بسـم ا   الرحمن الرحيـم

(قالوا سبحانك لا علم لنا إلا ماعلمتنا إنك أنت العليم الحكيم)

صدق ا   العظيم

سوره البقره آيه (٣٢)

Reliability of Reinforcing Flared Canals Using Fiber Posts and Different Restorative Materials

A Thesis Submitted to the Faculty of Oral and Dental Medicine Cairo University in the Partial Fulfillment of the Requirements for the Master Degree

In

ENDODONTICS

BY

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Abstract:

This study aimed at evaluating the reliability of reinforcing flared canals with different restorative materials and fiber post. Eighty maxillary incisors were assigned to four groups (n=20) according to the reinforcement material used. The crowns of the teeth were removed, after cleaning, shaping and obturation, the flared canals were reinforced with (Filtek), (Ketac), and (Core.X). The canals of the control were not flared. Then posts were luted and then core build-up was made in half of the samples. Ten samples from each group with core build up were used for testing fracture resistance using universal testing machine. Eight samples from each group were selected for evaluation of coronal microleakage using the dye-extraction leakage method. Two samples from each group were selected for SEM evaluation. The control group showed (1814 N), while Ketac group showed (667.4 N). In leakage test the control group showed (0.0410 optical density), while Ketac group showed (0.4625). The control group and Core.X group showed the highest fracture resistance load with repairable fracture mode and the least amount of leakage.

Key words:

Flared canals - fiber post - reinforcing – fracture resistance – coronal microleakage.

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Dedication

To my supporting father and loving mother for their continuous help, love, support and for being there whenever I need them.

To my brother ***Dr. Ahmed*** *and my sister* ***Dr. Marwa***

To my best friends ***Dr.Hosam, Dr.haidy, Dr.Mahmoud*** *and all my friends for their love and support.*

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Introduction

Restoration of endodontically treated anterior teeth with weakened roots requires special attention because esthetic and function of these teeth must be restored. Factors such as trauma in immature teeth, gross caries, internal resorption, congenital disorders, previous restoration with large post diameters, or over instrumentation during root canal therapy can result in the creation of a large flared root canal. Flared canals are more susceptible to fracture than vital teeth due to dehydration of dentin after endodontic therapy, excessive pressure during obturation and the removal of tooth structure during endodontic treatment. Maxillary incisors are most commonly involved in dental trauma and dental crown are frequently damaged because of their exposed position in the dental arch.

Some studies have reported strong evidence that endodontically treated teeth with or without posts, are susceptible to root fracture.Traditionally the custom cast post and core has been used in this situation. Today an alternative method of restoring a flared canal has been described. An adhesively bonded fiber post for severely compromised roots may provide improved fracture resistance while creating better stress distribution when loaded, which contributes to the reinforcement of the tooth.

The advent of more advanced composites and ceramics has led to the development of a wide variety of esthetic posts. Many dentists prefer to use prefabricated post systems because they are more practical, less expensive, and, in some situations, less invasive than customized post and core systems. Practitioners have root canal posts available that are made of translucent, white, or tooth colored materials. These posts increase the transmission of light within the root and overlying gingival tissues, thereby, eliminating or reducing the dark appearance often associated with non-vital abutments and metal posts and cores. Up till now tooth-colored posts have been made from carbon, silicon fiber, glass or quartz fiber-reinforced resin, or zirconia ceramic which is a much stiffer material. The modulus of elasticity and diametral tensile strength of fiber posts are sufficiently low and close to these properties in dentin. Thus, when bonded with resin cement they distribute forces evenly in the root resulting in fewer root fracture.

Another alternative for restoring flared canals is by lining of flared root canals with different reinforcement materials. It should be done with minimum tooth structure removal and with good esthetic. Reinforcement of flared root canal using suitable material not only changes the shape of the root, but also increases the fracture resistance of root canal because of the thicker and stronger root canal wall which obviously improves the fracture resistance of post and core.

Composite resin is the most popular core material used. It can be bonded to many of the current posts and to the remaining tooth structure. It posses high tensile strength and the tooth can be prepared for crown immediately. It is tooth colored and can be used under translucent restoration. Also, glass ionomer is another reinforcement material used. It has chemical adhesion to both tooth structure and resin posts. However, limited data is available concerning the best restorative material for reinforcing flared canals restored with fiber post.

Review of Literature

For many years, dentists have been faced with the problem of restoring endodontically treated teeth. Brittleness of these teeth is a major problem. Reasons postulated for this brittleness, include loss of dentin due to access cavities, root canal preparations and overall loss of moisture especially from dentin.(1) The anterior teeth require special attention because of their smaller diameter cervically.(2) Brittleness leading to vertical root fractures was also reported to result largely from operative procedures performed in the root canal after root canal treatment.(3) Therefore some forms of augmentation would be necessary to increase the strength of endodontically treated teeth.

Fracture resistance of endodontically treated teeth:

EL-Khodery et al (1990)(4) studied four restorative techniques in reinforcing endodontically treated intact anterior teeth. Eighty single canals were divided into four groups. All canals were cleaned, shaped and obturated with gutta percha and sealer. Coronal gutta percha were removed and roots were restored with composite resin post, amalgam post, and metal post in first three groups, while the control group was just restored with composite resin in the access cavity as done in all groups. The samples were mounted into a universal testing machine with oblique force at 45-angle till fracture. The results indicated that, composite post and coronal filling have a higher fracture resistance mean value than amalgam post and coronal filling or cemented metal post and composite coronal filling. The control teeth (coronal access cavity filled with composite) showed the lowest fracture load values. They concluded that all composite post and coronal filling bonded to etched dentin with Scotchbond was more effective in