Infection Control for Curing Lights

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With the increasing popularity of light-cured adhesives, the curing light has become a standard item in many orthodontic offices. Several types of barrier covers have been introduced to prevent contact of the fiberoptic light-curing tip with bodily fluids during bonding procedures. Such covers may attenuate the light transmission at the tip and thus affect polymerization of the adhesive.

This article will examine the properties of several types of curing-tip covers and propose an effective and economical alternative.

Materials and Methods

Four types of curing-tip covers were tested:

1. The Cure Sleeve Model 4500 light-tip cover,* a prepackaged translucent sleeve made of ethylene methacrylate copolymer (Fig. 1).
2. A translucent latex finger cot** that is rolled over the curing tip (Fig. 2).
3. Curelastic Cure Light Barrier,*** a translucent non-latex alternative to the finger cot (Fig. 3).
4. A 6" × 5" sheet of polyvinyl chloride (PVC) Perforated 920 Cling Film,† tightly wrapped

*Trademark of Pinnacle Products, Inc., 21401 Hemlock Ave., Lakeville, MN 55044.

**Henry Schein, 135 Duryea Road, Melville, NY 11747.

***Trademark of Steri-Shield Products, 1801 State St., Suite D, Santa Barbara, CA 93101.

†Trademark of Reynolds, Richmond, VA.

Fig. 1 A. Pinnacle Cure Sleeve Model 4500 light-tip cover. B. Note seam in sleeve where copolymer material is joined together.

Fig. 2 Henry Schein latex finger cot.

Fig. 3 Curelastic non-latex finger cot.

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around the curing tip (Fig. 4).

Ten samples of each barrier were tested. Each cover was conformed to the curing tip as closely as possible, but was not secured in place.

A curing light‡ with a new bulb was tested with a Demetron Model 100 curing radiometer,†† which measured the optical power density in milliwatts per square centimeter at the end of the curing tip. For each sample tested, the light source was switched on for 10 seconds to permit it to reach normal operating intensity. The curing tip was then placed perpendicular to and flush against the optical sensor of the radiometer, and the highest displayed output was recorded. Results were averaged for each type of barrier and compared to the light output of an unprotected curing tip.

‡Ortholux XT Model 704-089, trademark of 3M Unitek, 2724 S. Peck Road, Monrovia, CA 91016.

††Kerr, Danbury, CT.

Fig. 4 Reynolds Perforated 920 Cling Film is supplied in roll of 6" × 5" perforated sheets of polyvinyl chloride (PVC).

Results

The PVC film had virtually no measurable effect on curing-light intensity. The Cure Sleeve reduced light output by 3%, the Curelastic barrier by 11%, and the finger cot by 23%.

Discussion

The seam of the Cure Sleeve (Fig. 1B) and the bubbles at the end of both the latex (Fig. 2) and non-latex (Fig. 3) barriers may prevent the curing tip from being held as close as possible to the adhesive. Any of these three covers can also slip down the curing tip during use. A 3/16" latex or vinyl orthodontic elastic can be used to keep the cover tightly secured to the tip (Fig. 5).

Fig. 5 Curelastic and Pinnacle covers secured with 3/16" elastics to maintain close conformity against light-curing tips and prevent barriers from slipping down.

TABLE 1
TYPICAL COSTS OF BARRIER DEVICES FOR LIGHT-CURING TIPS

Device	Manufacturer	Price/Unit
Cure Sleeve Model 4500 light-tip cover	Pinnacle	$0.09
Curelastic Cure Light Barrier	Steri-Shield	0.06
Latex finger cot	Henry Schein	0.02
Perforated 920 Cling Film	Reynolds	0.004

The Cure Sleeve seam, which bisects the curing tip, could also refract a portion of the light beam, although our test showed only a 3% attenuation. The latex finger cot, coated with a cornstarch powder lubricant, demonstrated a 23% reduction in light output. This product also raises concerns about latex allergies and possible contamination of the adhesive with loose cornstarch. The non-latex Curelastic uses a similar powder lubricant, but our test showed only an 11% reduction in light output. It has been advertised as allowing 99% transmission of blue light.

The PVC film, with no latex or powder, is the least expensive of the four barriers tested, at a cost of less than a half-cent per sheet (Table 1). It can also be used as a barrier for the handle and trigger of the light-curing unit.

This study was not designed to measure the clinical effects of reduced curing-light output. Further investigation would be required to determine whether extra curing time would be necessary to maintain adequate bond strength when using any of these barrier devices. Based on the criteria of close conformation to the curing tip, translucency, and cost-effectiveness, however, it appears that the PVC film warrants consideration as a curing-tip cover for orthodontic bonding procedures. ❑