

Effect of a finishing and polishing system on hardness and gloss surface of four resin composites.

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The Aim

The purpose of this study is to evaluate the behavior of the gloss and morphology surface and hardness of four resin-based composites before and after using the same finishing and polishing system.

Methods

Four resin-composite material was investigated: Harmonize (Kerr), Gradia Direct (GC corporation), Estelite Σ Quick (Tokuyama Dental), TPH Spectra (Dentsply). Twenty discs of composite were prepared using homemade Teflon molds. A glass on bottom and a Mylar strip on top were used to exclude the oxygen inhibition during curing. Then, they were polymerized for 20 seconds both the top and the bottom. All the different composites specimens were divided into 3 groups (n=5): Control Group (with Mylar strip), Unpolished Group (with microbrush and spatula application) and Polished Group that consist in Sof-Lex discs (3M, ESPE), Spiral Wheels beige and then Spiral Wheels purple (3M, ESPE) with diamond paste (Enamel Shine C, Micerium). For evaluate resin-based composite hardness was used a Leitz micro-hardness tester. Gloss was determined by a glossmeter, calibrated with a reference value of 95 gloss units (GU). All samples were also examined by Scanning Electron Microscopy (SEM) to examine the morphology before and after finishing and polishing.

Results

The mean hardness and gloss values showed statistically differences results among to the different resin composites. For the hardness, in Control Group, Harmonize showed the highest hardness ($64,3 \pm 2$), Gradia Direct showed the lowest one (31 ± 2). In Unpolished Group, Harmonize showed the highest hardness (66 ± 4). Gradia Direct showed the lowest one ($35,8 \pm 3$). In Polished Group, Harmonize (68 ± 3) and Estelite (67 ± 1) showed the highest hardness. Gradia Direct showed the lowest one ($37,4 \pm 3$). Estelite and TPH Spectra showed an improvement of hardness from unpolished to polished. For the gloss surface, in Control Group, TPH Spectra showed the highest gloss values (103 ± 3), while in Unpolished Group Estelite showed the lowest (4 ± 1). In Polished Group, TPH Spectra showed the highest gloss values (41 ± 9). SEM micrographs showed that smooth flat surfaces especially in the finished glossy samples. ANOVA test and post doc t-test were used for statistical evaluations ($p < 0.05$).

Conclusion

The hardness and gloss surface are material dependent. The hardness surface improves with the polishing. It can be also recommended to use Estelite, Harmonize and TPH Spectra on the occlusal surface. The highest gloss surface is obtained when the resin composite polymerizes against a Mylar matrix without finishing and polishing. However, this study demonstrates that acceptable gloss results are obtained using systems combined with a diamond paste. Many manufacturers offer different finishing and polishing systems, despite no consensus has been reached on the method providing the smoothest and highest gloss surface. The suggested reliable and simple protocols can be advantageous for clinicians in order to obtain a considerably worth aesthetic result.

Keywords: gloss, hardness, composite resin, polishing.