COMMENTARY

The Effect of a Modeling Resin and Thermocycling on the Surface Hardness, Roughness, and Color of Different Resin Composites

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In an effort to minimize tackiness and improve handling of resin composites during placement, clinicians may utilize isopropyl alcohol, acetone, dentin/enamel adhesive, or commercially available products such as modeling resins, wetting resins, or sculpting resins to coat their instruments.[1] Little information is available in the literature regarding how the use of wetting agents affects the mechanical and physical properties of the resin composite restoration. The authors present a well-written manuscript thoroughly describing their evaluation of the effects that modeling resin has on resin composite properties, specifically microhardness, roughness, and color.[2]

A successful resin composite restoration is dependent upon clinical longevity and pleasing esthetic appearance, both of which are affected by the mechanical and physical properties of the final restoration. Surface roughness of a resin composite restoration may lead to discoloration, plaque retention, gingival inflammation, secondary caries, patient discomfort, and adversely affect marginal integrity, wear, and hardness ultimately impacting both esthetics and longevity of the restoration.[3–7]

The presented study evaluated one silorane-based and six dimethacrylate-based resin composites with various filler types. For each resin composite, 60 specimens were prepared in three groups: (1) resin composite was cured against a polyester matrix and finished/polished; (2) resin composite was smoothed with an instrument wetted with Bisco Modeling Resin, cured against a polyester matrix and finished/polished; (3) resin composite was smoothed with an instrument wetted with Bisco Modeling Resin and cured against a polyester matrix. Microhardness, roughness, and color were measured after 24 hours and repeated after 10,000 thermocycles.

All resin composites in Group 3 (modeling resin/no polish) exhibited significantly lower microhardness than those in Group 1 (no modeling resin/polish). Only two of the restorative materials in Group 2 (modeling resin/polish) had microhardness values significantly lower than Group 1. These findings indicate that modeling resin will minimally affect microhardness, and polishing should overcome any adverse effect it does have.

The smoothest surfaces were found for the resin composites in Group 3 with significantly lower surface roughness values compared with those that were finished and polished. However, curing under a polyester matrix strip creates a surface layer rich in organic matrix that is unstable and has less favorable mechanical properties.[7] This is corroborated by the significantly lower microhardness values exhibited for Group 3. Polishing is recommended to remove the surface layer and improve longevity of the resin composite restoration.[5]

A color change (ΔE) ≤ 3.3 is considered to be clinically acceptable.[8] All resin composites, with the exception of the silorane-based resin composite in Group 3 exhibited clinically acceptable color change values. A recent study by Sirin Karaarslan *et al.*[9] concluded that resin composite type and polishing method significantly affected the color stability of composite resins after accelerated aging.

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Although the mechanical and physical properties of resin composites vary by composite type, the results of this valuable study reinforce the importance of the clinician adhering to proper manipulation and placement techniques when restoring with resin composite. As suggested by the findings, this includes proper polishing to alleviate any adverse effects that may result from the use of modeling resin to minimize stickiness of the resin composite material.

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