necessary static and dynamic occlusal adjustments were performed to achieve successful clinical performance. The amount of material removed during adjustment was digitally measured and analyzed using Geomagic Control software for precise quantification.

RESULTS: Among the three groups, the splints designed with jaw motion tracking data (Group 2) required the least occlusal adjustment. AI-designed splints (Group 1) showed moderate adaptation, while splints based on average values (Group 3) needed the highest level of clinical adjustment. Statistical analysis confirmed significant differences between groups ($p < 0.05$).

CONCLUSION: Digital splints designed with patient-specific jaw motion data demonstrated superior occlusal fit and required the least clinical modification. Integrating functional

dynamic data into digital design processes can significantly enhance the clinical performance of occlusal splint and reduce chair-time.

Keywords: occlusal appliance, jaw motion tracking, digital dentistry, artificial intelligence

SS-346 Prosthetic Rehabilitation of a Bruxist Patient Requiring Increasing Vertical Dimension: A Case Report

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INTRODUCTION: Bruxism is a habit characterized by the nonfunctional clenching of teeth. Depending on the extent of tooth wear, a loss of occlusal vertical dimension is usually observed. A stable occlusal vertical dimension that the patient can adapt to should be established first. In addition, elimination of joint complaints, gaining function, and correction of aesthetics and phonation should be targeted.

Case description: A 32-year-old male patient presented to Atatürk University Faculty of Dentistry, Department of Prosthodontics due to loss of chewing function, pain and esthetic reasons. The anamnesis revealed that the patient had a habit of clenching teeth and that the crown lengths of the upper and lower jaw teeth had decreased. After the rest and occlusal vertical dimension determination, it was decided to gradually increase the required 4 mm occlusal vertical dimension increase since it exceeded physiological limits. First of all, the vertical dimension was increased by 2 mm with the stabilization splint used for 6 weeks and the vertical dimension was increased by 2 mm with the prosthetic rehabilitation of the upper jaw. The vertical dimension was increased by 2 mm with the stabilization splint applied again and used for 6 weeks. Subsequently, the prosthetic rehabilitation of the lower jaw was also provided. As a result, the occlusal vertical dimension was increased by 4 mm using metal ceramic fixed dental prosthehis. After the patient's treatment was completed, the stabilization splint was renewed to protect the health of both the temporomandibular joint and muscles. In the control sessions, it was observed that the health of the stomatognathic system was preserved.

DISCUSSION: The increase in the occlusal vertical dimension was made within the neuromuscular limits. Then, the occlusion was maintained and stabilized. The patient's aesthetics, phonation and function were corrected and the pain in the muscles was treated.

Keywords: Bruxism, Increasing vertical dimension, Dental prosthesis, Tooth wear

SS-347 Evoluating The Knowledge Level of Dentists About Prosthetic Procedures Performed In Mobile Dental Services

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Objectives: Mobile dental services as a means of reaching out to the underserved in the population are serving nursing homes, and people with impaired mobility. The predominant demography in this group is elderly, with a significant requirement for prosthesis. This study aimed at evoluating of dentists kowledge level of prosthetic procedur in this services, which are starting to widespread at our country. Materials and methods; 42 dentists who completed their dentistry education and actively practiced their profession participated in the study voluntarily. Participating dentists were asked a survey consisting of 14 questions measuring knowledge in addition to demographic questions regarding their years of clinical experience and the institution they work for. These questions are aimed at prosthetic procedures applied in mobile dental services. The Chi-Square test and Fisher's Exact Chi-Square test were used for data comparison. The significance was assessed at the $p<0.05$ level. Results; A significant majority of dentists didn't previously offered this service (90.47%) and didn't have training before (95.23%). All the dentists providing this service work in a public hospital. There is a significant difference in the knowledge level among institutions ($p<0.05$), and the average knowledgen level of doctors working in public hospitals is higher. There is no significant difference in the level of knowledge among the years of professional experience ($p>0.05$).

CONCLUSIONS: The findings indicated that dentists exhibited a deficient understanding of prosthetic operations in mobile dental services, irrespective of their clinical experience, however this knowledge differed based on the institutions. It's observed that the level of knowledge of dentists working in public hospitals, where this service is widely provided in Turkey, is higher. Considering the probability of dentists having careers in government institutions post-graduation, it would be advantageous to provide additional training on mobile dental services within dental faculties.

