Influence of ceramic translucency on curing efficacy of different light-curing units.


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Abstract

PURPOSE: The aim of the study was to examine the influence of dental ceramic translucency under different exposure conditions upon the polymerization rate of a dual-curing composite resin by measuring the depth of cure (DOC) and the Vickers microhardness (VHN).

MATERIALS AND METHODS: Three hundred twenty ceramic specimens (160 Empress 2, Ivoclar Vivadent, color 300, and 160 ProCAD, Ivoclar Vivadent, 300, 114; diameter 4 mm, height 1 mm or 2 mm) were inserted into steel molds and overlayed using a composite resin (Variolink II, Ivoclar Vivadent) with and without a self-curing catalyst. Specimens were cured either in contact with or at a 5-mm distance from a conventional halogen curing light (Elipar TriLight, 3M ESPE, exposure duration 40 s, standard mode) and a light-emitting diode (LED: Bluephase 16i, Ivoclar-Vivadent, exposure duration 20 s, high-power mode). DOC under the ceramic specimen was measured following ISO 4049:2000. The VHN of the resin composite was determined at 0.5 mm and 1.0 mm distance from the ceramic using a Vickers hardness tester. Statistical analysis was performed using the Mann-Whitney U-test (alpha = 0.05) and the error-rates method (ERM).

RESULTS: Higher translucency of the ceramic restoration resulted in higher DOC and VHN values, which were statistically significant for the halogen light source and in most cases for the LED groups. The use of a self-curing catalyst generally produced an increase in DOC and VHN data, with the exception of DOC data for the highly translucent ceramic and direct contact of the tip of the light source with the ceramic. No significant differences between VHN data of the highly
translucent ceramic without catalyst and the opaque ceramic with catalyst were observed in 3 out of 4 pairwise comparisons and according to the ERM. Thus, there are indications that for a highly translucent ceramic with the LED unit tested the catalyst may be waived for a ceramic thickness up to 2 mm.

CONCLUSIONS: There are indications that for a highly translucent ceramic with the LED unit tested, the catalyst may be omitted with a ceramic thickness up to 2 mm. High ceramic translucency improves polymerization of luting composite.

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