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Polymerization shrinkage of bulk fill composite through optical coherence tomography

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Purpose/aim: This study aimed to evaluate the linear polymerization shrinkage of flowable bulk fill composite resins through optical coherence tomography (OCT) and to compare their results with a conventional resin.

Materials and methods: Three groups were selected ($n = 10$) according to the restorative material: (G1) SDR Smart Dentin Replacement (Dentsply), (G2) Filtek Bulk Fill Flowable Restoracion (3M ESPE), (G3) control, Filtek Z 100 (3M ESPE). The OCT system used (Callisto, Thorlabs) operates in the spectral domain, with 930 nm of central wavelength and axial resolution of 7/5.3 μm in air/water. The specimens were manufactured from a 500 μm thick and 7 mm diameter teflon mold and light cured according to the respective manufacturers. OCT images were captured prior light curing and 15 min after

light curing of the specimens. Each OCT image constitutes a matrix array, composed by 2000 columns and 512 lines. The polymerization shrinkage measurement was carried out using the Image J software, from three predetermined points in the images. Then the differences of these measurements between the images captured before and 15 min after the curing were calculated. Two-way ANOVA (post hoc Tukey) test was used, considering $p < 0.05$.

Results: G2 presented the highest perceptual of linear shrinkage values (0.15%), followed by G1 (0.10%). The control group G3, in turn, had the best performance (0.08%).

Conclusions: The bulk fill resin composites presented worst linear polymerization shrinkage rates, if compared to the conventional composite.