

CA2866

Moisture-Ph Impact On Zirconia Bilayered Ceramic Flexural StrengthXiaofeng Qin^{*1}, Xiaohui Su²¹Guangxi Medical University Stomatological Hospital, Nanning, China; ²The Second Affiliated Hospital of Guangxi Medical University, Nanning, China

Aim or purpose: To evaluate the combined effects of moisture and pH variations on the biaxial flexural strength of zirconia/veneering porcelain bilayered ceramics under cyclic loading.

Materials and methods: Two protocols were implemented: (1) cyclic loading (10,000 cycles, 600 N) under dry and saliva-simulated wet conditions (pH 7); (2) cyclic loading followed by immersion in acidic (pH 4), neutral (pH 7), and alkaline (pH 8) environments. Post-loading assessments included biaxial flexural strength testing, fracture mode analysis via optical microscopy, and reliability evaluation using Weibull statistics.

Results: Moisture reduced flexural strength by 70% (dry: 942.8 MPa vs. wet: 551 MPa), with wet conditions inducing Hertzian cone cracks and circumferential cracks, leading to veneer delamination. Neutral pH (pH 7) exhibited the highest strength, surpassing acidic (pH 4) and alkaline (pH 8) groups by 14% and 45%, respectively. Alkaline environments showed reduced structural reliability (Weibull modulus: 8.9; R^2 : 0.94) due to heterogeneous crack propagation, while acidic conditions slowed crack growth (attributed to $\text{SiO}_2/\text{Al}_2\text{O}_3 \approx 4$).

Conclusions: Oral humidity and pH fluctuations synergistically degrade zirconia/porcelain bilayers via mechanical fatigue and chemical corrosion. Saliva amplifies stress and corrosion, necessitating dual-mechanism mitigation for durable all-ceramic restorations.

Key Words: Dental ceramics, Bilayered structure, Cyclic loading, Biaxial flexural strength, Weibull analysis.

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CA2701

Study On Electrospinning Artificial Periosteum To Promoting OsteogenesisJunyi Fang^{*1}, Zhenhua Wang¹¹Urumqi Stomatological Hospital, Urumqi, China

Aim or purpose: A nanocomposite artificial periosteum loaded with black phosphorus and vascular endothelial growth factor was fabricated using electrospinning technology. The physicochemical characteristics, biocompatibility, in vitro and in vivo osteogenic capabilities of this material were systematically investigated.

Materials and methods: The electrospinning solution was prepared by dissolving L-poly(lactic acid) particles in methylene chloride. Black phosphorus/vascular endothelial growth factor nanocomposite artificial periosteum (PLLA, PLLA/BP, PLLA/VEGF, PLLA/BP/VEGF fiber membranes) was fabricated using electrospinning technology. The physical and chemical properties were studied in vitro, their ability to promote osteogenic differentiation was investigated in vivo through SD rat

skull defect repair experiments. Animal experiments have been approved by the Institutional Animal Ethics Committee.

Results: (1) Characterization: All the membranes exhibited excellent mechanical properties, and the incorporation of black phosphorus and growth factors enhanced the hydrophilicity of the membranes. (2) Biocompatibility: Live/dead fluorescence staining and CCK-8 results indicated that the fiber membrane exhibited superior biocompatibility. (3) In vitro osteogenic differentiation performance: ALP, ARS staining, and qRT-PCR further confirmed that the fiber membrane markedly promoted the osteogenic differentiation of BMSCs. (4) Establishment of animal model and composite membrane implantation: Micro-CT revealed increased new bone in the defect area compared to the control group, while the composite membrane effectively promoted the high expression of osteogenesis-related genes.

Conclusions: Electrospun artificial periosteum loaded with black phosphorus and vascular endothelial growth factor has better osteogenic mineralization promoting performance, which can provide certain research basis for the progress of periosteum tissue engineering.

Key Words: Electrospinning, periosteum, Tissue Engineering, Biocompatibility.

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3. Dental Treatment & Restorative Dentistry - 3.5 Dental Biomaterials

Case Report – Posters

CA5380

Icon Resin Infiltration For Managing Dental Lesions - Case ReportNatasha Longurova^{*1}, Ljupka Arsovski¹, Marko Mladenovski¹, Sanja Nashkova¹, Sandra Atanasova¹, Bruno Nikolovski¹, Elizabeta Stevkovska Cvetkovska², Julija Zarkova Atanasova¹, Ivona Kovachevska¹, Katerina Zlatanovska¹¹Faculty of Medical Sciences, Goce Delcev University, Stip, North Macedonia, Shtip, North Macedonia; ²Dental office Dentalux-S, Kumanovo, North Macedonia

Introduction: Icon dental resin infiltration features microinvasive technology for removing spots that form when teeth are developing, defects caused by poor oral hygiene, possibly formed when a patient wear braces, or teeth with fluorosis or hypoplasia.

