

Rehabilitation of Grossly Decayed Crown Structure of Tooth with Post and Core Method – A Case Report

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Abstract:-

Substantial damage of tooth structure is associated with various problems like poor mechanical properties, poor aesthetic, and discomfort, functional and phonetic problem. Complex fractured crown of such tooth poses a challenge for the dentist, to save the tooth. The successful treatment of such tooth with significant destruction to the tooth structure not only depends on good endodontic treatment, but also on precise post endodontic restoration of the tooth after the completion of the same. A post and core helps to prevent fracture when the remaining tooth structure is very less. When a large amount of tooth structure is lost, a custom cast post and core is indicated. The primary purpose of the post is to retain a core that can be used to retain a definitive prosthesis. The following case report illustrate the interdisciplinary approach to restore function and aesthetic of severely damaged treated teeth by means of full veneer crowns following post and core method. Synchronised endodontic and prosthetic treatments with careful consideration of patient's expectations and requirements were critical for a successful outcome & patient satisfaction.

Keywords: prefabricated post & core, Endodontic treatment, post endodontic restoration, Restoration, PFM crowns

Introduction

Excessive loss of dental hard tissues creates difficulties for the aesthetic outcome of subsequent prosthetic restorations. In such cases, an interdisciplinary approach is necessary to evaluate, diagnose & restore aesthetic problems using a combination of endodontic and prosthetic treatment. Structurally compromised decayed teeth can be restored with large variety of materials, techniques.¹ Such tooth with less coronal tooth structure remaining often poses a challenge while choosing an appropriate post-endodontic restorative material². A post and core build-up is necessary for sufficient retention of the definitive restoration in case of grossly decayed teeth, often lack sufficient substance in the crown region. In addition to prophylactic treatment against bacterial recolonisation of the root canal system, the aim is to reproduce aesthetic and biomechanical characteristics comparable to those of a healthy tooth. In such cases, the amount of remaining dental hard tissue, the type of material used for the root post and the coronal build-up, the type of composite-based cement, the extent of the preparation and the occlusion must all be taken into consideration.

Clinicians always face the problem whether to go for a direct/indirect restoration, partial/full coverage crown, also whether to opt for a post or not. According to Franklin Weine, most of the Endodontically treated teeth often failed following root canal treatment owing to poor post endodontic restoration rather than primary endodontic cause.³ While choosing an appropriate post endodontic restorative material⁴, various factors have to be kept in mind e.g. Remaining coronal tooth structure following RCT, functional requirements of the tooth, esthetics, age of the patient and the existing periodontal condition

Post is a dental material placed in the root of structurally insufficient tooth when additional retention is required to retain the core & coronal restoration. The objective of the post and core is primarily to replace missing coronal tooth

structure sufficiently to provide adequate retention & resistance for the crown that will eventually restore the function and the aesthetic of the tooth.^{5, 6} Posts can be either prefabricated or custom based post. Prefabricated posts are best suited for circular canals while custom-cast posts and cores possess superior adaptation to all root canals.

The indications for a post and core restoration are tooth with extensive crown loss, crown susceptible to cervical area fracture, grossly discoloured tooth, loss of two proximal surfaces, shortened tooth with insufficient retention form with favourable periodontal and periapical condition.⁷ The fit of the post with the canal walls depends on the configuration and size of the root canal.⁸ Prefabricated metal, carbon fiber, ceramic, and glass fiber posts are available. These last two options provide esthetic alternatives to metal posts. They are used in conjunction with a plastic material such as composite resin, amalgam, or glass ionomer. A two-step technique consisting of a post-and core foundation and a separate crown obtained superior results. With the two-step approach of fabricating a separate crown over a cast post-and-core, achieving a satisfactory marginal fit is easier because the expansion rate of the two castings can be controlled individually.⁹ a cast post and core needs to be slightly smaller than the canal to achieve optimal internal seating, whereas the crown needs to be slightly larger to achieve optimal seating. The two-step approach further permits fabrication of a replacement crown, if necessary, without the need for post removal. Finally, a different path of placement than the one selected for the post-and core may be selected for the crown. This is often helpful when the tooth is restored to serve as an abutment for a fixed partial denture. The aim of the following case report is to restore the complex fractured crown of maxillary right permanent second premolar using Glass Fiber Reinforced Post and Core.

Case Report

A 37 yr old female patient visited to my clinic with the chief complaint of decayed upper right side back teeth and wanted to get them restored (fig.1). Patient gave history of pain in the upper back teeth of right side six month ago which gradually subsided on taking medication. Intra oral examination revealed a grossly decayed upper right side permanent second premolar along with healthy gingival. . On examination, there was no pain and swelling. Canine Guided occlusion was present without loss of vertical dimension with adequate overjet and overbite. Radiolucency involving enamel, dentine, and pulp was seen in radiographic examination. Vitality test was negative. After examination and diagnosis treatment was decided to restore the grossly decayed crown structure with fiber post and core followed by Porcelain fused to metal crown.

Local Anaesthesia was given. Access was gained with round and Endo-z bur. An electronic apex locator was used to determine the working length and was confirmed with radiography. During the biomechanical preparation Sodium hypochlorite (2.5%) was used. Paper points were used to dry the root canal and then obturated with root canal sealer and laterally condensed with gutta-percha. (fig.2a, fig.2b)

The post spaces were prepared with corresponding drills to receive the fiber reinforced post (fig.3).The fiber post was checked for the fit (Fig. 4). The fiber post was seated using glass ionomer cement and core build up was done with composite (Figure 5). Tooth preparation was done in relation to 15. Upper and lower elastomeric Impression was taken. Finally PFM crown cementation was done (Figure 6) and high points checked for proper occlusion.

