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Fracture resistance of implant- supported monolithic crowns cemented to zirconia hybrid-abutments: zirconia-based crowns vs. lithium disilicate crowns

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Abstract: PURPOSE. The aim of this in vitro study was to investigate the fracture resistance under chewing simulation of implant-supported posterior restorations (crowns cemented to hybrid-abutments) made of different all-ceramic materials. MATERIALS AND METHODS. Monolithic zirconia (MZr) and monolithic lithium disilicate (MLD) crowns for mandibular first molar were fabricated using computer-aided design/computer-aided manufacturing technology and then cemented to zirconia hybrid-abutments (Ti-based). Each group was divided into two subgroups (n=10): (A) control group, crowns were subjected to single load to fracture; (B) test group, crowns underwent chewing simulation using multiple loads for 1.2 million cycles at 1.2 Hz with simultaneous thermocycling between 5?C and 55?C. Data was statistically analyzed with one- way ANOVA and a Post-Hoc test. RESULTS. All tested crowns survived chewing simulation resulting in 100% survival rate. However, wear facets were observed on all the crowns at the occlusal contact point. Fracture load of monolithic lithium disilicate crowns was statistically significantly lower than that of monolithic zirconia crowns. Also, fracture load was significantly reduced in both of the all-ceramic materials after exposure to chewing simulation and thermocycling. Crowns of all test groups exhibited cohesive fracture within the monolithic crown structure only, and no abutment fractures or screw loosening were observed. CONCLUSION. When supported by implants, monolithic zirconia restorations cemented to hybrid abutments withstand masticatory forces. Also, fatigue loading accompanied by simultaneous thermocycling significantly reduces the strength of both of the all-ceramic materials. Moreover, further research is needed to define potentials, limits, and long-term serviceability of the materials and hybrid abutments. [J Adv Prosthodont 2018;10:65-72]