

In vitro failure and fracture resistance of veneered and full-contour zirconia restorations.

Preis [V](#), [Behr M](#), [Hahnel S](#), [Handel G](#), [Rosentritt M](#).

Source

Department of Prosthetic Dentistry, University Medical Center Regensburg, 93042 Regensburg, Germany.

Abstract

OBJECTIVES:

This study evaluated the failure and fracture resistance of zirconia-based fixed partial dentures (FPDs) under the influence of different surface treatments and adjustment procedures.

METHODS:

Seven groups (n=8/group) of three-unit zirconia-based FPDs were fabricated in anatomic design (AD) or anatomically reduced design (ARD) and surfaces were prepared according to clinical relevance: #1: AD - sintered; #2: AD - sintered - glazed; #3: AD - sintered - sandblasted - glazed; #4: AD - sintered - polished - grinded (contact points adjusted); #5: AD - sintered - polished - grinded - repolished; #6: ARD - sintered - veneered; #7: control: analogous to #3 but without thermal cycling (TC) and mechanical loading (ML). FPDs were adhesively bonded to polymethylmethacrylate abutment teeth. TCML (TC: 6000×5°/55°; ML: 1.2×10(6)×50N, 1.6Hz) was conducted in a chewing simulator with steatite spheres as antagonists. Failures were monitored and fracture resistance was determined after ageing. Data were analysed statistically with Mann-Whitney U-test (Kolmogorov-Smirnov-test; $\alpha=0.05$). FPDs were subjected to scanning electron microscopy for fractographic failure analysis.

RESULTS:

None of the FPDs failed during TCML, but showed wear at contact points. Median fracture force ranged between 1173.5N (#4) and 1316.0N (#3) without significant ($p=0.910$) differences between the groups or in comparison to the control ($p>0.462$).

CONCLUSIONS:

Zirconia restorations showed high resistance to failures and fracture under different surface treatment variations. Full-contour polished or glazed zirconia FPDs might be an alternative to common veneered restorations.