Keywords: Dentists, Mobile dental services, Survey

SS-348 Wear of bulk-fill resin composites

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OBJECTIVE: Bulk-fill resin composites are a special group of restorative materials designed to reduce chair time needed to insert a direct composite restoration. Clinically the major reasons for failure of direct restorations are secondary caries and fracture of the restoration or the tooth itself. As bulk-fill materials have their own composition that will determine their mechanical properties, the wear resistance may be affected as well. The aim of this in vitro study was to evaluate the wear of bulk-fill composites in comparison with a conventional hybrid composite. The null hypothesis was that there are no differences between the four bulk-fill materials and one traditional highly filled nanohybrid composite for posterior use when subjected to a two-body wear rate test and hardness measurement.

METHODS: Four bulk-fill composites SDR Smart Dentin Replacement (SDR), X-tra base (XBA), FiltekBulk Fill (FUP), Dual-Curing Bulk Composite (FBFL) and conventional nanohybrid resin composite Grandio (GDO) subjected to a two-body wear test against a stainless steel (SS) antagonist wheel. Scanning Electron Microscopy analysis was performed to detect the surface alterations. Microhardness of all samples was tested (n = 5) with a Vickers diamond indenter (5 indentations in each specimen). One-way ANOVA and Tukey's *post hoc* test ($P < 0.01$) were used to analyze differences in wear values. The hardness data were submitted to one-way ANOVA test, followed by the Tukey *post hoc* test ($\alpha = 0.05$). T-test was applied to compare wear rate in time interval between one day and one month.

RESULTS: The highest wear rate values were recorded for SDR and the lowest wear rate values were for GDO. Hardness was the highest for GDO and the lowest for FBFL.

CONCLUSIONS: The bulk-fill composites have a higher wear rate and lower hardness than the conventional nanohybrid composite, making them less suitable for stress-bearing restorations.

Keywords: bulk-fill composites, wear, SEM, hardness

SS-349 Comparative evaluation of two crestal approach sinus lifting techniques using 3D CBCT imaging

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OBJECTIVE: To compare the results of the traditional crestal and the large area (Baysal Lifting) methods in order to determine the most appropriate crestal approach for sinus lifting.

METHOD: The initial, post-implant and healing bone heights compared with cbct for a total of 10 implants of four different regions in five teeth (16, 17, 25, 26 and 27) from five patients who received implants. Two of the patients were applied the traditional method for sinus lifting before implant, and three of them were applied the Baysal Lifting method developed by the researcher. Due to the effect of the difference in the initial tooth bone levels of the cases, the differences in the bone levels immediately after sinus lifting and healing were analyzed from the initial level.

RESULTS: The bone heights of both methods were similar after lifting and healing and the difference was not statistically significant ($p>0.05$). However, when the change according to the initial bone value was examined, a statistically significant increase was recorded in Baysal method compared to the beginning ($p<0.05$). In the improvements in the medial region, Baysal Method caused significantly more bone formation both for the initial difference of lifting and for the initial difference of healing ($p<0.05$). For the teeth in the distal and middle regions, although the difference between the two methods was in favor of the Baysal method, it was not statistically significant ($p>0.05$).

CONCLUSION: Although the initial bone level was lower in the Baysal method, more effective results were obtained both after lifting and after healing. This method shows that the Baysal method is superior to traditional crestal lifting in terms of implant applications in patients with bone less than 5 mm and in terms of healing in a much shorter time and building natural bone without any grafting.

Keywords: Crestal approach, Sinus lifting, Baysal technique

SS-350 Rehabilitation of severely atrophic maxilla and mandible with custom-made subperiosteal implants: a case report

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INTRODUCTION: Today, implant-supported fixed prostheses are widely used as an alternative to removable dentures in the treatment of edentulism, offering patients greater comfort. However, the rehabilitation of atrophic jaws using conventional endosseous implant-supported overdentures and immediate loading protocols still presents clinical challenges. With advancing technology and digital systems, subperiosteal implants have become increasingly popular. This case report aims to present the rehabilitation of a severely atrophic maxilla and mandible using a custom-made subperiosteal implant.

Case description: A 61-year-old male patient with no systemic diseases presented to our dental clinic. During the initial oral examination, due to advanced periodontal problems, it was decided to extract the remaining upper and lower teeth. Given the patient's strong gag reflex, the use of removable prostheses was deemed unsuitable, and fixed treatment options were considered. Radiographic evaluation revealed insufficient bone volume in the maxilla, eliminating conventional implant options. Therefore, a custom-made subperiosteal implant was planned. An immediate denture was fabricated to serve as a surgical guide during the subperiosteal implant planning process. A full denture containing radiopaque teeth made with Barium Sulfate (NTX-Ray Radiopaque, Toros Dental, Turkey) was used to obtain dental tomography images. Based on the obtained images, a 3D implant planning was performed for the patient. A subperiosteal implant made of titanium alloy (Custimesh Medical Innovative Solution, Kayseri, Turkey) was surgically placed. After a three-month osseointegration period, an impression was taken using the open tray technique with an intraoral digital scanner (Trios 5, 3Shape, Denmark). Following the trial fitting of the monolithic zirconia prosthesis with a multi-unit abutment, the final prosthesis was delivered to the patient.

