Original Research

Assessment of efficacy of Finishing and Polishing on the Surface Roughness of Nanofilled Composite: A clinical study

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ABSTRACT:
Background: The smoothness of restorative material's surfaces has a great importance in the success and clinical longevity of the restorations. Various techniques of finishing and polishing have been proposed and analyzed over time. Hence; the present study was conducted for assessing the efficacy of Finishing and Polishing on the Surface Roughness of Nanofilled Composite.
Materials & methods: A total of 120 patients were included in the present study. Only those patients were enrolled in the present study that recently underwent aesthetic restoration of tooth by composite materials. Complete demographic and clinical details of all the patients were obtained. All restorations were divided into 3 groups depending upon finishing and polishing systems as follows: Group A: Shofu finishing and polishing kit, Group B: Sof-Lex composite finishing and polishing kit and Group C: Mylar Strips. All the three study groups contained 40 patients in each group. Then surface sealant (prime & bond) was applied to all treated specimens and the average roughness (Ra) was measured.
Results: Mean surface hardness among patients of group A, group B and group C before application of sealant was 0.83, 0.59 and 0.51 respectively. Significant results were obtained while comparing the means surface roughness before application of sealant. Mean surface hardness among patients of group A, group B and group C after application of sealant was 0.71, 0.51 and 0.32 respectively. Significant results were obtained while comparing the means surface roughness after application of sealant.
Conclusion: Mylar strip provided the smoothest surfaces followed by Sof-Lex followed by Shofu.
Key words: Finishing, Composite, Nanofilled

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INTRODUCTION
The smoothness of restorative material's surfaces has a great importance in the success and clinical longevity of the restorations. It is known that materials with rough surfaces enhance bacterial adhesion and decrease stain resistance. Especially restorations in close contact to gingival tissues require surface smoothness for optimal gingival health as well. Surface gloss is another factor playing an important role on the appearance of tooth-coloured restorative resins.[1-3]
Various techniques of finishing and polishing have been proposed and analyzed over time: many studies have shown that the smoothest surface is obtained using a polyester matrix in direct contact with the material during the curing phase. However, it is not always possible to use this method because of the anatomical complexity of the tooth. Other finishing and polishing methods include the use of aluminum

oxide finishing discs, fine diamond finishing burs, carbide finishing burs, resin polishing points, and polishing pastes. The results of previous investigations suggest that each material behaves independently: the same finishing and polishing procedures applied to different materials lead to different smoothness results.[4-6] Hence; the present study was conducted for assessing the efficacy of Finishing and Polishing on the Surface Roughness of Nanofilled Composite.

MATERIALS & METHODS

The present study was conducted with the aim of assessing the efficacy of Finishing and Polishing on the Surface Roughness of Nanofilled Composite. A total of 120 patients were included in the present study. Only those patients were enrolled in the present study that recently underwent aesthetic restoration of tooth by composite materials. Complete demographic and clinical details of all the patients were obtained. All restorations were divided into 3 groups depending upon finishing and polishing systems as follows:
Group A: Shofu finishing and polishing kit,
Group B: Sof-Lex composite finishing and polishing kit and
Group C: Mylar Strips.

All the three study groups contained 40 patients in each group. Then surface sealant (prime & bond) was applied to all treated specimens and the average roughness (Ra) was measured. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Mann Whitney U test was used for evaluation of level of significance.

RESULTS

In the present study, a total of 120 patients were analysed and were divided into 3 groups depending upon finishing and polishing systems as follows: Group A: Shofu finishing and polishing kit, Group B: Sof-Lex composite finishing and polishing kit and Group C: Mylar Strips. Mean surface hardness among patients of group A, group B and group C before application of sealant was 0.83, 0.59 and 0.51 respectively. Significant results were obtained while comparing the means surface roughness before application of sealant. Mean surface hardness among patients of group A, group B and group C after application of sealant was 0.71, 0.51 and 0.32 respectively. Significant results were obtained while comparing the means surface roughness after application of sealant.

