Cure Times for Contemporary Composites

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Adequate photocuring of composite resin materials requires an adequate delivery of visible light energy. Traditionally, quartz-tungsten-halogen with relatively moderate intensities was used to activate composite, and most composites required a 40-second exposure to adequately cure a typical 2-mm increment.

Today, composite materials can be classified as easy, difficult, or traditional cure. In addition, many different types of light-curing units are available with broad or narrow bandwidths and moderate to high intensity. Various combinations of "curability" and light source result in different exposure times required to deliver the appropriate amount of energy. Because of that, some authors have attempted to provide guidelines for curing times based on these variables.

However, it has become apparent that there is no way to provide a table of lights and composites with suggested exposure times. Spectral outputs of lights and combinations of photoinitiators in restoratives have made this nearly impossible. Instead, a simple scrape test can be used to determine customized curing times for various combinations of light source and composite material.

To accomplish this scrape test, the plunger is removed from a composite compule, and the curved compule spout is sectioned from the main cylindrical compule body. This process leaves the bolus of uncured composite paste retained within the plastic cylinder. A Mylar strip is placed on a countertop, and the end of the compule previously retaining the plunger is placed on top of that strip. The flat end of a dental hand instrument is used to compact the composite paste against the Mylar. The composite is light-activated from the opposite end of the compule. Various exposure times can be used. Following light-activation, the compule is placed into a gun-type dispenser, and the composite contents are ejected. A plastic spatula is used with manual pressure to remove the residual, uncured composite paste. Thickness of the remaining, hard composite specimen is measured with a digital micrometer. This simple scraping test has been proven to be an accurate indicator of composite biaxial flexural strength and thus an indirect measure of its degree of conversion.

SUGGESTED READINGS

Caughman WF, Rueggeberg FA. Shedding new light on composite polymerization. Oper Dent 2002;27:636–8.

Rueggeberg FA, Cole MA, Looney SW, et al. Comparison of manufacturer-recommended exposure durations with those determined using biaxial flexure strength and scraped composite thickness among a variety of light-curing units. J Esthet Restor Dent 2009;21:43–61.

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