

Microtensile Bond Strength and Microleakage of HEMA-Free One-Step Self-Etch Adhesive

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This study evaluated the microtensile dentin bond strength (μ -TBS) and microleakage of a one-step HEMA-free self-etch adhesive (G-aenial Bond-GB) compared to a 2-step self-etch (Clearfil SE-SE) and a 3-step etch and rinse (OptiBond FL-OB) adhesive with and without pre-etching with phosphoric acid. Human molars were divided randomly into 5 groups (n=15), GB and SE (without pre-etching), GB+ and SE+ (with pre-etching), and OB. Eight beams were obtained from each tooth and half of the beams were subjected to μ -TBS testing after 2d. The remaining beams were thermocycled (2,500 cycles), aged for 40d and subjected to μ -TBS testing using a universal testing machine. Failures were analyzed using light microscopy and SEM. Similar groups were used for the microleakage test (n=11). Class V cavities were prepared on the buccal and lingual surfaces of each molar. Teeth were thermocycled (2,500 cycles), aged for 40d, soaked in 1% methylene blue dye for 24h, and sectioned longitudinally from the facial to lingual surface. The dye penetration was scored using light microscopy and an ordinal scale from 0-3. Data was analyzed using Weibull, GEE, and Wilcoxon Rank Sum tests ($\alpha=0.05$). Phosphoric acid pre-etching significantly increased dentin bond strength. After 40d, the mean bond strength ranged from 28.6-45.7 MPa with a statistical significance of GB, SE<GB+, SE+ & OB. The Weibull Characteristic Strength ranged from 31.5-51.0 MPa and the Weibull Modulus ranged from 2.3-4.1. Cohesive failure ranged from 16%-57% with a statistical significance of GB<SE+ & OB, but GB+ & SE<OB. Phosphoric acid pre-etching had no significant effect on microleakage. However, significant differences were found between coronal and gingival surfaces for all groups except GB. Pre-etching with phosphoric acid significantly increased dentin bond strength of GB and SE and had no significant effect on microleakage. Materials supplied by GC America and Ultradent.

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