THE BOTTOM LINE: ADHESIVE-COMPOSITE INCOMPATIBILITY

Growing scientific evidence demonstrates that simplified, acidic adhesive systems are incompatible with self- or dual-cured composites. These adhesives are of two types: the total-etch single-bottle systems and the "all-in-one" self-etch adhesives. They are acidic in nature, and their application mode places them in direct contact with the restorative or luting composite. The resulting acid-base reaction between adhesive and composite prevents proper polymerization of the latter and the coupling between the two. In addition, the reaction between adhesive and composite creates a hypertonic zone that draws water from the hydrated dentin substrate into the interface.

Such simplified adhesives are highly hydrophilic and function as permeable membranes that permit the flux of water across their cured structure shortly after polymerization. Apparently, for single-step self-etch adhesives, the bond strength to chemical-cured composites can be enhanced with the adjunctive use of co-initiators based on sodium salts of aromatic sulphinic acids or others. On the other hand, the benefits of co-initiators might not apply to all simplified adhesives. The permeability problem can be eliminated, at least in part, by the placement of an intermediate layer of a relatively more hydrophobic, nonacidic, low-viscosity resin separating the acidic adhesive from the composite. This mechanism probably accounts for the favorable results observed when three-step total-etch adhesives are used.

Although the incompatibility issue has raised serious concerns for several procedures in clinical practice, clinicians should understand that a combination of factors must be present to result in unsuccessful treatment. For instance, clinicians should not experience problems when luting veneers with simplified adhesive systems because they typically use light-cured resin cements. Additionally, permeability is not an issue when indirect restorations are to be cemented on metal, ceramic, or fiber-reinforced resin posts or cores. Perhaps the worst clinical situation applies when luting posts with simplified adhesives and dual-cured cements. Owing to limitations of light exposure, proper bonding of the apical portion may be severely compromised by the adverse interactions between the adhesive and the luting composite. Although less hydrated than in a vital tooth, the dentin is somewhat hydrated, and this contributes to potential problems in bonding. To avoid the problems related to the incompatibility issues described here, clinicians should use three-step total-etch or two-step self-etch adhesives for luting purposes or when fabricating cores with chemical- or dual-cured composites.

Editor's Note: We welcome readers' suggestions for topics and contributors to Critical Appraisal. Please address your suggestions to the section editor:

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