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A comparison of fracture resistance of roots prepared with two reciprocating instruments and obturated with gutta-percha and Gutta flow bioseal & AH plus canal sealers.

(An in vitro study)

A thesis
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Abstract

It is well established that endodontically treated teeth have reduced resistance and higher susceptibility to fracture than teeth with vital pulp. This is mainly associated with the loss of dentinal structures following root canal treatment. The objective of this *in vitro* study was to compare and evaluate the fracture resistance of endodontically treated roots prepared with different reciprocating systems (Reciproc blue, Wave one gold) and obturated with gutta-percha using two types of root canal sealer (Gutta flow bioseal and AH plus).

Forty eight freshly extracted human mandibular second premolars with single rooted canal were performed in the present study. The teeth were decoronated to a length of 13 mm from the apex. The roots were then randomly divided into two main groups (n=24 each group) according to the type of instrumentation system used in root canal preparations, **Group I**: prepared with Reciproc blue R25 files and **Group II**: prepared with Wave one gold primary files. Then each main group was further subdivided into three subgroups (n=8 each subgroup) according to the type of root canal sealer used in the obturation procedure, **Subgroup IA, IIA**: control group (samples were prepared but unfilled), **Subgroup IB, IIB:** obturated with gutta-percha and Gutta flow bioseal sealer and **Subgroup IC, IIC:** obturated with gutta-percha and AH plus sealer.

Root canal instrumentation was carried out following manufacturer's instructions for each file system. The smear layer was removed using standardized irrigation protocol (3 mL of 5.25% sodium hypochlorite after each file, followed by 5 mL of 17% Ethylene Diamine Tetraacetic Acid for 1 minute after the preparation and the final rinsing was with 10 mL of distilled water).

Obturation of the instrumented roots with either type of sealers was achieved according to the manufacturer's instructions using single cone obturation technique with corresponding gutta-percha size. All root specimens were stored for 1 week at 100% humidity to allow for complete setting of sealers.

Each specimen was then embedded in clear acrylic resin (apical 5mm) and subjected to fracture testing using a universal testing machine, the load was applied vertically at a crosshead speed of 1mm/min. The data were analyzed statistically using one way ANOVA test (analysis of variance of mean), Two way ANOVA test and Dunnett's 2-sided test a significant level of 0.05.

The results of this study showed that the highest mean of fracture resistance was recorded in Newton by **Group IIC** (611.125 ± SD 132.572) followed by **Group IC** (543.250 ± SD 108.235), **Group IIB** (519.875 ± SD 144.813), **Group IB** (511.875 ± SD 65.821), **Group IIA** (270.125 ± SD 71.317) and **Group IA** (267.875 ± SD 54.773) respectively, the obturated groups (**Group IIC, Group IC, Group IIB and Group IB)** showed a statistically high significant differences when compared to the control groups, but showed no significant difference among them. The control groups exhibited the lowest mean of fracture resistance with statistically insignificant differences between them.

From the results of this study, it can be concluded that both sealers were able to increase the fracture resistance of instrumented roots whereas preparation of the root canals with Reciproc blue and Wave one gold weakened the tooth structure.