Table 1: Comparison of surface roughness before application of sealant

Group	Mean	SD	p- value
Group A	0.83	0.18	0.00
Group B	0.59	0.15	
Group C	0.51	0.11	

Table 2: Comparison of surface roughness after application of sealant

Group	Mean	SD	p- value
Group A	0.71	0.16	0.00
Group B	0.51	0.14	
Group C	0.32	0.12	

DISCUSSION

Finishing refers to the contouring, shaping, and smoothing of the restoration to give anatomical contours and to remove excess material at the interface. Polishing is a step performed after finishing when the surface gains a high luster and enamel-like texture. A smooth surface finish is clinically necessary because the presence of surface irregularities from poor finishing and polishing can lead to staining, plaque, gingival irritation, recurrent caries, abrasiveness, wear kinetics, and tactile perception by the patient. Therefore, polishing procedures help to maintain longevity of restoration and preserve good oral health. Polishability of resin-based composites relies on the filler particle size and morphology, the filler loading, the type of filler, and on the polishing method and instruments. Therefore, the finishing and polishing procedures are both affected by the technique and are material sensitive.[7,8] Gloss is a desirable characteristic for restorative materials to mimic the appearance of the enamel. A smooth and glossy surface is generally obtained under a Mylar strip without subsequent finishing or polishing, but unfortunately intra-oral finishing is always required. Moreover, such a surface has a higher resin content and will reduce the wear resistance of the restoration over time. Therefore, finishing and polishing of tooth-coloured restorative materials after placement are inevitable procedures that will improve esthetics, early wear resistance, color stability and marginal integrity.[9,10] Hence; the present study was conducted for assessing the efficacy of Finishing and Polishing on the Surface Roughness of Nanofilled Composite.

In the present study, a total of 120 patients were analysed and were divided into 3 groups depending upon finishing and polishing systems as follows: Group A: Shofu finishing and polishing kit, Group B: Sof-Lex composite finishing and polishing kit and Group C: Mylar Strips. Mean surface hardness among patients of group A, group B and group C before application of sealant was 0.83, 0.59 and 0.51 respectively. Significant results were obtained while comparing the means surface roughness before application of sealant. Kaminedi RR et al evaluated the effect of finishing time and polishing time on surface roughness and microhardness of nanofilled and hybrid resin composites. Hundred disk composite specimens from micro hybrid composite and nanohybrid composite were prepared, 50 for each type of composite. The specimens were divided into five groups according to the time of finishing and polishing (immediate, 15 min, 24 h and dry).

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Composite under the Mylar strip without finishing and polishing was taken as the control group. Surface roughness was measured with environmental scanning electronic microscope (ESEM) and microhardness was determined using Vickers Microhardness Tester. Smooth surface with low hardness was obtained for the group under Mylar strip without finishing and polishing. The highest roughness was recorded for delayed finishing and polishing for both composites. Immediate finishing and polishing increased the surface hardness more than that in the control group in both types of composites. Dry finishing reduced the hardness significantly for micro hybrid composite, but resulted in the highest surface hardness for nanofilled composite. Immediate finishing and polishing under coolant resulted in the best surface smoothness and hardness values in micro hybrid composite; however, immediate dry finishing and polishing gave the best smoothness and hardness values in nanohybrid composite.[11]

In the present study, mean surface hardness among patients of group A, group B and group C after application of sealant was 0.71, 0.51 and 0.32 respectively. Significant results were obtained while comparing the means surface roughness after application of sealant. Kameyama A et al compared surface roughness and gloss produced by different finishing/polishing procedures for two resin composites, Clearfil AP-X (AP-X) and Estelite Σ (ES). A total of 70 composite discs (n=35 for each resin composite) were prepared and divided at random into seven finishing/polishing groups (n=5): glass-pressed control; using a super-fine-grit diamond bur (SF); using CompoMaster (CM) after SF-finishing (SF+CM); using White Point (WP) after SF-finishing (SF+WP); using CM after SF+WP-finishing (SF+WP+CM); using Stainbuster (SB) after SF-finishing (SF+SB); and using CM after SF+SB-finishing (SF+SB+CM). After the finishing/polishing procedures, average surface roughness (Ra) and surface gloss (Gs(60°)) of all specimens were assessed with a surface profilometer and specimen gloss meter, respectively. Glass-pressed controls for both AP-X and ES composites showed the best surface finish in terms of both Ra and Gs(60°). SF-finishing produced the roughest surface and led to almost complete loss of gloss. While additional polishing with CM reduced Ra and increased Gs(60°), the additional finishing effect of WP or SB between SF-finishing and CM-polishing was not found for either AP-X or ES.

CONCLUSION

From the above results, the authors concluded that Mylar strip provided the smoothest surfaces followed by Sof-Lex followed by Shofu. However; further studies are recommended.

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