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Arthur A. Dugoni
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In-Vitro Composite Surface Analysis Using Four Polishing Systems A SEM STUDY

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Objective:

◈ To evaluate the effect of four polishing methods on the surface gloss of a composite.

Introduction:

Polishing of a dental composite is essential to avoid plaque accumulation and secondary caries. Staining and discoloration correlate to the surface roughness. The goal of each composite filling is a glossy surface finish. Four polishing methods that are commonly used in dental practice were tested in this study.
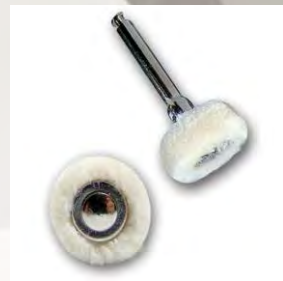
Materials and Methods:

◈ A total of 30 disks of composite Filtek Supreme Ultra shade B1 (3M) were fabricated and light cured for 40s using the light curing unit Elipar S10 (3M).

◈ The disks were sanded to a uniform surface finish using 320 grid SiC paper.

◈ Dimensions 10mm diameter and 3mm in height

Materials and Methods:

- Groups of specimens n=6

- 1.Control group (no treatment),

- 2. Rockstar system (BIOCLEAR),

- 3. Soflex mylar discs (3M) and ASAP Wheels(Clinician's-choice),

- 4. Minnow MCOMP blue and white (Henry-Schein-Dental),

- 5. Brownie/Greenie (Patterson-Dental) followed by bristle brush (Dental-Ventures-of-America) impregnated with CompoDotz medium (Patterson-Dental) followed by linen buff without any material(Dental-Ventures-of-America).
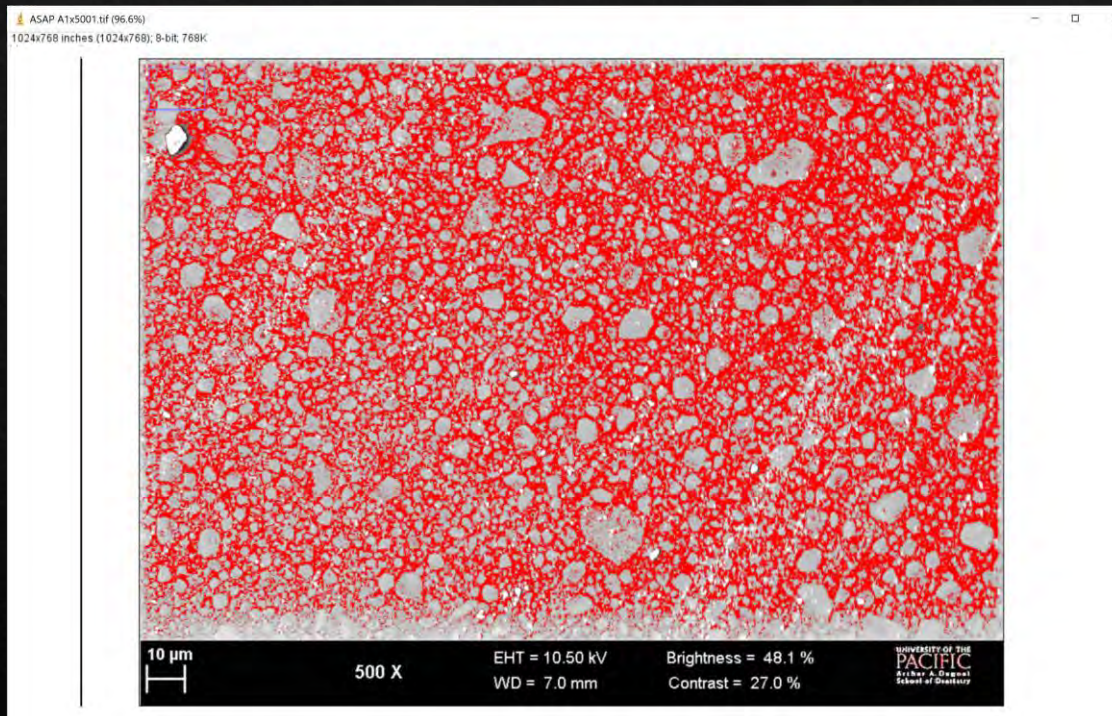
Materials and Methods:

- Samples were stored dry at room temperature for 3 days

- Samples were gold sputter coated before images were taken

- Images were captured using a Zeiss EVO 50 Scanning Electron Microscope at 500x.

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Materials and Methods:

◈ Surface analysis was done using Image J 1.53k NIH, USA software.

◈ The ratio of the polished surface(in grey, representing mostly filler particle) versus the less polished surface (in red, representing lower height, mostly resin) on a distinguished Gray/Red scale was determined based on the SEM images.

