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Case Report

Rehabilitation of badly broken-down maxillary anterior with custom cast post and core

Rajat Shukla[1]*, Rohit Kochhar[1], Manju Kumari[1], Mansi Punjabi[1], Navneet Kaur[1], Deepika Shukla[2]

[1]Dept. of Conservative Dentistry and Endodontics, I.T.S Dental College Hospital & Research Centre, Greater Noida, Uttar Pradesh, India
[2]Akash Dental Clinic, Dehradun, Uttarakhand, India

Abstract

To rehabilitate the coronal portion of the anterior teeth, which had been fractured, is one of the major issues faced by endodontists. This leads to various problems, including the functional, psychological, and aesthetic appearance of the patient, and it is also a serious challenge for the placement of a permanent prosthesis over the concerned region.

Post and core come out to be a tremendous option considering the tooth which is badly broken down, and it also facilitates the deployment of a crown over it. There are different categories of post systems available in modern dentistry.

The post is typically made from metal or other durable materials, and the core is shaped to form the foundation for a final crown.

Cast post and core is a promising approach when dealing with a weakened tooth that lost its strength due to either extensive caries or traumatic injuries.

Keywords: Aesthetic rehabilitation, Cast post and core, Post and core, Pattern resin, Anterior tooth rehabilitation.

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1. Introduction

To regain the lost strength of a extensively damaged tooth is one of the daunting tasks in modern dentistry. A canal's internal anatomy, geometry, and the amount of preparation to be done are the major factors that decide which type of post system to choose. Cast post and core is one of the trustworthy options when dealing with a severely weakened tooth that has undergone endodontic treatment.

The amount of tooth structure remaining, shape, size, and anatomical variations are a few important aspects for deciding which type of post system is to be used, either a cast post or a prefabricated one.[1] When a root canal requires a greater amount of preparation and the internal anatomy is too wide, a post system such as a cast post that fits nicely into the canal is preferred over prefabricated posts that do not adapt to the canal's internal shape.[2,3] In this method, the insertion of a custom-made metallic post into the root canal facilitates a well-fitting final prosthesis. A core material is built around the post to provide a stable foundation for the permanent restoration.

This case report is focused on investigating the probable benefits, results, and various challenges of using a cast post and core. This case report also gives a clear perspective on the efficiency and long-term durability of the restorative method. Through the evaluation of the case, the report focuses on understanding the various approaches of metallic cast posts and the different ways they help to reinforce the tooth which was severely damaged.

The main purpose of a cast post is to provide a reasonable amount of retention for the core, which helps in the reconstruction of lost coronal structure and facilitates the placement of a full-coverage restoration over it. Cast metal posts possess a high modulus of elasticity. They also deliver superior geometric adaptation to severely flared or elliptical

*Corresponding author: Rajat Shukla
Email: shuklarajatat22@gmail.com

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canal spaces and require a lesser volume of the natural tooth structure.

This case report validates the efficacy of a custom cast post and core in rehabilitating a severely damaged tooth, utilizing a bespoke cast post and core along with a porcelain-fused metal crown to restore aesthetics and revive a lost smile.

2. Case Report

A 21-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of a dislodged crown with respect to tooth no. 11. On thorough clinical examination, there was mild tenderness on percussion and also inadequate root canal therapy with respect to tooth no. 11 (**Figure 1**a,b).

Based on the above-mentioned findings, and radiographic examination a probable diagnosis of symptomatic apical periodontitis with respect to tooth no. 11 was made.

The treatment plan comprised retreatment in relation to tooth no. 11, followed by a custom cast post and core and a porcelain-fused metal prosthesis.

Retreatment was initiated. The gutta-percha was initially removed with the help of Gates Glidden drills (MANI Inc., Japan) in the coronal region, and from the middle and apical thirds, it was first softened by a gutta percha solvent (Prevest DenPro, USA), and then removed with a size #35 Hedstrom file (M Access, Dentsply Maillefer, USA). The working length was then determined (**Figure 2**).

Hand instrumentation was used for biomechanical preparation up to the master apical file. The root canal space was irrigated with 10 ml of 3% sodium hypochlorite and 17% EDTA alternatively. The root canal was then filled with calcium hydroxide paste, and the access cavity was temporized.

After one week of follow-up, the patient reported no symptoms. Intracanal medication was removed using an H-file and ultrasonic irrigation. Final irrigation was done as per standardized protocol. The canals were then dried using sterile paper points, followed by obturation using GP points and Fillapex sealer (MTA-based sealer, Angelus, Brazil).

An intraoral radiograph was acquired for confirmation. Post space was prepared, and 5 mm of gutta-percha was left apically to preserve a hermetic seal (**Figure 3**).

An indirect technique was then used to create the metal post. A separating medium was applied to the root canal walls, and a Pinjet (Angelus, Brazil) was used to record an impression of the post using pattern resin (GC America, Pattern Resin) (**Figure 4**, **Figure 5**, **Figure 6**).

Luting glass ionomer cement was used to cement the metal post (**Figure 7, Figure 8**). An intraoral scan was sent to the lab after proper shade selection for the fabrication of the porcelain-fused metal crown (**Figure 9**). Cementation of the porcelain-fused metal crown was done using glass ionomer cement (**Figure 10**).

