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Effect of Dentine Sealing after Abutment Scanning on the Marginal and Internal Gaps of Zirconia Crowns: An *In Vitro* Study

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Abstract

Objectives: This study aimed to assess the effects of applying dentine sealing material after abutment scanning on the marginal and internal gaps of zirconia crowns and the thickness of different adhesive systems.

Methods: Forty extracted human molars were milled into uniform abutments and randomly chosen for scanning and fabricating a zirconia crown using CAD/CAM. Specimens were divided into four groups according to the dentine sealing technique: the control (C), total-etch (TE), self-etch (SE), and universal (U) adhesive groups. A silicone replica was made and longitudinally sectioned with the abutment for measuring adhesive thickness and gaps at different points (EF: external finish line, IF: internal finish line, AW: axial wall, CT: cusp tip, OI: occlusal incline plane, and CO: center of occlusal surface) under a stereomicroscope. Data were analyzed using a two-way ANOVA and multiple comparisons test.

Results: Regarding adhesive thickness, adhesive types and measuring points showed significant interaction. The TE group had a significantly higher adhesive thickness, especially in concave areas (IF and CO). The TE group also showed significantly wider gaps at the CT, OI, and CO and a significantly narrower gap at the EF, IF, and AW. The AW had the narrowest internal gap in all groups. The marginal gap increased in all experiment groups compared with the control but remained clinically acceptable (<120 µm).

Conclusions: The marginal gap increased significantly when the adhesive was applied after the final impression. High-viscosity adhesive produced a thicker adhesive layer, especially at the IF, causing marginal and internal gap increases.

Keywords: dentine sealing, digital impression, internal gap, marginal gap, zirconia crown