

Analysis of marginal adaptation and sealing to enamel and dentin of four self-adhesive resin cements.

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Source

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Abstract

This in vitro study compared the marginal adaptation of all-ceramic MOD-inlays luted to human molars with four self-adhesive resin cements. Thirty-two human third molars were randomly assigned to four test groups (n = 8 per group). MOD cavities were prepared with approximal finishing lines in dentin and enamel. All-ceramic Empress 2 inlays were luted with four self-adhesive cements (Clearfil SA, iCEM, Bifix SE, seT). Oral stress was simulated by 90 day storage in water as well as by thermal and mechanical loading (TCML, $1.2 \times 10(6) \times 50$ N, $6,000 \times 5^\circ/55^\circ$, 1.6 Hz). The marginal fit was evaluated by scanning electron microscopy (SEM) and dye penetration. Data were analyzed with the ANOVA/Tukey's test ($\alpha = 0.05$). The SEM investigation of the gingival cement margins (cement-tooth interface) showed values of perfect margin [percent] (means \pm SD) after simulated aging between $84 \pm 9\%$ and $95 \pm 5\%$ for enamel and $80 \pm 9\%$ and $92 \pm 3\%$ for dentin. In enamel, seT showed significantly higher marginal integrity than iCEM after water storage and TCML (post hoc; $p = 0.011$). Furthermore, the marginal adaptation of iCEM in enamel deteriorated by simulated aging ($p = 0.014$, ANOVA). Mean values of dye penetration (percentage of dye entry into dentin) at the investigated restorations margins ranged between 3% and 8% for enamel and 12% and 22% for dentin. Clearfil SA, iCEM, and seT showed lower dye penetration in enamel than in dentin (Clearfil SA: $p = 0.013$, iCEM: $p = 0.044$, seT: $p = 0.003$). The results suggest that the four self-adhesive luting agents investigated seem to successfully bond to dentin-restricted as well as to enamel-restricted cavities, predicting good clinical performance.