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

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Source
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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; α=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.