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Rebuilding the decimated tooth with bundle glass fibre post - a novel treatment option- A case report

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Abstract

The restoration of the fractured crown with pulpal involvement is always a challenge for a restorative dentist. This challenge may be further be complicated by a substantial loss of coronal tooth structure and thus the inability to predict restorative success. Hence, to strengthen the crown some anchorage within teeth has to be made that anchorage and support are gained by a rigid structure which is known as post.

The desired support for the endodontically treated tooth is accomplished by using a post (also referred to as a dowel), preferably with a core or coping and a crown or onlay as a superstructure to give coronal-radicular stabilization.

Bundle glass fibre reinforced composite post system consists of a bundle of fine individual posts 0.3 mm in diameter in varying numbers. Thus, on placement in the root canal and removal of the sleeve, the fibres fan out and occupy and take the shape of the prepared internal morphology of the root canal. This system is thus indicated in teeth with atypical root canal anatomies and pronounced conicity. The modulus of elasticity is similar to that of dentin i.e 31.5 GPa. It is characterized by high

radiopacity (408 %Al) as well as high flexural strength and fracture resistance.

A novel, viable treatment option for rehabilitating endodontically treated teeth with insufficient crown structure is demonstrated in this case report. This treatment option is also compared and contrasted with other commonly used post and core systems.

Keywords: Bundle glass fiber reinforced composite post, crown lengthening

Introduction

The most important reason for the emergence of endodontics to the forefront of clinical dentistry is a perfect balance between the understanding of the basic scientific principles and evolving technologies. The restoration of endodontically treated teeth is an important aspect of dental practice that involves a range of treatment options of varying complexities.1

The successful restoration of endodontically treated teeth is an ongoing challenge for a restorative dentist.2

Present-day clinicians are well aware that "The naturally retained root is the ultimate dental implant." The endodontically treated teeth with extensive loss of tooth substance have numerous problems due to a significant reduction in the capability to resist a myriad of functional forces.3

The restoration of the fractured crown with pulpal involvement is always a challenge for a restorative dentist. This challenge may be further be complicated by a substantial loss of coronal tooth structure and thus the inability to predict restorative success. Hence, to strengthen the crown some anchorage within teeth has to be made that anchorage and support are gained by a rigid structure which is known as post.

Endodontic posts have been classified in various ways, the preformed and custom cast, metallic and non-metallic, stiff and flexible, aesthetic and non-aesthetic4

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Bundle glass fibre reinforced composite post system consists of a bundle of fine individual posts 0.3 mm in diameter in varying numbers. Thus, on placement in the root canal and removal of the sleeve, the fibres fan out and occupy and take the shape of the prepared internal morphology of the root canal. This system is thus indicated in teeth with atypical root canal anatomies and pronounced conicity. The modulus of elasticity is similar to that of dentin i.e 31.5 GPa. It is characterized by high radiopacity (408 %Al) as well as high flexural strength and fracture resistance.

A novel, viable treatment option for rehabilitating endodontically treated tooth with insufficient crown structure is demonstrated in this case report. This treatment option is also compared and contrasted with other commonly used post and core systems.

Case Report

A 33-year-old male reported with the chief complaint of fractured upper anterior tooth with the history of traumatic injury one day before and patient was having aesthetic problem and wanted to preserve his tooth. Medical and past dental history was non-contributory.

On clinical examination there was fractured 21 at cervical 1/3rd level of the crown, involving pulp and some laceration on the lingual papilla of 21. (Fig-1)

On radiographic examination fractured involving pulp with no periapical radiolucency. (Fig-2)

Root canal treatment was planned for 21 followed by post and core and prosthetic rehabilitation. For this root canal treatment was initiated after given local anesthesia. The rubber dam was avoided as the patient was discomfort with that. Access opening was done with the help of endo access bur (Fig-5). Working length determination done with the electronic root length measuring device (Electronic apex locator) and confirmed with Intra Oral Periapical radiograph (Fig-6). Canal preparation is done with the help of a rotary endomotor. Corresponding to the master apical file used (F3), master cone selection was done (Fig-7). Obturation is done with cold lateral compaction technique (Fig-8). After root canal obturation, their 2/3 was cleared with peso reamer to create post space to place post and core (Fig-9). Before placement of the post, a crown lengthening procedure was performed using a soft tissue laser. (Fig-3 & 4)

