Restoration of Anterior Tooth with Extensive Coronal Tooth Loss with Custom Metal Cast Post: A Case Report

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Abstract

The success of an endodontically treated tooth, when most of the coronal structure is lost, not only depends on the quality of Endodontic treatment but also its post-treatment coronal rehabilitation. This can be achieved by retaining a core with a post holding the final fixed prosthesis. In cases where the bulk of the natural crown is lost, a post and core with Endodontics treatment help to improve fracture resistance. Therefore it is of great importance that an apt post system is chosen depending on the clinical condition of the tooth to be restored. When a large amount of tooth structure is lost or if an insufficient ferrule is present, a custom cast post and core is indicated. This paper elaborates on a case report depicting restoration for central incisor using custom cast posts followed by PFM crowns.

Keywords: *Anterior Tooth; Extensive Coronal Tooth Loss; Custom Metal Cast Post.*

Introduction

Teeth undergo extensive loss of coronal tooth structure after Endodontics treatment and the reason could be either fracture, a pre-existing restoration, or a large access cavity preparation. In such a condition opting for an apt post Endodontics restoration method is of great importance and can be very challenging.[1] The choices are between direct or indirect restoration for smaller defects, partial or full coverage crowns for relatively larger cavities, and also whether there is a requirement of placement of post. If it is decided upon the placement of post, the type of post needs to be opted too, whether a prefabricated or a cast custom post. According to Franklin Weine, the success of most of the Endodontically treated teeth depends on the post Endodontic restoration and not on the endodontic treatment itself.[2]

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Post Endodontic restoration and its choice depending on factors like the remainder coronal structure, position of the tooth and its functional requirements, esthetics, patient's age, and the periodontal health of the tooth.[3] Endodontically treated anterior teeth, without any discoloration can be restored with composite resin if the loss of tooth structure is moderate to low. This will provide a good coronal seal and the fracture susceptibility will be reduced.[4,5] Composite restoration can also be chosen when the anterior teeth have the cingulum or the incisal edge intact with a couple of proximal carious lesions[6] in the Endodontically treated tooth is found to be discolored, bleaching can be done paired with indirect or direct veneers. When coronal tooth structure is considerably lost (<50%) in a root canal treated tooth, it is essential to decide whether to opt for direct restoration or it needs to be restored with full coverage crowns. This depends on the amount of occlusal load on the tooth and the position of the tooth in the arch. Any tooth that is root canal treated and is found with crack lines, mesial or distal caries or cervical abrasion is recommended for placement of intra radicular posts. This provides for better retention on the core and the final restoration with improved fracture resistance.[7] Anterior teeth with more than 50% tooth structure loss, post, and core followed by fullcoverage restoration are mandatory.[8]

When there is a requirement for placement of posts, various options are ranging from the conventional custom cast post to newer fiber posts. Placement of fiber posts requires less time and also the evidence from the laboratory and clinical experience of technicians and dental professionals respectively emphasis on the use of fiber posts. This does not conclude that custom cast post is a matter of past, as they are a better option when there is extensive loss of tooth structure and if there is a need to change in angulations of the core. In this case report, we present a case where it requires the restoration of maxillary incisors by custom cast post with porcelain fused to metal crowns.

Case Report: A Female patient of age 76 years reported to the department of prosthodontics. She had been referred to our department from the department of endodontics post endodontic treatment of both the upper central incisors. She reported a history of trauma on the left central incisor which led to it being fractured from the cervical third of the tooth. The right central incisor was grossly decayed. The patient underwent Endodontics treatment for both the central incisors. The patient gave a drug history of antiplatelet therapy. Intraoral examination revealed 11 to be restored temporarily and 21 with Ellis Class 3 fracture. 21 had undergone such extensive loss of coronal tooth structure that barely the natural crown was visible.

Figure 1. Left central incisor with class 3 Elli's Fracture

The rest of the upper arch revealed severe attrition. The lower arch had undergone complete rehabilitation with porcelain fused to metal crowns where various crowns had lost the ceramic coating over them. There was a general loss of vertical dimension of occlusion and the patient showed a deep bite.

The intraoral periapical radiographs concerning the central incisors revealed that the canals of both incisors were well obturated with no periapical abnormality. After the patient was thoroughly examined, the treatment plan was to restore 11 with composite and place a custom cast post for 21 followed by porcelain fused to metal crowns for both the incisors. As there was not enough crown structure to preserve a ferrule for final prosthesis the patient was referred to the Department of Periodontics for the clinical crown lengthening procedure.

The patient returned to the department after one week. The right central incisor was restored with composite and prepared to receive porcelain fused to metal crown. The tooth preparation was done in such a manner that angulation of the core is inclined more in the buccal direction to provide for clearance on the palatal side as the patient has severe deep bite. For 21, post space was created leaving at least 5 mm of Gutta-percha to preserve apical seal using upto size 3 of the Gates drill. This was confirmed using a radiograph. A ferrule was prepared on the remaining tooth structure.

Figure 2. Custom Cast Post

The canal space was lubricated with petroleum jelly and the impression of the post space is made with light body elastomeric material. Provisional restoration is made and luted with zinc oxide eugenol cement over 11, and the post space of 21 was blocked with cotton pellets.

