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Abstract

Effect of Curing on MOD Cavities Restored with Two Different Composites Using Two Distinct Techniques †

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Abstract: Background: It's well known that polymerization process hides negative aspects such as cuspal deflection mainly caused by shrinkage and temperature rise. Therefore, the purpose of this study was to assess the latter aspects of flowable and packable bulk-fill composites applied to mesio-occlusal-distal (MOD) cavities with bulk-fill or incremental layering technique. Methods: The linear shrinkage and mechanical properties of two bulk-fill composites with different properties (high viscosity and low viscosity) were analyzed with an extensometer and compressive tests. Subsequently, cusp deformation and temperature rise recorded in MOD cavities of first maxillary human premolars restored with both bulk-fill and incremental layering techniques were evaluated. A thermocouple placed 1 mm below the cavity floor was used to measure temperature rise, meanwhile cusp deflection was recorded with an extensometer. Results: Shrinkage profiles recorder for flowable composite was significantly higher ($p < 0.5$) than that of packable one; in addition, compression tests showed better results for the latter. The cuspal deflection measured in incremental technique was higher than that of bulk-fill technique for both flowable and packable composites. For each composite and technique, a temperature enhancement from 1.4 to 1.7 °C was observed. Conclusions: No significant difference was observed for cusp deflection in both restorative techniques using both composites. Apparently, the higher Young's modulus of the not very shrinkable packable composite and the lower Young's modulus of the very shrinkable flowable composite seemed to balance the cusp distance variation. The small temperature rise observed in the present study during curing suggests that the process may be safe for pulp tissue.

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