The system chosen was Rebilda Post GT (VOCO, Cuxhaven, Germany) for post and core. Corresponding to the width of canal space 1.2 mm width Rebilda Post GT was selected. To confirm the width and position, selected Rebilda Post GT was inserted into the prepared post space, and a radiograph was taken (Fig-10). After confirmation prepared space was rinsed with saline and dried with the help of paper point. Silanation of Post was done with Ceramic Bond, allowed to act for 60 sec and air-dried. For luting Rebilda Post GT, Dual-cure adhesive (e.g. Futurabond U) by the respective instructions was used. Before polymerization, shorting of post according to the desire length done with the help of diamond bur in the absence of water. While holding the Rebilda Post GT in the canal, the sleeve removed with the help of a tweezer and flaring of individual fibers done with the help of a spreader(Fig-11).

Final polymerization is done with the help of a light cure gun. Composite was used as a core build-up material. (Fig-12 & 13)

Crown preparation was done and the impression was made with the help of rubber-based impression material. (Fig-15). A temporary acrylic crown was placed till the final ceramic crown. (Fig-16)

Finally, the all-ceramic crown was cemented and the patient recalled after one month for follow-up. (Fig-17 & 18)

Fig-1: Pre-operative

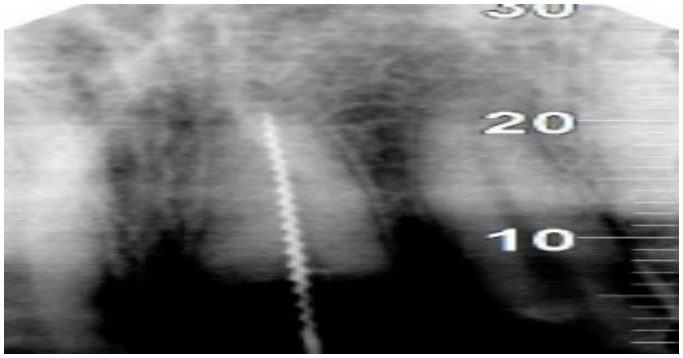

Fig-2: Pre-operative IOPAR

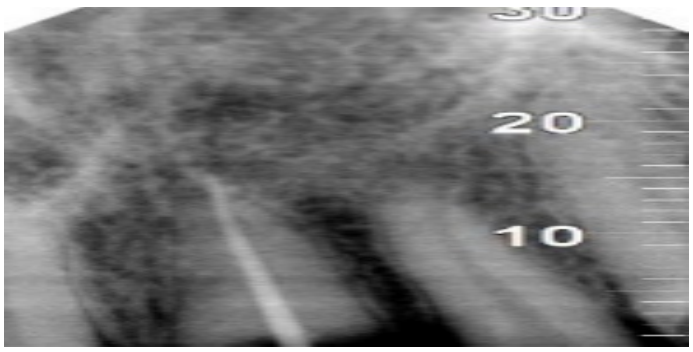

Fig-3: Crown lengthening with LASER

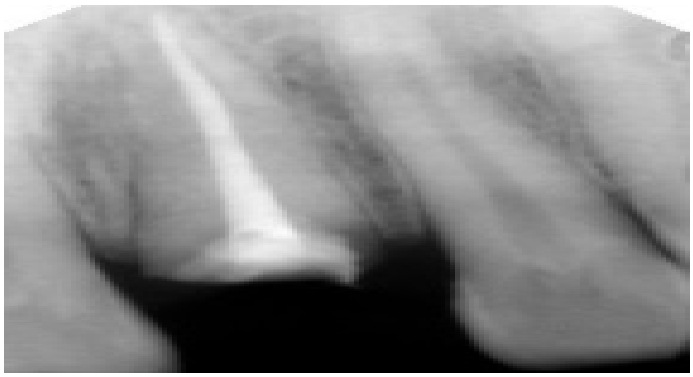

Fig-4: After Crown lengthening

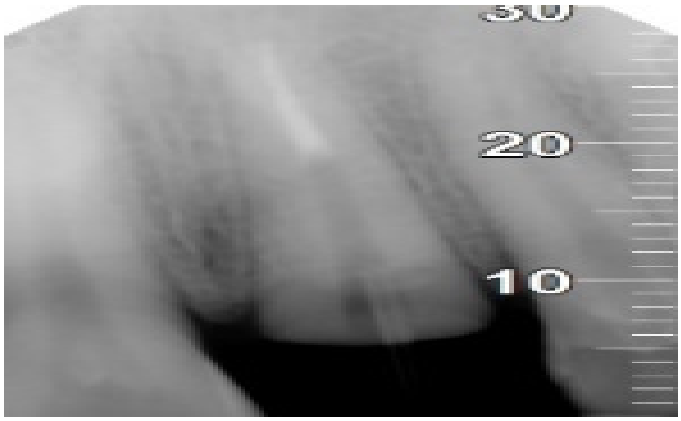

Fig-5: Access opening

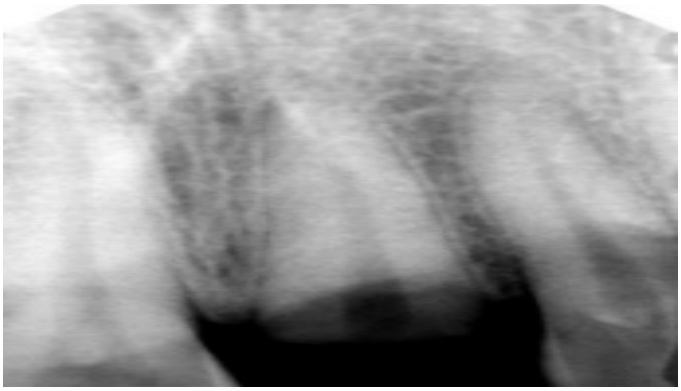

Fig-6: Working length IOPAR

Fig-7: Mastercone IOPAR

Fig-8:Obturation IOPAR

Fig-9: Post Space IOPAR

Fig-10: Post length IOPAR

Fig-11:Rebila POST GT insertion

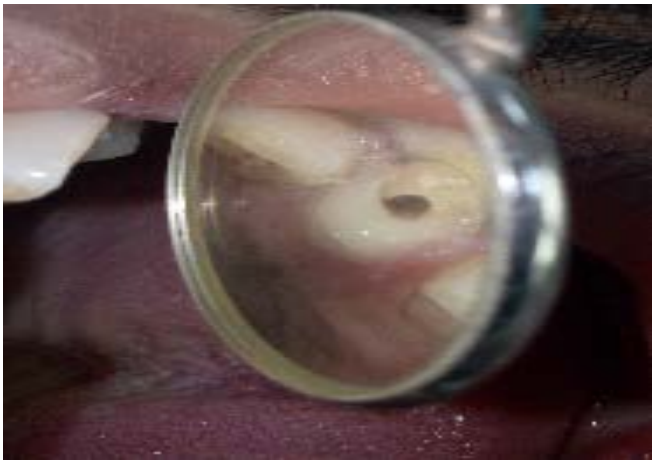

Fig-12: Rebila POST GT polymerisation

Fig-13: Core Build up

Fig-14: Post Core build up IOPAR

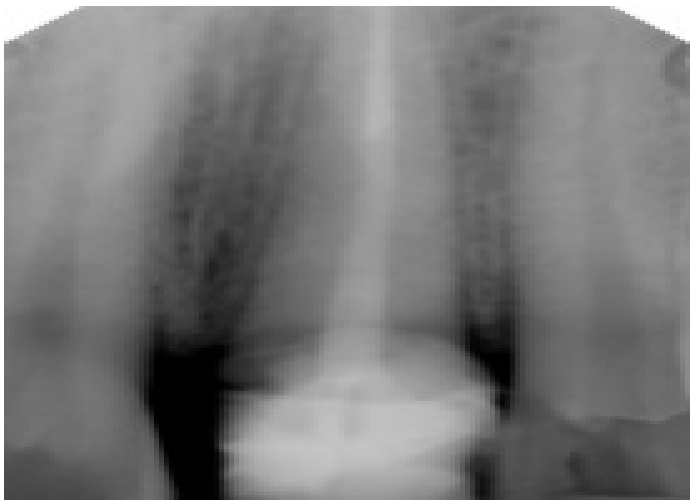

Fig-15: Crown preparation

Fig-16: Temporary Crown

Fig-17: Ceramic Crown

Fig-18: Ceramic crown cementation

Discussion