◈ Ratio = Gray/Red was calculated with the Image J software(6 samples per group)

Results:

Polishing Methods in Comparison
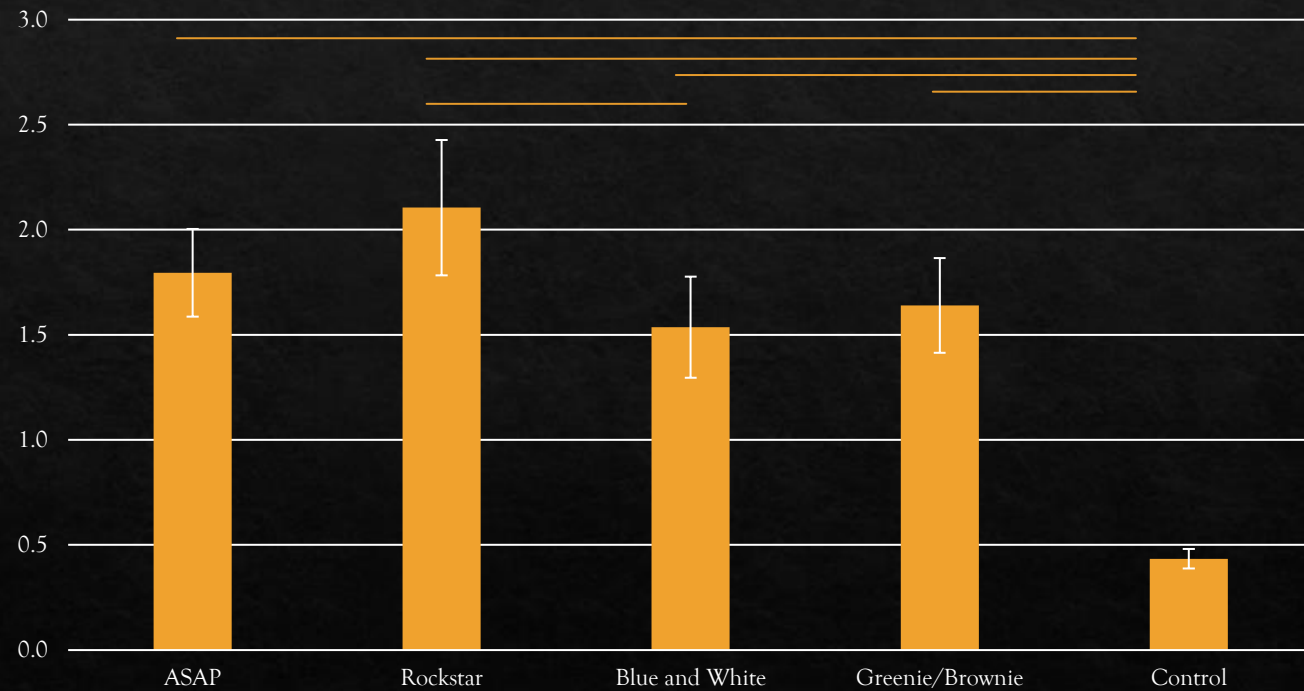
Statistically significant different

Anova One Way and Bonferoni corrected t-test

Results:

◈ All polishing methods showed statistically significant better polished surfaces compared to the control samples(p≤0.05).

◈ Among the polishing groups no significant differences were found except for the Rockstar group vs Minnow MCOMP group(p=0.006).

◈ The most polished surface area was seen in Rockstar(2.1),followed by ASAP(1.8),followed by Greenie/Brownie(1.6),followed by Minnow MCOMP(1.5).

Discussion

◈ Rockstar came out best in this study. It is speculated that the special paste in combination with the polishing cups may have a positive impact on the surface gloss of the composite.

◈ In the absence of a Glossmeter a SEM method was used instead to analyze the surface texture.

◈ Only one type of composite was used in this study. The filler to resin ratio was supposedly the same for all specimens. It was assumed that the more flattened or polished area exists on the surface of the composite the glossier it may appear to the human eye.

◈ Previous studies have used similar methods (Richard B Price et al. Effect of Polishing and the Effect of Toothbrushing on Four Composites, IADR 2020 #0729)

◈ Double operators were utilized while polishing and being able to work in similar environment helped us to compare the different polishing systems.

Conclusion:

In this study all polishing methods have been used on Filtec Supreme for better comparisons.

The outcome might be different for different composites. This SEM study filtered out a difference between two commercially available polishing methods. Rockstar produced the best polishing result in this study.

The final polish achieved by these different polishing systems is very similar to a naked eye so clinicians won't be able to compare the high polish
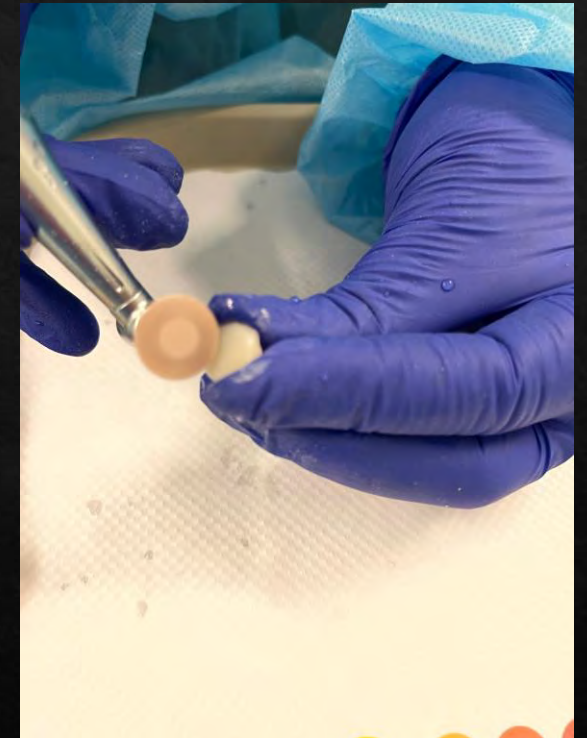
Acknowledgement

◈ I am thanking my mentors Dr. Schulze and Dr. Roetzer for their support in this study.

◈ Thank you to Scott Davis for his help with SEM imaging and thank you to the dental companies that provided the materials used in this study.

◈ There was no conflict of interest in this research project.

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◇Thank You For Your Attention!

◇Questions?

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