COMMENTARY

SURFACE ROUGHNESS OF NANOFILL AND NANOHYBRID RESIN COMPOSITES AFTER POLISHING AND BRUSHING

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When placing resin composites on anterior and posterior teeth, the clinician needs to select a material that not only presents adequate mechanical properties, such as fracture toughness and elastic modulus, but also appropriate physical properties, such as low surface roughness and toothlike optical characteristics. A low surface roughness is paramount for composite selection because a rough composite surface may increase plaque accumulation, risk of caries, and periodontal inflammation.[1–3]

As stated in the Senawongse and Pongprueksa article, the various resin composites exhibit different levels of surface roughness after polishing. Moreover, different polishing systems resulted in a variation of surface roughness values for the composites. According to this study, the polished nanofill resin composites and the nanohybrid, Premise (Kerr, Orange, CA, USA) presented the smoothest surfaces (i.e., lowest surface roughness) regardless of the polishing system used. For the microhybrid composites, the silicone polishing system, Astropol (Ivoclar Vivadent, Schaan, Principality of Liechtenstein), produced a smoother surface than did the abrasive Sof-Lex disks (3M ESPE, St. Paul, MN, USA); for the nanohybrid composites, it was brand dependent. As described in the article, the smooth surface achieved for these materials is a result of their small average particle size. As has generally been reported by others, within the same composite categories (i.e., nanofill, nanohybrid, or microhybrid), a greater surface roughness correlates with the size of the largest particles present.

Toothbrushing is inevitable after composite placement. Therefore, the authors of this study are commended for evaluating the composite surface roughness after brushing. The authors note that a surface roughness value of 0.2 μm may represent a threshold in terms of being clinically significant—that is, roughness greater than this may be associated with more plaque retention, risk of caries, and periodontal inflammation. However, caution should be urged here, as surface roughness may not be equivalent to surface gloss. It may be that two composites with surface roughness below this threshold value may still differ in gloss and therefore appear different in the oral cavity.

In this article, only the microhybrid Filtek Z250 (3M ESPE, St. Paul, MN, USA), the nanohybrid Premise, and the nanofill resin composites, except for Estelite Sigma (Tokuyama, Tokyo, Japan), showed a smooth surface after brushing that was at or below the 0.2-μm threshold. The results for Filtek Supreme (3M ESPE, St. Paul, MN, USA) deserve special consideration because one wonders if the outcome would have been the same had the enamel shade been tested in addition to the dentin and translucent shades, as the former is most often going to be the surface layer on a restoration made with this material. In any case, the outcomes of the study raise the question as to whether many resin composite restorations should be repolished during recall exams, thus reducing the chance for increased plaque accumulation, which may enhance the likelihood for subsequent caries development.

This study verified that surface roughness is material dependent and that resin composite particle size plays an important role in determining composite polishability. As was well stated in the present article, the nanofill composites are an excellent choice of material when considering the smooth surface that can be achieved as well as its polish retention upon brushing.

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