Endodontic treatment has progressed significantly over the last two decades leading to greater knowledge, clinical success and concomitant cost of endodontic treatment. Failure in teeth that have been root canal treated is more likely to be the result of the failure of the restoration that has been placed, rather than the endodontic treatment itself.5

Thus, the variables under study which are the different materials used for post and core restoration became the factors most crucially responsible for the variability in the clinical performance of the teeth over time.6

The cast metal post and core has been the traditional and time-honored method of restoring endodontically treated teeth. However, there are some disadvantages associated with the conventional post and core systems such as poor retention of the post, greater incidence of root fracture, and risk of corrosion when different metals are used in the system.7

Fabrication of cast metal posts and cores can be time-consuming and involves additional laboratory costs. The laboratory procedure itself may introduce errors within casting and thus increase the risk of failures.

A growing interest in aesthetic dental restorations and adhesive dentistry has led to the development of innovative post materials and techniques for the restoration of endodontically treated teeth.

These newer systems, like quartz fiber posts, have focused on physical properties, such as modulus of elasticity, that are closely matched to dentin to decrease stress concentration within the root canal and reduce the incidence of fracture. Most of the fibre posts can be removed from a root canal with ease and predictability when necessary, without compromising core retention in cases of endodontic retreatment.

Rebilda Post GT is characterized by high radiopacity (408 %Al) as well as high fracture resistance and flexural strength (1,040 MPa), while its elasticity is similar to that of dentin (31.5 GPa). The diameter of a single fine post is 0.3 mm.

Just like conventional root posts, Rebilda Post GT is indicated for all post/core build-ups. whether it be for treating a tooth with atypical anatomy or a mechanically prepared root canal, Rebilda Post GT is highly effective. Once initially seated the sleeve is removed, the bundle is spread and the fine individual posts are distributed in the entire root canal. In contrast to conventional root posts, this provides homogeneous reinforcement of the entire core build-up. Rebilda Post GT offers advantages in the subsequent treatment procedure that includes:

