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Microtensile bond strength of new self-adhesive luting agents and conventional multistep systems

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Statement of problem

Several self-adhesive luting agents have recently been introduced on the market. It is crucial to know the effectiveness of such luting agents prior to their clinical application.

Purpose

The purpose of this study was to evaluate the microtensile bond strengths (μ TBS) produced by different self-adhesive cements and compare them with conventional luting agents.

Material and methods

Six self-adhesive cements (RelyX Unicem (UN), RelyX U100 (UC), SmartCem 2 (SC), G-Cem (GC), Maxcem (MC), and SeT (SET), and 2 conventional luting agents, one that uses a 2-step etch-and-rinse adhesive (RelyX ARC (RX)), and one that uses a 1-step self-etching adhesive (Panavia F (PF)), were used in this study. An additional group included the use of a 2-step self-etching primer adhesive system (Clearfil SE Bond) prior to the application of Panavia F (PS). Fifty-four human molars were abraded to expose occlusal surfaces and were assigned to 9 groups according to the luting material (n=6). Five composite resin (Filtek Z250) discs (12 mm in diameter, 5 mm thick) were cemented on the teeth according to manufacturers' instructions. After 24 hours of water storage, restored teeth were serially sectioned into beams with a cross-sectional area of approximately 1 mm² at the bonded interface and were tested in tension with a crosshead speed of 1 mm/min. Failure mode was determined using scanning electron microscopy. Data were statistically analyzed by 1-way ANOVA and Tukey's studentized range HSD test ($\alpha = .05$).

Results

Mean bond strengths (SD) in MPa were: RX, 69.6 (16.6)^A; PS, 49.2 (9.7)^A; PF, 33.7 (13.9)^{AB}; GC, 16.9 (10.3)^{BC}; UC, 15.3 (3.4)^{BC}; UN, 12.5 (2.4)^C; MC 11.5 (6.8)^{CD}; SC, 8.5 (4.9)^{CD}; SET, 4.6 (0.5)^D. Groups with different uppercase letters were significantly different from each other ($P < .05$). The predominant failure mode of the self-adhesive cements was adhesive between the resin cement and dentin.

Conclusions

The bond strengths produced by the multistep luting agents were significantly higher than those observed for most self-adhesive cements.

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