♦021

Effect of light source on depth of cure and polymerization shrinkage of composites

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The aim of this study was to evaluate the efficiency of the recently introduced light curing units to polymerize a light curing resin composite.

Four light curing units XL 3000, Optilux 500 for halogen light source, Apollo 95E for plasma arc and Easy cure for LED (blue-light Emitting Diode) were evaluated.

Radiometer was used for measure the light intensity.

The Vicker' s hardness test was performed to determine the depth of cure of the resin composite with each of the light units (XL 3000, Optilux 500 : 20sec irradiation, Apollo 95E : 3 & 6sec, Easy cure : 8 & 16sec).

The dye penetration method was used to evaluate the polymerization shrinkage. Standardized Class V cavities (height: 3mm, width: 3mm, depth: 2mm) with half of the finish lines limited within dentin were prepared on the buccal surface of 40 freshly extracted bicuspids. The specimens were restored with 37% phosphoric acid, Prime & Bond NT™ and Esthet · X™ using 4 light curing units (XL 3000 : 30sec irradiation, Optilux 500 : 20sec, Apollo 95E : 9sec, Easy cure : 16sec).

The specimens were stored in 37℃ physiologic saline solution for 24 hours. Nail varnish was applied up to 1.0mm from the restoration margins for sealing tooth surface, then immersed in 2.5% methylene blue solution for 24 hours.

The data were analyzed using One way ANOVA followed by Student-Newman-Keuls method.

The results were as follows:

1. In top surface, the Optilux 500-20sec irradiation group showed maximum Vicker' s hardness number followed by XL 3000-20sec, Apollo 95E-6sec, Easy cure-16sec, Apollo 95E-3sec, Easy cure-8sec($p<0.05$).
2. The Apollo 95E-3sec and Easy cure-8sec groups showed lower curing depth than others($p<0.05$).
3. There is no marginal leakage in enamel side.
4. The marginal leakage in dentin of Easy cure was lower than the others($p<0.05$).

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Color changes in composite according to various light curing sources

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The purpose of this study was to evaluate the color change of composite resin polymerized with three type of light curing units. Composite resin (Z100, shade A2) were condensed inside a 2 ㎜ thick metal mold with 7 ㎜ diameter and devided into three groups. Twenty specimens of each light curing units were made.

Group 1 : the specimens were polymerized with Apollo 95E (AP) for 3 seconds (1370 ㎽/㎠).

Group 2 : the specimens were polymerized with Spectrum 800 (SP) for 10 seconds (250 ㎽/㎠) and 30seconds (700 ㎽/㎠).

Group 3 : the specimens were polymerized with XL 3000 (XL) for 40 seconds (480 ㎽/㎠).

All specimens were stored in distilled water at 60℃ for 30 days.

The color characteristics (L^*,a^*,b^*) of the specimens before and after immersion were measured by spectrophotometer and the total color difference (ΔE^*) were computed. The microhardness of the specimens before immersion were measured by microhardness tests for the degree of polymerization.

The results obtained were as follows :

1. In all groups the microhardness values of upper surface were significantly higher than those of lower surface ($p < 0.05$).
2. The microhardness values of AP showed significantly lower than those of XL and SP ($p < 0.05$).
3. In all groups the ΔE^* values presented below 2.0.
4. AP showed the highest ΔE^* values and SP showed the lowest ΔE^* values ($p < 0.05$).
5. The L^* values of XL and SP were decreased after immersion, while those of AP increased.
6. In all groups the a^* values increased after immersion, while the b^* values decreased.
7. AP showed the highest Δa^*, Δb^* values and SP showed the lowest Δa^*, Δb^* values ($p < 0.05$).