

## INFLUENCE OF SHOULDER AND CHAMFER MARGINAL DESIGN AND TYPE OF CEMENT ON FRACTURE RESISTANCE OF ZIRCONIA CROWNS. AN *IN VITRO* STUDY

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### Abstract

One of the major problems of all-ceramic restorations is the possibility of their fracture under occlusal force in posterior region. The aim of the present *in vitro* study was to compare the effect of two marginal designs (shoulder and chamfer) and two types of cement (phosphate and glass-ionomer) on the fracture resistance of zirconia crowns.

The stainless steel dies prepared with two different designs (shoulder and chamfer) were used as premolars. 20 zirconia copings with a wall thickness of 0.6 mm were fabricated for each type of preparation and cement. After cementation by two different types of cement (phosphate and glass ionomer), they were loaded on Universal Testing Machine until fracture. Obtained data were analyzed by the Student's t-test.

The mean values of fracture resistance of copings cemented with phosphate cement for shoulder and chamfer preparation were  $899 \pm 19.7$  N and  $617.14 \pm 25.9$  N, respectively. The mean values of fracture resistance of copings cemented with glass-ionomer cement for shoulder and chamfer preparation were  $799 \pm 31.6$  N and  $522.43 \pm 20.9$  N, respectively. Statistical analysis revealed significant differences between the groups.

Based on the results of this study, both marginal designs had sufficient fracture resistance, which are higher than the physiological masticatory force in posterior region. Both can be used, but since the fracture resistance of chamfer preparation is significantly higher than the shoulder preparation, and the phosphate cemented copings showed significantly higher resistance than the glass-ionomer cemented ones within a same type of preparation, chamfer preparation in combination with phosphate cement are recommended for zirconia based restorations from mechanical point of view.

**Key words:** Zirconia, Tooth preparation, Fracture resistance, Cement.