Figure 3: Cementation of custom cast post and preparation of ferrule w.r.t 21

Figure 4: Tooth preparation of 11

The impression is poured with Class III gypsum material and the wax pattern is fabricated for custom cast post and core. It is invested immediately and casting is done.

This cast post and core (Fig.2, Fig.3, Fig.4) was cemented onto 21 with glass ionomer cement. The final impression is made with light body elastomeric impression material for fabrication of porcelain fused to metal crowns for both the central incisors. The provisional restoration is placed back. Shade selection was done under natural light. Final porcelain facing metal restorations are tried, glazed and cemented with glass ionomer cement.

Figure 5: Bisque trial of porcelain facing crowns w.r.t. 21 and 11

Figure 6. Cementation of Porcelain facing Crowns

Discussion

The prognosis after an Endodontic treatment of the tooth greatly depends on the post-treatment restoration and little on the endodontic treatment itself,though together with good endodontic treatment and good restoration success rates are seen to be as much as 91.4%. [9]

The post is indicated to aid in the retention of core in a tooth with reduced coronal tooth structure.[10,11] When an anterior tooth has undergone a minimal amount of tooth loss, it can be conservatively restored with bonded restorative materials.[12] In such cases,the post is of not much benefit as the tooth structure is sound it can increase the risk of nonrestorable failure.[13-15]

After an anterior tooth undergoes root canal treatment, the remaining tooth structure is pretty thin and reduces further if indicated for a crown. Anterior teeth are subjected to lateral and shearing types of forces

and after restoration, it should be able to withstand these forces. also, the small pulp chambers are not supportive in providing adequate retention and resistance. and the pulp chambers are too small to provide adequate retention and resistance without a post. Therefore in most cases, placement of post becomes necessary.

As a wide array of post systems available in the market and depending on the case, it is necessary to opt for the best type of post by weighing the advantages and disadvantages of all post systems during treatment planning.

Cast post and core have been the standard for many years and clinicians are still using these as it is advantageous in various situations. In cases where multiple teeth require post and core, to increase efficiency, one impression is made and they are fabricated in the laboratory instead of placing a post in and buildup in each tooth separately as a chair-side procedure. When there is a requirement in the change of angulation for the final restoration to match the adjacent tooth, as in cases of mild proclination, cast post and core can be given.[16]Cast posts are also indicated when there is the minimal residual coronal structure of the tooth, as in mandibular incisors with not enough bulk of tooth to provide anti-rotation features during tooth preparation. These posts are easily retrievable if the tooth requires endodontic re-treatment. Cast posts are capable of confirming to the canal morphology and hence can be used in different types of canal configurations like oval or elliptical.

These have fallen from favor over time because for it to be installed there is a need for two appointments, temporization, and a laboratory fee. On the other hand, according to Gomez Polo et al, cast metal posts have shown higher survival rates over10 years.[17] There have been reportsof a high rate of success with these post and core systems.[18,19] and the research till now is not entirely in favor of other post systems as there are still many unanswered questions.

A 2mm ferrule can increase the fracture resistance of a root canal treated anterior teeth, irrespective of the post system implied or the type of crown to be given. The reason for increased fracture resistance can be credited to the improved stress distribution.[20]The ferrule is a ring of sound tooth structuresthat envelope by the cervical third of the crown. The crown restoration braces the tooth around this ferrule to enhance the integrity and longevity, provides resistance and retention form on the endodontically treated tooth. It helps to transfer the occlusal forces vertically to the periodontium as the artificial crown and root act as one unit. The more is the modulus of elasticity of the post better is their performance. In the absence of ferrule, a cast post with high elastic modulus preferred, since there is less available tooth structure for bonding.[21-23]

The material of the post is not responsible for its fracture resistance and mode of failure. Instead, they are a result of various mechanical properties interacting with each other. But cast posts are preferred in cases where the integrity of the tooth is compromised in the cervical region or has been extensively destructed due to caries of fracture, especially when it is difficult to obtain a ferrule. In the present case, 11 had sufficient clinical crown structure, whereas in 21 the clinical crown was greatly reduced hence rehabilitation of the tooth was planned by placing custom cast posts followed by a metal-ceramic full-coverage crown. As there was insufficient ferrule for the tooth, it underwent the procedure for clinical crown lengthening of about 1 mm. In such conditions, periodontal surgery like gingivectomy with alveoloplasty or orthodontic extrusion becomes mandatory to obtain a ferrule.[24,25] Though all-ceramic crowns are the best option for full coverage restoration in Anterior teeth due to their aesthetic superiority, Porcelain facing metal crown restorations opted to mask the discoloration of the cast core. Also, there was not much clearance on the palatal side due to severe deep bite. This lead to the choice of Porcelain facing metal crown instead of full metal-ceramic crowns.

Conclusion

There are various post systems available today and the selection of the suitable system is greatly influenced by the clinician's knowledge of the indications and contraindications depending on the case and the amount of sound d tooth structure remaining. We should be well versed in the advantages and the disadvantages of these post systems to make a wise choice. In cases with reduced coronal tooth structure, custom cast metal post and core is recommended. Esthetics, other than function, is of great concern when considering the restoration of Anterior teeth.

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