

**The Influence of Recent Direct Restorative  
Composite Resin and Techniques on Cuspal  
Deflection of Premolars  
(A Comparative Study)**

A thesis

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## ABSTRACT

Cuspal deflection represents interactions between the polymerization shrinkage stresses of the composite resin and the compliance of the cavity wall, which may cause failure during curing composite restoration or act as a preloading, facilitating tooth fracture under occlusal loads. It has been reported that placing resin composites in MOD cavities leads to inward deflection of the cusps, and the amount of cuspal deflection differed according to the materials and filling techniques used. This study aimed to evaluate and compare the cuspal deflection between four low-shrinkage resin composites **SDR<sup>®</sup>** (Smart Dentin Replacement), high viscosity Bulk fill **QuiXfil<sup>®</sup>**, high viscosity nano-hybrid **Tetric EvoCeram<sup>®</sup> Bulk Fill** and **Universal Nano-hybrid Tetric EvoCeram<sup>®</sup>**, and the effect of water storage on cuspal deflection of all experimental premolars teeth at different storage periods.

Forty extracted sound maxillary first premolars of approximately similar sizes were prepared with standardized MOD cavities. The teeth were randomly divided into four groups (10 specimens each) according to the restorative material. **Group A** filled with **SDR<sup>®</sup>** composite overlaid with **Universal Tetric EvoCeram<sup>®</sup>** composite.

**Group B** filled with **QuiXfil<sup>®</sup>** composite.

**Group C** filled with **Tetric EvoCeram<sup>®</sup> Bulk fill** composite.

**Group D** filled with **Universal Tetric EvoCeram<sup>®</sup>** composite.

Group **A**, **B** and **C** were restored with bulk fill technique, and group **D** was restored with oblique incremental technique. The intercusp distance was measured before and after restorative procedures and after 48 hours, one week and two weeks of water storage and the difference was recorded as cuspal deflection.

Cuspal deflection was calculated by measuring the intercusp distance between the indexed cusp tips using Computerized Digital Microscope. Data were analyzed statistically by ANOVA and least significant difference (LSD) test.