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Effect of Different Luting Protocols on Bond-Strength of Fiber-Reinforced CAD/CAM-Blocks

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Objectives The aim was to evaluate the shear-bond strength (SBS) of experimental short fiber-reinforced CAD/CAM composite (SFRC-CAD) and commercial CAD/CAM composite (Cerasmart 270) to different luting resins before and after hydrothermal aging.

Methods Discs (2mm thick) obtained from SFRC-CAD and Cerasmart 270 were mounted in acrylic cylindrical-blocks and polished flat using an automatic grinding machine with 180 grit silicon carbide papers to create a standard surface for bonding. Followed by sandblasting with aluminum-oxide and cleaning with air. Subsequently, primer (G-CEM One Enhancing Primer) with or without bond (G2 Bond) are applied on the treated surfaces. Two different luting resins were used: fiber-reinforced composite (everX Flow Bulk) and self-adhesive resin (G-CEM One). Total 16 groups determined on types of restorative material, bonding protocol, luting material and aging procedure (n=8/group). Half of the specimens (n=64) were subjected to the SBS test after 24-hour of storage in water at 37°C, while the other half underwent the SBS test after 16-hour of hydrothermal aging by boiling. SBS test was performed using a universal testing machine at a crosshead speed of 1.0 mm/min until failure occurred. The failure modes of the specimens were analyzed with visual inspection. Data were analyzed using ANOVA and Mann-Whitney U test for comparison.

Results No statistically significant differences in SBS between everX Flow and G-CEM One groups ($p>0.05$) regardless of the bond application. The SBS of SFRC-CAD+everX Flow+bond (23.2 ± 3.6 MPa) was notably higher ($p<0.05$) compared to Cerasmart 270+everX Flow+bond (18.9 ± 2.4 MPa). However, there was no significant difference observed in the similar groups with using G-CEM One.

Conclusions The SFRC-CAD composite demonstrated SBS values similar to those of Cerasmart 270. Additionally, everX Flow Bulk proved to be an effective luting resin, yielding results comparable to those of self-adhesive resin.