CONCLUSION: In cases of severely atrophic jaws, custom-made subperiosteal implants can be considered a viable treatment alternative to help meet the patient's lost esthetic and functional needs.

Keywords: Subperiosteal Implant, Oral Rehabilitation, Intraoral Scanner, Digital Dentistry, Atrophic Jaws

SS-351 Rehabilitation of short edentulous spaces with fiber-reinforced composite bridges in patients who are not eligible for ımplant treatment and do not accept tooth preparation: a case series

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INTRODUCTION: Fiber-reinforced adhesive bridges, due to their compatibility with composite and adhesive systems, can be utilized as both temporary and permanent restorations. These restorations may be applied with or without tooth preparation in cases involving anterior or posterior tooth deficiencies.

MATERIALS AND METHODS: This case series presents the clinical application of fiber-reinforced composite bridges in three patients with anterior tooth loss.

Case 1: A 23-year-old male patient presented with a congenitally missing maxillary right lateral incisor. A previous implant attempt in the edentulous space had failed. Consequently, a fiber-reinforced adhesive bridge was selected as the treatment modality. Minimal palatal preparation was performed on the adjacent abutment teeth in the middle third region. A braided fiber strip was placed, and the pontic was constructed using composite resin in the form of a lateral incisor. Occlusal contacts were evaluated to ensure no interference with the pontic. The restoration was finalized with finishing and polishing procedures.

Case 2: A 20-year-old female patient exhibited bilateral agenesis of the maxillary lateral incisors. İmplant treatment couldn't be applied Furthermore, a fixed partial denture was not feasible due to root resorption of tooth 11 and mobility of adjacent teeth. A fiber-reinforced adhesive bridge was fabricated bilaterally to both replace the missing teeth and stabilize the mobile teeth, following the protocol described in Case 1.

Case 3: A 17-year-old female patient presented with congenitally missing mandibular central incisors. Implant placement was not possible and the patient declined a fixed partial denture. A fiber-reinforced adhesive bridge containing two pontics was placed in the edentulous area, using the same clinical technique as in the previous cases.

CONCLUSION: In cases where implant-supported restorations are not feasible or patients decline conventional tooth preparation, fiber-reinforced adhesive bridges represent a conservative and minimally invasive treatment alternative, providing both functional and esthetic outcomes.

Keywords: Fiber-reinforced adhesive bridge, composite bridges, resin based adhesive bridges

SS-352 Anterior ceramic restorations: navigating the spectrum of esthetic materials

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INTRODUCTION: Increasing esthetic demands in contemporary dentistry have driven the development of advanced all-ceramic systems, providing effective alternatives to traditional porcelain-fused-to-metal restorations. These advancements have resulted in a broad spectrum of ceramics, each with distinct mechanical, optical, and adhesive properties—supporting minimally invasive, biomimetic prosthetic rehabilitations. While this diversity expands therapeutic options for anterior restorations, it also presents a clinical challenge in selecting the most suitable material to meet both functional and esthetic needs, particularly in the anterior region where precision and optical integration are critical.

Case description: This report presents three anterior clinical cases, each demonstrating the selection of a distinct ceramic material based on functional and esthetic considerations:

• Case 1: Four lithium disilicate veneers on the maxillary incisors for diastema closure.

• Case 2: Six layered zirconia crowns for severe fluorosis, including masking a metallic post in the lateral incisor.

• Case 3: Full-contour monolithic zirconia bridge with incisal edge cut-back for six maxillary anterior teeth.

DISCUSSION: Selecting the optimal ceramic material for anterior restorations requires balancing esthetic demands, biomechanical performance, and adhesive capacity. Monolithic zirconia, despite its opacity, can effectively mask discolored abutments or metallic posts, broadening its indications in the anterior region. Layered zirconia combines the strength of a zirconia framework with the enhanced translucency of veneering ceramics, addressing both structural and esthetic requirements. Lithium disilicate offers superior translucency and bonding potential, making it suitable in cases with favorable substrate color, low occlusal load, and high esthetic expectations. Ultimately, material selection should be individualized, guided by comprehensive clinical evaluation of occlusal forces, smile line, and the optical and adhesive characteristics of the substrate. This patient-centered approach optimizes both restoration longevity and esthetic integration.

Keywords: Anterior restorations, All-ceramic systems, Biomimetic dentistry, Lithium disilicate, Zirconia, Material selection