Discussion:-

Some teeth are severely disfigured because of caries, trauma or even as a result of previous large restorations. In case of an evident horizontal loss of clinical crown, most of the teeth could be unable to retain the final restoration without some additional support. If only a ferrule of minimal thickness can be achieved from remaining coronal tooth structure, a post and core build up following endodontic treatment could be of great assistance for retaining and supporting the future restoration. Post and core system has therefore been very popular and widely used for such teeth and have been in practice for a long time already.

Most post systems can be used successfully if few principles are followed such as:

1. Avoid bacterial contamination of the root-canal system
2. Provide cuspal coverage for posterior teeth
3. Preserve radicular and coronal tooth structure
4. Use posts with adequate strength in thin diameters
5. Provide adequate post length for retention
6. Maximize resistance form including an adequate ferrule
7. Use posts that are retrievable.

History of fiber posts guides us to as far as 1989, when the producers claim to have introduced their original carbon fiber post-Composi post and they were started being used clinically, in France. However, the first evidence of a published article on the dental fiber posts was in 1990, by Duret et al¹⁰⁻¹²

The initial fiber posts consisted of carbon/ graphite fibers considering their good mechanical properties,^{13,14} such as high stiffness, tensile strength and

conductivity to electricity and comparatively lower toxicity¹⁵ The introduction of fiber posts brought an revolution in the field of dentistry, providing a reliable substitute to metal posts for the first time, of all types (casted or pre-fabricated). Over the time elapsed after the introduction of fiber posts, they have gained popularity in the dental market because of their benefits regarding ease in manipulation, mechanical properties, esthetics and removability, offering predictable clinical performance in several ways. However, the initially introduced posts had some drawbacks regarding their esthetic usage, as they were radiolucent and difficult to conceal under all-ceramic or composite restorations.^{10,12} Especially in case of the anterior teeth, the color would reveal from an otherwise perfect definitive restoration. Successively, radiopaque fiber posts were obtained and more esthetic posts using the quartz and glass fibers were introduced to overcome this problem by being incorporated in the resin base. These fiber posts are white or translucent, more favorable for conditions with high esthetic demands. Besides, fibers have elasticity, high tensile strength, low electrical conductivity, resistance to solubility, and resistance to biochemical degradation. These quality claims highly advocated for the severe change for the acceptance of fiber posts.

Ideal properties for the post material include physical properties like modulus of elasticity, compressive strength, flexural strength and thermal expansion, similar to that of dentin. It should esthetically resemble and bond efficiently to the dentine^{14, 16}. Currently available fiber-based posts are essentially composite materials. They consist of prestretched fibers of carbon or silica bounded by a matrix of polymer resin. Most of the fiber-reinforced posts contain epoxy resin or bisGMA matrix along with some fillers.¹⁷

This is believed that fiber post distribute the stresses more evenly throughout the tooth than metal posts, making the root less susceptible to fracture. Some

studies have shown that fiber posts strengthen the root when used with a resin luting cement, and several short-term clinical studies have reported high success rates. Carbon fiber posts are generally removed fairly easily by boring through the middle of the post with an ultrasonic or rotary instrument. The alignment of the fibers assists in keeping the instrument moving in the right direction and thus helps prevent perforations. Quartz fiber posts are newer to the market, and there is some disagreement on their ease of removal. Several short term clinical studies report high success rates with fiber posts.

Fiber post itself is a new advancement in the field of dentistry. The unfavorable transmission of stress from post to tooth structure resulting from the high modulus of elasticity of the metal post leading to frequent decementation or even fracture of the tooth can be attributed for failure of the metal post system¹⁷. This led to decreasing preference of metal post and rising popularity of fiber posts. Many researches have been done and numerous papers published concerning the fiber posts and their different properties.^{18, 19}

Conclusion:

To restore the bulk of the coronal portion of the grossly decayed tooth, a post-and-core restoration is placed to facilitate the subsequent restoration of the tooth by means of an indirect extracoronary restoration. Excellent functional and esthetic results can be achieved with the use of a glass fiber-reinforced root canal post and composite material. Fiber post has better homogeneous tension distribution when loaded, than rigid metal or zirconium oxide ceramic therefore, a combined use of fiber posts provides satisfying esthetic results and improved mechanical properties. The above technique helps in achieving the internal support by posts to the remaining root that provides retention and adds stability to the prosthesis.

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Figures:-



Fig.1- Grossly Decayed Tooth



Fig.2a-Obturation after BMP



FIG.2B-Radiographic View Obturated Canal

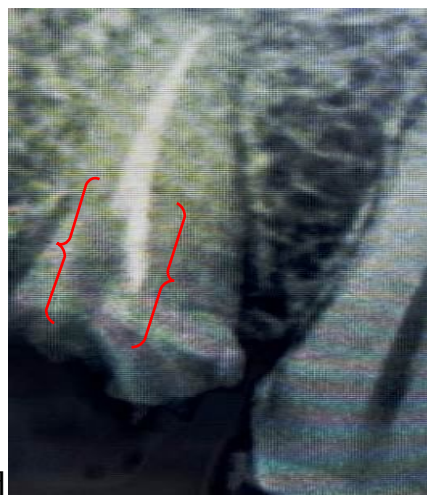


Fig.3- Post Spaces Were Prepared



Fig.4-fiber post was checked for the fit.

Fig.5- Fiber Post Was Seated Using Glass Inomer Cement and Core Build up Was Done With



composite and tooth preparation was done.



Fig.6- PFM crown cementation