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3D Microleakage Assessment of Bulk-Fill Composite Resins: a Micro-CT Analysis

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Objectives This study aimed to evaluate microleakage from class II cavities filled with bulk-fill composite applied at different thicknesses, and with different polymerization modes.

Methods A total of 36 mesio-occlusal cavity were drilled into the extracted human third molars at 2 mm and 4 mm thickness. Bulk-fill composite resin (Tetric powerflow and Tetric powerfill) was applied to the cavities after the adhesive resin was applied, and cured using high power and extra power light-curing modes of a VALO light-curing unit. An incrementally applied microhybrid composite was used as the control. The teeth were subjected to 2000 cycles of heating to 55 °C and cooling to 5 °C with a 30-s hold time. Then, they were immersed in a 50% silver nitrate solution for 24 h and scanned with micro-computed tomography. Scanned data were processed using the CTAn software. three (3D) dimensional analyses of leached silver nitrate were performed.

Results Polymerization in extra power polymerization mode generally increases the microleakage values.

Conclusions Based on 3D measurements, applying bulk-fill composite resin at 2 mm thickness and high power polymerization reduced microleakage.