Effect of Mechanical Polishing on Surface Roughness of Chairside Lithium Disilicate Based Glass Ceramics

Objectives: To investigate the surface roughness of nano-lithium disilicate glass-ceramics, immediately after milling and following different chairside finishing procedures.

Materials and methods: One hudred and twenty flat samples (1.2mmx1mm) were produced from three different novel lithium disilicate based CAD/CAM materials (IPS e.max CAD, Amber Mill, Amber Mill Direct) and divided into three groups (n=10/group) and treated as follows: Group 1, no polishing; Group 2, polishing with Ivoclar OptraFine; and Group 3; polishing with Ivoclar Optrafine using Amber Mill Glow polishing paste, Group 4; Glazing. Polishing was performed using a Kavo adjustable slow speed electric contra-angle handpiece. The influence of different finishing procedures was examined by comparing surface roughness (Ra, Rmax) data for three groups using a benchtop stylus profilometer. Statistical analysis was performed with a one-way analysis of variance (ANOVA) and Tukey' s HSD post-hoc tests (α=.05).

Results: The smallest surface roughness values were found for Amber Mill Direct group samples. Polishing with and without paste significantly reduced the surface roughness compared with the non-polished control groups (1.15 μm). Group 4 exhibited the smoothest surface with 0.09 μm, followed by group 3 with 0.14 μm, and group 2 with 0.19. Using novel polishing paste significantly helped to increase the surface smoothness similar to glazing procedure.

Conclusions: Polishing after milling or occlusal adjustment is essential in order to obtain the optimal clinical performance. Chairside polishing following grinding and adjustment with discs and polishing paste leads to comparably smooth surfaces as labside glazing procedure.

Keywords: Polishing, Surface Roughness, Lithum disilicate, CAD/CAM, Ceramic.