1. No need for a special drill to suit the size of the post the post bundle adapts to the root canal, so when using Rebilda Post GT, minimal if any additional tooth substance needs to be sacrificed and there is no further weakening of the tooth structure. Rebilda Post GT will work with any drilling system.
2. Simple insertion into the root canal the bundling of the fine individual posts with the color-coded sleeve makes the placement of Rebilda Post GT as simple if

not simpler than the placement of a conventional root post.

3. Adapts to any root canal morphology After insertion of the post and before polymerization of the post cement, the sleeve used to bundle the posts must be removed and the individual posts spread out in the root canal with a suitable instrument (e.g. a spreader). This ensures more homogeneous reinforcement of the post cement.
4. Reinforcement of the build-up Distributing the fine individual posts fans them out in the area of the core build-up. This increases the surface area and thus the adhesion and retention attained between the core build-up material and the Rebilda Post GT, resulting in a stronger build-up.

Crown lengthening with laser is having a significantly shorter healing time and less post-operative pain and less blood at the working site

Conclusion

A novel, viable treatment option for rehabilitating endodontically treated teeth with insufficient crown structure is demonstrated in this case report. Fibre post and core technique offers the advantage of reducing chairside time, and obviates the need of arduous time-consuming, error-prone laboratory procedures and expensive equipment. They possess inherent flexibility as of natural dentin, allowing the post to absorb stress and prevent root fracture. Other advantages of fibre post, like aesthetics, corrosion resistance, biocompatibility, modulus of elasticity is similar to that of dentin, could not be embraced in this study.

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