

Fracture performance of computer-aided manufactured zirconia and alloy crowns.

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OBJECTIVE: To compare the fracture resistance and fracture performance of CAD/CAM zirconia and alloy crowns. **METHOD AND MATERIALS:** One electrophoretic deposition alumina ceramic (Wolceram, Wolceram) and 4 zirconia-based systems (ce.novation, ce.novation; Cercon, DeguDent; Digizon, Amann Girrbach; and Lava, 3M ESPE) were investigated. A porcelain-fused-to-metal method (Academy, Bego Medical) was used in either conventional casting technique or laser sintering. Sixteen crowns of each material were fabricated and veneered with glass-ceramic as recommended by the manufacturers. Crown and root dimensions were measured, and 8 crowns of each system were adhesively bonded or conventionally cemented. After the crowns were artificially aged in a simulated oral environment (1,200,000 mechanical loads with 50 N; 3,000 thermal cycles with distilled water between 5 degrees C and 55 degrees C; 2 minutes per cycle), fracture resistance and fracture patterns were determined and defect sizes investigated. **RESULTS:** The fracture force varied between 1,111 N and 2,038 N for conventional cementation and between 1,181 N and 2,295 N for adhesive bonding. No significant differences were found between adhesive and conventional cementations. Fracture patterns presented mostly as a chipping of the veneering, in single cases as a fracture of the core, and in 1 case as a fracture of the tooth. **CONCLUSIONS:** Crown material and cementation do not have any significant influence on the fracture force and fracture performance of all-ceramic and metal-based crowns. Therefore, it may be concluded that adhesive bonding is not necessary for the application of high-strength ceramics.