

Evaluation of tooth analogs and type of restoration on the fracture resistance of post and core restored incisors.

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OBJECTIVE:: In in vitro tests, metals and resins are frequently used as substitutes for human teeth. This study aims at determining the suitability of various materials for substituting human incisors in load capability tests. **METHOD::** Veneering composite (Adoro; n = 16) and non-precious CoCr-alloy (NPA; n = 16) were used for manufacturing 32 identical specimens based on the model of a maxillary central incisor resin tooth (Morita). Sixteen human incisors served as a control group. After root canal treatment, all specimens were restored with fiber-reinforced composite posts and core build-ups. For each group, eight specimens were chosen randomly and restored either with identical NPA crowns or with all-ceramic crowns. Specimens were exposed to thermal cycling and mechanical loading (TCML) until failure. Statistical analysis was conducted using the Kruskal-Wallis test and the Bonferroni-adjusted Mann Whitney U-test. **RESULTS::** In ceramic crowns, the highest median fracture resistance was found in alloy tooth substitutes (430 N) and natural incisors (426 N), which both showed a significantly higher fracture resistance than composite tooth substitutes (162 N). In alloy crowns, alloy tooth substitutes exhibited the highest fracture resistance (348 N), but no statistically significant difference could be detected between natural incisors (158 N) and composite tooth substitutes (117 N). No artificial tooth substitute showed fracture patterns similar to those of natural incisors. **SIGNIFICANCE::** Mechanical parameters are significantly influenced by the type of restoration and the restorative material used. In vitro tests, the range of artificial tooth substitutes suitable for the replacement of human incisors is limited by load capability. (c) 2009 Wiley Periodicals, Inc. *J Biomed Mater Res Part B: Appl Biomater* 2009.