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ORIGINAL REREARCH

Assessment of fracture strength of two different post and core system

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ABSTRACT:
Background: Endodontic treatment saves the tooth and restoration of endodontically treated tooth restores the tooth hack to function. The present study was conducted to assess fracture strength of different post and core system. **Materials & Methods:** 60 first premolars were divided into three groups of 20 samples. In group I, teeth inserted with prefabricated carbon posts, in group II, teeth inserted with prefabricated zirconia posts and in group III, teeth inserted with prefabricated ever Stick posts. Compressive load required to fracture the tooth was measured in all groups. **Results:** The mean compressive strength in group I was 610.2 MPa, in group II was 728.5 MPa and in group III was 526.4 MPa. The difference was significant (P< 0.05). **Conclusion:** Zirconia posts exhibited maximum fracture resistance as compared to carbon posts and ever Stick posts.
Key words: Carbon posts, Ever Stick posts, Zirconia posts

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INTRODUCTION

Endodontic treatment saves the tooth and restoration of endodontically treated tooth restores the tooth hack to function. Methods of restoring pulpless teeth were described more than 100 years ago.[1] The restoration of root canal treated teeth, although practiced for many years, remains a major concern in dentistry. Endodontically treated tooth complicated by substantial loss of coronal tooth structure presents a multifaceted restorative challenge for the dentist. So, the restoration of pulpless tooth should increase the resistance of tooth to fracture.[2]

Until recently, all available prefabricated posts consisted of metal alloy that resulted in a final heterogeneous combination of dentin, metallic post, cement and core material. The major disadvantage being the stresses concentrated in uncontrolled areas that were sometimes vital to the root. The restoration of endodontically treated teeth with metal free, physiochemically homogeneous material that have physical properties similar to dentin has become a major objective in dentistry.[3]

The post is inserted in the root canal and the core is retained by this apical extension. This supports the coronal portion that simulates the prepared tooth to sustain definite cast restoration.[4] So a dowel and core is commonly placed to provide retention for subsequent crown when coronal tooth structure is lacking. It was believed that one of the functions of dowel is to provide reinforcement of the tooth. The current literature however seems to dispute the reinforcement potential. Success of post and core treatment depends on case selection, type of post and core used, adhesive resin cement, and operator caliber.[5] The present study was conducted to assess fracture strength of different post and core system.

MATERIALS & METHODS

The present study was conducted among extracted 60 first premolars due to orthodontic treatment. Ethical clearance for the study was obtained.

In all teeth, conventional step-back technique was used to prepare a canal. Obturation was carried out and post space was created using a Peeso reamer.

Teeth were randomly divided into three groups of 20 samples. In group I, teeth inserted with prefabricated carbon posts, in group II, teeth inserted with prefabricated zirconia posts and in group III, teeth inserted with prefabricated ever Stick posts. Core build up was performed using light-cured composite resin. Compressive load required to fracture the tooth was measured using a universal testing machine. Results thus obtained were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Table I Distribution of post

Groups	Group I	Group II	Group III
Post system	Carbon posts	Zirconia posts	Ever Stick posts
Number	20	20	20

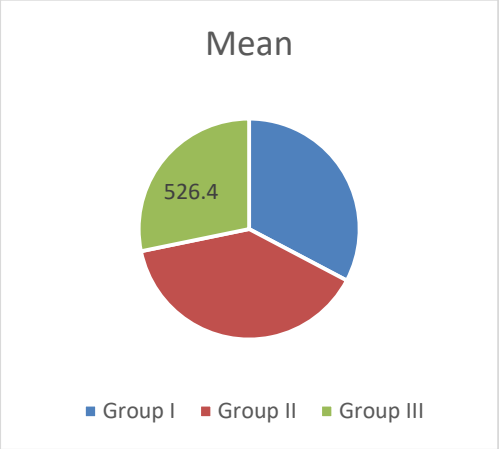
Table I shows that group I had carbon posts, group II had zirconia posts and group III had prefabricated ever Stick posts. Each group had 15 posts.

Table II Assessment of mean compressive strength

Groups	Mean	P value
Group I	610.2	0.02
Group II	728.5	
Group III	526.4	

Table II, graph I shows that mean compressive strength in group I was 610.2 MPa, in group II was 728.5 MPa and in group III was 526.4 MPa. The difference was significant (P< 0.05).

Graph I Assessment of mean compressive strength



DISCUSSION

The prime objectives of post and core procedure are to build missing coronal structure and to provide sufficient retention and resistance form to final restoration.[6] In earlier days, custom-made post and core restoration was one of the popular methods to restore endodontically treated teeth. Later on, prefabricated posts gained importance due to reduced time and feasibility. Most of the literature concerning restoration of endodontically treated tooth focuses on the post and core unit.[7]

Post restoration depends on esthetic requirements, amount of remaining tooth structure, tooth position, and functional load on tooth. Posts can be classified as custom made or prefabricated, metallic or nonmetallic, flexible or stiff, and esthetic or nonesthetic types.[8] Post and core interface is the most common site for tooth fractures. Fracture resistance of restoration with post is directly related to post design, post length, post diameter, core material, and type of cement used. It has been observed that the core structure provides stress transmission from crown to the post and core structure to remaining root dentin. Root fracture occurs when this stress transmission exceeds the withstanding resistance.[9] The present study was conducted to assess fracture strength of different post and core system.

In present study, group I had carbon posts, group II had zirconia posts and group III had prefabricated ever Stick posts. Each group had 20 posts. Narang et al[10] compared the failure load and failure modes of these two post and core systems using Fracture Strength Test and to use Finite Element Models for the comparison of pattern of stress distribution between the two post and core systems. FST indicated a statistically significant difference in the 2 post core systems with light transmitting post failing at a higher load than custom cast post. The mode of failure was classified as being favorable for light transmitting post. FEN results indicated less stress distribution on tooth and with in post core system for light transmitting post compared to custom cast post.

We observed that mean compressive strength in group I was 610.2 MPa, in group II was 728.5 MPa and in group III was 526.4 MPa. Moyin et al[11] assessed the fracture resistance strength of different post systems in endodontically treated teeth. The compressive strength of zirconia posts was highest with a mean of 796.10±20.78 followed by carbon posts (628.22±18.11) and lower compressive strength was exhibited by ever Stick posts (534.13±19.98). An analysis of variance revealed a statistically highly significant difference among the different posts used, and a statistically significant difference between carbon posts vs. zirconia posts, carbon posts vs. ever Stick posts, and zirconia posts vs. ever Stick posts.

Abduljabbar et al[12] compared the fracture resistance of endodontically treated teeth restored with glass fiber post and composite resin cores, customized zirconia posts, and cast metal post and cores. The findings indicated a statistically significant difference between the failure loads in the groups studied. The mean load required to fracture the zirconia custom posts was higher (765.1 ± 48.5 N) than the fiber posts and the cast posts and cores. The fiber posts resisted a mean load of 561.4 ± 37.2 N which was higher than the cast posts and cores. The control group revealed the lowest value of fracture resistance.

The limitation of the study is small sample size.

CONCLUSION

Authors found that zirconia posts exhibited maximum fracture resistance as compared to carbon posts and ever Stick posts.

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