

Implications of resin-based composite (RBC) restoration on cuspal deflection and microleakage score in molar teeth: Placement protocol and restorative material

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Abstract: Objective To assess the cuspal deflection of standardised large mesio-occluso-distal (MOD) cavities in third molar teeth restored using conventional resin-based composite (RBC) or their bulk fill restorative counterparts compared with the unbound condition using a twin channel deflection measuring gauge. Following thermocycling, the cervical microleakage of the restored teeth was assessed to determine marginal integrity. Methods Standardised MOD cavities were prepared in forty-eight sound third molar teeth and randomly allocated to six groups. Restorations were placed in conjunction with (and without) a universal bonding system and resin restorative materials were irradiated with a light-emitting-diode light-curing-unit. The dependent variable was the restoration protocol, eight oblique increments for conventional RBCs or two horizontal increments for the bulk fill resin restoratives. The cumulative buccal and palatal cuspal deflections from a twin channel deflection measuring gauge were summed, the restored teeth thermally fatigued, immersed in 0.2% basic fuchsin dye for 24 h, sectioned and examined for cervical microleakage score. Results The one-way analysis of variance (ANOVA) identified third molar teeth restored using conventional RBC materials had significantly higher mean total cuspal deflection values compared with bulk fill resin restorative restoration (all $p < 0.0001$). For the conventional RBCs, Admira Fusion (bonded) third molar teeth had significantly the lowest microleakage scores (all $p < 0.001$) while the Admira Fusion x-tra (bonded) bulk fill resin restored teeth had significantly the lowest microleakage scores compared with Tetric EvoCeram Bulk Fill (bonded and non-bonded) teeth (all $p < 0.001$). Significance Not all conventional RBCs or bulk fill resin restoratives behave in a similar manner when used to restore standardised MOD cavities in third molar teeth. It would appear that light irradiation of individual conventional RBCs or