Wear performance of monolithic dental ceramics with different surface treatments.

Preis V, Weiser F, Handel G, Rosentritt M.

Source

Department of Prosthodontics, Regensburg University Medical Center, Regensburg, Germany.
verena.preis@ukr.de

Abstract

OBJECTIVE:

To investigate the two-body wear performance of monolithic dental ceramics with different surface treatments.

METHOD AND MATERIALS:

Standardized specimens (n = 8/series) were fabricated from three monolithic dental ceramics (experimental translucent zirconia, experimental shaded zirconia, lithium disilicate). Four groups of each material were defined according to clinically relevant surface treatments: polished, polished-ground, polished-ground-repolished, glazed. Two-body wear tests with steatite antagonists were performed in a chewing simulator. Surface roughness (R(a)) was controlled, and wear depths of specimens and antagonistic wear areas were calculated in relation to human enamel as reference. Statistical analysis of wear data was carried out using one-way ANOVA and Bonferroni multiple comparison test for post hoc analysis (α = .05). Scanning electron microscopy was applied for evaluating wear performance of ceramics and antagonists.

RESULTS:

Polished, ground, and repolished zirconia showed no wear, while glaze was abraded. Irrespective of the surface treatment, wear depth of lithium disilicate was significantly (P <= .001) higher than for zirconia but only about half as high as for the enamel reference (274.14 µm). Mean relative wear areas of steatite antagonists (enamel reference: 1.25 mm²) ranged between 0.86 and 1.57 for zirconia, and between 1.79 and 2.28 for lithium disilicate, with the highest values found after grinding and glazing. Steatite surfaces were smooth when opposed to polished/ground/repolished zirconia, and ploughed when opposed to glaze and lithium disilicate.

CONCLUSION:

Translucent and shaded experimental zirconia yielded superior wear behavior and lower antagonistic wear compared to lithium disilicate. A trend to higher ceramic and antagonistic wear was shown after grinding and glazing.