

## Effect of polishing procedures on the surface roughness of universal composites

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### I. Objectives

One of the parameters playing an important role in the reliability of a composite restoration is the state of its surface. This surface state influences the amount of plaque retained, the appearance of discoloration, periodontal disease, recurrent decay and the patient's comfort. The aim of this study was to evaluate the effect of two polishing methods and chemical conditioning on the surface of three universal hybrid composites.

### II. Materials and Methods

Specimens (n=90) were fabricated using three universal hybrid composites - Filtek Z250 (3M, USA), Tetric Ceram (Ivoclar Vivadent, Liechtenstein), DenFil (Vericom, Korea). They were cured with a curing light (at 550 mW/cm<sup>2</sup>) in stainless steel molds (8 mm in diameter and 2 mm in depth) against a mylar strip/glass slide configuration. The mylar strip-formed surface was used as a baseline. Thirty specimens for each composite were randomly divided among three treatment subgroups - ① Mylar strip (no treatment), ② Sof-Lex polishing system (3M, USA), ③ PoGo polishing system (Dentsply, Germany). After each treatment step, average surface roughness (Ra) measurements were taken using a surface profilometer - SJ-400 (Mitutoyo, Japan). After measurements, the specimens were immersed into the 0.02N lactic acid and evaluated for surface roughness after 1-week and 1-month. Representative specimens from treatment steps were examined by scanning electron microscopy (SEM). The data were analyzed by one-way ANOVA and Scheffe's tests at 0.05 significance level.

### III. Results

#### 1. Difference among polishing methods

The Ra values were not influenced by materials and storage periods. The ranking of mean Ra values by polishing methods were as follows: Sof-Lex (0.111 μm) > PoGo (0.043 μm) > Mylar strip (0.025). There was significant difference among the polishing methods (p < 0.001).

#### 2. Difference among materials

The total mean Ra values of each materials were not significantly different. But, they were influenced by polishing methods. The ranking of mean Ra values by mylar strip were as follows: Tetric Ceram > DenFil > Filtek Z250. Filtek Z250 was significantly rougher than other materials by Sof-Lex polishing system. Tetric Ceram was significantly rougher than other materials by PoGo polishing system.

#### 3. Difference among storage periods

The mean Ra values of each materials increased after 0.02N lactic acid storage, but the mean Ra values by PoGo system were not significantly affected by 0.02N lactic acid.

The mean Ra values of Tetric Ceram had a significant change after 1 month.

### IV. Conclusions

The PoGo polishing system gave a superior polish than Sof-Lex polishing system for the three composites. But, The mean Ra values by two polishing systems were below 0.2 μm, which is very excellent result clinically.

However, the correlation to clinical practice may be limited, since there are several processes, such as abrasive, fatigue, and corrosive mechanisms. Thus, further studies are needed for polishing technique under in vivo conditions.