COMMENTARY

EFFECT OF SURFACE TREATMENTS AND BONDING AGENTS ON THE BOND STRENGTH OF REPAIRED COMPOSITES

Kraig S. Vandewalle, DDS, MS*

The complete removal of defective composite resin restorations may not always be desirable because of the prospect of removing adjacent healthy tooth structure and the potential for pulpal trauma—not to mention the additional expense to the patient. However, dental practitioners may be somewhat hesitant to repair rather than replace defective restorations because of concerns over a possible compromise in bond strength between the old and recently placed composite material. The bond between incrementally placed, uncontaminated composite is predictably high.[1] However, once the surface is compromised by manipulation or age, the repair bond strength drops precipitously.[2] Repair strengths vary widely and have been found to range between 25 and 80% of the cohesive strength of the intact composite.[3] Different repair procedures have been evaluated, and the results are somewhat equivocal.[4] Roughening the surface and the use of a bonding agent appear to be the easiest techniques found to improve the adhesion between new and aged composite.[3] The actual bonding mechanism has been postulated to potentially involve micromechanical and/or chemical adhesion. With micromechanical adhesion, the new material may be interlocked within the roughened surface of the old material. Chemical mechanisms may be possible as well and may occur because of the formation of chemical bonds between the new bonding agent and old composite matrix, or from the microentanglement of new and old polymer chains.[3] It was not surprising that the authors in this study found repair strengths to be relatively high because the repairs were made only 24 hours after the original composite polymerization and the repaired surface was stored largely untouched until the surface-treatment procedures. And although the use of air abrasion with the self-etching bonding agent showed no statistical difference in microtensile bond strength compared with the ultimate tensile strength of the original intact composite, all groups demonstrated a loss in bond strength (ie, 64.8–82.2% of the cohesive strength of the composite). This study demonstrates that even with relatively immediate repairs, the bond of new to old composite is unpredictable and typically compromised. Nonetheless, repair may be a good alternative in areas where high bond strength is not critical. A 2-year clinical study by Gordan and colleagues found that repair of composite resin restorations was a conservative option for treatment of composite resin restorations with inadequate marginal adaptation and staining.[5] Repair can often be achieved more efficiently than replacement, providing an extended service for the existing restoration. Case selection is critical, however, when planning the treatment of a potentially defective restoration. In particular, repair may be indicated in cases involving marginal discoloration and/or discrepancies around existing restorations, limited recurrent caries surrounded by otherwise healthy tooth structure and a sound composite restoration, or when complete removal may unnecessarily compromise the pulpal status of the tooth.[6]

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*Director, dental research, 2-Year Advanced Education In General Dentistry Residency, Lackland AFB, TX 78236

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