

Title: Does Selection of Post and Core Material Influence The Fracture Strength of Endodontically Treated Teeth?

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Purpose: In order to determine the influence of post and core material in fracture resistance of endodontically treated teeth, this In vitro study compared cast nickel–chromium alloy (Ni–Cr), cast non-precious gold alloy (NPG), one-piece custom-made zirconia post and cores and fiber-composite post systems in premolars under all-ceramic crowns.

Materials and Methods: A total of 48 extracted human mandibular premolars, subjected to standard endodontic treatment, were divided to four groups (n=12) and treated with post and cores with the following materials: cast Ni–Cr and NPG post-and-core, one-piece custom-milled zirconia post-and-core, and prefabricated fiber-glass post with composite resin core. After restoring each specimen with a zirconia all-ceramic crown, they were loaded to failure via a universal testing machine at a cross-head speed of 0.5 mm/min, at an angle of 45 degrees to the long axis of the roots. Fracture resistance and modes of failure were analyzed. The significance of the results was assessed using analysis of variance (ANOVA) and Tukey honest significance difference (HSD) tests ($\alpha=0.05$).

Results: Fiber-glass posts with composite cores showed the highest fracture resistance values (915.70 ± 323 N), and the zirconia post system the lowest (435.34 ± 220 N). The differences among the groups were only statistically significant for the zirconia group ($p < 0.05$).

Conclusion: The present study failed to demonstrate any statistically significant differences among the experimental post and cores material systems used to restore endodontically treated premolars, except for one piece zirconia post-and-core systems. Moreover, catastrophic and non-restorable fractures were more prevalent in teeth restored by zirconia posts.

Keywords: Endodontically Treated Teeth, Fracture Strength, NPG Alloy, Zirconia, Post and Core