



Comparison of Fracture Resistance of Endodontically Treated Teeth Restored with FiberSitePostsystem and Glass Fiber, Combined with Different Root Canal Sealers

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Abstract

Background: This study was carried out to assess the Comparison of Fracture Resistance of Endodontically Treated Teeth Restored with FiberSitePostsystem and Glass Fiber, Combined with Different Root Canal Sealers.

Material and methods: 100 human lower premolar teeth with one root and one canal that had been extracted for periodontal or orthodontic treatment had been used in this investigation. Two-rooted teeth with developing apices and broken or damaged roots were not included in the study. Using a computerized calliper, the roots' length and dimensions were measured. The cemento-enamel junction (CEJ) teeth that were comparable in length and size were chosen. Prior to the procedure, the chosen teeth were radiographed mesiodistally and buccolingually to make sure they had not previously had root canal therapy or been exposed to resorptions or calcifications.

Results: Group 3 (glass fiber with a composite core and Sure-Seal Root) showed considerably higher load values in comparison to group 2 (FiberSite and AH Plus).

Conclusion: While not statistically significant, Sure-Seal displayed higher fracture resistance values than AH Plus within the constraints of this investigation. When combined with the AH Plus sealer, the FiberSitepostsystem performed worse than glass fiber posts.

Keywords: fracture, fibersite, post, glass, sealers

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Introduction

The restoration of endodontically treated has been a challenge as these teeth loses significant part of tooth structure due to caries, previous restorative procedures, from endodontic access cavity preparation or due to loss of moisture supplied by dentin, which makes them weak. The restoration of such teeth is accomplished by using post and core, to prevent further destruction and provide retention for the core, before a crown or a fixed partial denture can be placed.[1] Custom cast and prefabricated metal post are rigid, lack bonding ability, and modulus of elasticity was different from

the tooth structure which induced stresses and results in root fracture; therefore, fiber-reinforced composite (FRC) posts have been preferred choice.[2] The FRC-posts contain a high percentage of continuous reinforcing fibers embedded in a polymer matrix of epoxy resins or others polymers with a high degree of conversion and highly cross-linked structure.[3,4]

Fiber posts have gained popularity because fiber posts mitigate the possibility of root fracture in endodontically restored teeth due to their dentin-like elasticity modulus [5]. Therefore, they are considered to be a more suitable option than metal posts in most cases [6]. The most popular materials used today as core materials are cast gold, amalgam, dental composite resin, and glass ionomer cement. While amalgam cannot be prepared in the same appointment due to the hardening time, it is similarly disadvantageous to include a second visit in cast postcore systems [7]

Hence, this study was carried out to assess the Comparison of Fracture Resistance of Endodontically Treated Teeth Restored with FiberSitePostsystem and Glass Fiber, Combined with Different Root Canal Sealers.

Material and methods

100 human lower premolar teeth with one root and one canal that had been extracted for periodontal or orthodontic treatment had been used in this investigation. Two-rooted teeth with developing apices and broken or damaged roots were not included in the study. Using a computerized calliper, the roots' length and dimensions were measured. The cemento-enamel junction (CEJ) teeth that were comparable in length and size were chosen. Prior to the procedure, the chosen teeth were radiographed mesiodistally and buccolingually to make sure they had not previously had root canal therapy or been exposed to resorptions or calcifications. With their respective drills supplied by the manufacturers, each postsystem was given postspaces that were 11 mm deep from the cement-enamel junction in all samples. The apical root filling was 4 mm long and left in the canal. After instrumentation, the postspaces were rinsed with 5 mL of distilled water, dried with paper towels, and then irrigated with 2 mL of 17% EDTA for 2 minutes to eliminate the smear layer. Then, using a finger to carefully press each post (glass fiber posts (groups 1 and 3) and FiberSite posts (groups 2 and 4) into the postspaces. A microbrush was used to remove any extra resin cement. Statistical analysis was conducted using SPSS software.

Results

Table 1: Mean values of fracture resistance for each group (in newton).

Groups	Number of subjects	Mean values
Glass fiber + AH Plus	25	263.57
FiberSite + AH Plus	25	224.12
Glass fiber + Sure-Seal	25	305.11
FiberSite + Sure-Seal	25	297.66

Discussion

The prognosis of endodontically treated teeth (ETT) depends not only on the success of root canal treatment but also on the success of the coronal restoration.[8-11] The restorative procedures for ETT are quite challenging because of the alterations in the mechanical properties of the dentin and require technique sensitivity. Furthermore, the root canal such as access cavity and root canal preparation,[12] extensive carious lesions, previous endodontic treatment, iatrogenic failures, root resorption, and removal of the previously placed posts. [13],[14] It is known that the ETT with thin

dentinal walls causing stability loss are more prone to fractures reducing the long-term success of the restoration. [15] In this study, periodontal membrane application was found appropriate to imitate the natural tooth structure. The polyvinyl siloxane (impression material) was used in this study because its modulus of elasticity is close to the periodontal ligament [16]. Various postsystems were evaluated for fracture resistance. The fiber-based postsystems are recommended over metal posts to prevent irreparable root fractures [17].

Ferrario et al. assessed the bite force of teeth from 52 healthy young adults and reported that single-tooth bite forces ranged from 178 to 291 N in premolar teeth.[18] In the present study, fractures occurred under very high loads, which do not occur in clinical situation. Therefore, it is possible to infer that under normal conditions, the four systems tested in this analysis would present a favorable prognosis.

Dean et al. carried out an in vitro comparison of carbon fiber with conventional cast posts and concluded that there were no root fractures with carbon fiber posts, unlike cast posts.[19] A clinical study by Preethi and Kala, on the comparative evaluation of a cast post and core, a carbon-fiber-reinforced post with a composite core, and a glass-fiber-reinforced post with a composite core showed that the glass fiber group exhibited a higher success rate.[20]

Conclusion

While not statistically significant, Sure-Seal displayed higher fracture resistance values than AH Plus within the constraints of this investigation. When combined with the AH Plus sealer, the FiberSitepostsystem performed worse than glass fiber posts.

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