COMMENTARY

IN VIVO TEMPERATURE MEASUREMENT: TOOTH PREPARATION AND RESTORATION WITH PREHEATED RESIN COMPOSITE

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With proper case selection and technique, the direct placement of composite resins in posterior preparations has proven to be clinically successful. To improve physical properties and performance in stress-bearing areas, manufacturers have increased filler loading of composite resin restorative materials. Attempting to express heavier-bodied composite resin materials through a loaded compule may be difficult and potentially increase the size and number of voids along the interface of the preparation walls. The use of a flowable composite as the first increment has been suggested to provide a more thorough adaptation to all areas of the preparation. However, because of the greater resin content of flowable composite resins, increased polymerization shrinkage and contraction stress may adversely affect the adhesion of the composite to the preparation leading to gap formation.[1] Additional concerns with flowable composites are the reduction in mechanical properties and radiopacity. Although popular with dental practitioners, controlled clinical studies have failed to show any significant advantage to the additional use of a flowable composite resin in conjunction with heavier-filled composite resin in posterior restorations.[2,3] However, warming conventional composite resin restorative materials prior to placement potentially provides easier placement without the loss in physical properties found with flowable composite resins.

Heating composite resin restorative materials may not only decrease their viscosity, but laboratory studies have found an actual improvement in properties. The use of heated conventional composite resin has been shown to decrease microleakage and curing time and increase cross-link density, degree of polymerization, and depth of cure.[4] However, no studies exist to determine if the improvement in physical properties found with laboratory testing may also be demonstrated under clinical conditions. This well-done study is the first attempt to evaluate the performance of preheated composite resin in posterior restorations in vivo. With the use of a thermocouple, the authors were able to measure the temperature at the pulpal floor and the top surface of preheated composite resin restorative materials at various stages of placement. The results of this study were somewhat surprising. The composite resin temperature decreased rapidly after contact with the prepared teeth, yielding a restorative material with a much lower calculated conversion value than expected. Although the results of this study suggest that warming composite resin may not ultimately produce the dramatic increase in physical properties demonstrated in laboratory studies, the technique does offer the advantage of ease of placement; and it does so without the loss of physical properties found with the use of flowable composite resin. However, randomized, controlled clinical trials are necessary to evaluate the clinical significance of the use of preheated conventional composite resin in posterior restorations over the long term.

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