Case description: The aim of this paper is to present a clinical case of local hypoplasia treated using the resin infiltration technique, thus reviewing the mechanism of action and clinical procedure. A female patient aged 32 years reported a complaint of whitish patches on the front teeth. The patient was explained about various treatment options, and decided to be treated with Icon resin. The procedure was performed with currently available Icon Resin which contains three components: Icon-Etch: 15% hydrochloric acid, Icon-Dry: 99% ethanol, Icon-Infiltrant: methacrylate-based resin matrix.

Discussion: Icon-Etch is the first step gently put onto the tooth surface and then allowed to sit for a period of 2 minutes, followed by a 30-second rinse with water. Icon-Dry is the second step of the procedure. This step ensures adequate adhesion of the low-viscosity resin within the lesion. At the end we applied The Icon-Infiltration gel to the lesions and left to sit for 3 minutes. Before light curing, the excess resin was cleaned from the interdental spaces with a micro-brush and dental floss.

Conclusion/clinical significance: It is a microinvasive procedure where etching only erodes 30 to 40 μm of enamel, which is then infiltrated with resin. Also can remove caries in lesions that are too advanced to be treated with fluoride.

Key Words: Icon resin, local hypoplasia, caries.

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3. Dental Treatment & Restorative Dentistry - 3.6 Esthetics"
Original studies – Free Communications

CA6451

Socket Shield Technique In Maxillary Anterior Immediate Implantation

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Aim or purpose: To evaluate the efficacy of the Socket Shield Technique (SST) in preserving soft and hard tissue contours during immediate implant placement in the maxillary anterior aesthetic zone.

Materials and methods: Thirty patients (30 implants) undergoing SST for maxillary anterior teeth were enrolled (15 males/15 females, aged 22–66 years). Follow-up: 12–18 months. Parameters assessed: 1. Vertical changes in mesial/distal papilla height (preoperative vs. 12-month postoperative); 2. Gingival aesthetics via modified Pink Esthetic Score (PES) at baseline, 3 months, and 12 months; Labial bone thickness changes (implant shoulder, 2 mm/4 mm apical) via CBCT (immediate vs. 12-month postoperative); 4. Implant survival rate and complications.

Results: 1. Implant survival: 100%. 2. No significant differences in papilla height changes ($P > 0.05$). 3. PES scores: 12.11 ± 1.17 (baseline), 11.93 ± 1.16 (3 months), 12.03 ± 1.21 (12 months) ($P > 0.05$). 4. Labial bone resorption at all levels showed no statistical significance ($P > 0.05$).

Conclusions: SST effectively maintains soft/hard tissue architecture in immediate maxillary anterior implants, ensuring stable aesthetics and high success rates.

Key Words: Socket shield technique, Aesthetic zone implants, Immediate implant placement, Soft and hard tissue remodeling.

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CA6035

Predicting Dental Cervical Morphology Through Three-Dimensional Facial Parameters

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Aim or purpose: The abutments produced with circular symmetry failed to accurately replicate the natural teeth's cervical shapes. This study aimed to evaluate the efficacy of facial parameters in predicting dental cervical morphology (DCM) of the maxillary anterior teeth.

Materials and methods: This cross-sectional study was conducted at Stomatology Hospital of Fujian Medical University. Facial parameters of participants were obtained using a 3D facial scanner and subsequently imported into reverse engineering software for measurement. DCM data was captured by cone beam computed tomography (CBCT). Pearson correlation analysis was employed to identify relationships between facial and DCM measurements. Linear regression was performed on significantly correlated variables, while t-tests evaluated the difference of real value and predicted value ($\alpha=0.05$).

Results: A total of 147 volunteers participated in this study. Significant correlations for DCM were observed with interlateral canthus width (LCW) in males ($P < 0.05$) and with intermedial canthus width (MCW) in females ($P < 0.05$). Regression equations based on facial parameters showed no significant differences between predicted and actual values for DCM ($P > 0.05$), with LCW used for males and MCW for females ($P > 0.05$).

Conclusions: DCM of the maxillary anterior teeth can be predicted using regression formulas derived from facial widths (LCW and MCW) in Chinese population.

Key Words: Esthetic, Dental Cervical Morphology, Facial Parameters.

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3. Dental Treatment & Restorative Dentistry - 3.6 Esthetics"
Case Report – Free Communications

CA6632

Digital Planning In Prosthetic And Restorative Dentistry: New Horizons

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Introduction: Modern dentistry is experiencing a digital shift that enhances diagnostics and restorative workflows.