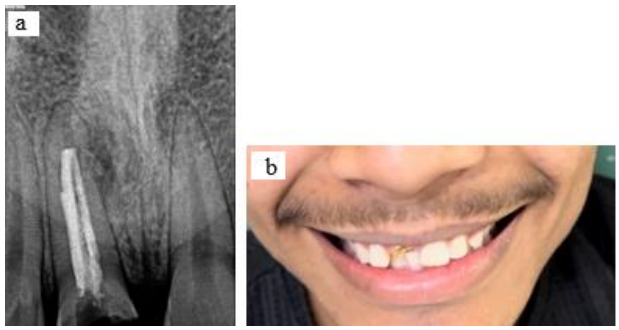

Figure 1: a: pre-operative radiograph; b: pre-operative clinical picture

Figure 2: Working length radiograph

Figure 3: Post space preparation

Figure 4: Impression of the post space with pattern resin

Figure 5: Recorded pattern of the post space

Figure 6: Fabricated cast post and core

Figure 7: Luting of cast post & core

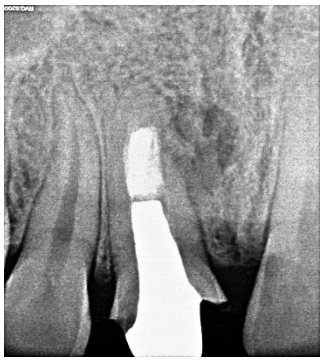

Figure 8: Radiograph after Luting

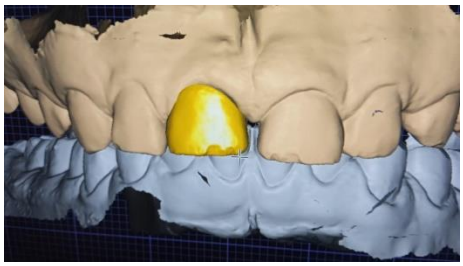

Figure 9: Digital mock-up of the prosthesis

Figure 10: Final prosthesis in the patient's mouth

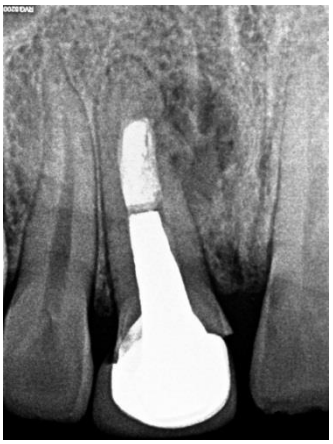

Figure 11: 6 Months follow up

3. Discussion

Historically, in scenarios where there is severe destruction of anterior teeth caused due to caries, trauma, or other causes, there was a lack of sufficient coronal tooth structure to provide support to a direct restoration or a fibre post. The internal structure of the root canal was often very wide, making cast post and core a reliable option that fit seamlessly into the root canal.

For a permanent restoration to be placed successfully, there should be a proper foundation over the underlying tooth structure to provide adequate support and long-lasting retention. Due to its remarkable strength and prolonged stability, cast post and core was a preferred choice.

Metal posts (such as titanium and stainless steel), fiber posts (such as carbon and glass), and ceramic posts (such as zirconia) are among the several post options available. Prefabricated posts can have various characteristics, such as a circular cross-section with different textures—threaded, roughened, smooth, or serrated. Additionally, both parallel and tapered post shapes are available, with respective drills designed to create the appropriate post space.[5]

One of the standout properties of the cast post and core is the precise adaptation of the custom-made post to the canal. This conforming fit allows for the even distribution of biting forces across the tooth, which in turn reduces the chances of failure. Moreover, using high-strength material increases the durability of the restoration.

A previous study performed on cast post and core-treated teeth demonstrated an acceptable survival time. Long-term survival rates of 83% after 10 years, 90% after 9 years, and 89% after 7 years have been reported.[4] According to Gomez Polo et al.,[6] cast metal posts have shown increased survival rates over 10 years. This method also helps in avoiding vertical root fractures, which are one of the major concerns in teeth with significant structural loss and reduced fracture resistance—as long as there is sufficient remaining dentin.[7-9]

Raedel M et al.[10] conducted a study involving 717 custom cast posts and cores for 343 patients and concluded that the mean survival time for custom cast posts and cores was 13.5 years. A systematic review and meta-analysis conducted by Tsintsadze N et al.[11] presented an overall survival rate of 78.1% for custom cast post and core.

The structure of the tooth ferrule refers to the part of the tooth that is situated approximately 1.5 to 2.0 mm above the projected ferrule margin.[7-9,12] It has been proven that a 2 mm ferrule in teeth restored with metal crowns reduces the amount of stress concentration in dentin for both metallic and non-metallic post systems.[13]

According to a study, it has been stated that the presence of a minimum 2 mm crown ferrule underlying the remaining tooth structure increases the fracture resistance of anterior teeth rehabilitated using cast post and core and metal-ceramic crowns.[14] Hence, in the present case, around 1.5–2 mm ferrule was maintained to enhance the long-term retention and survival rate of the final prosthesis.

Although the procedure requires multiple appointments and is technique-sensitive—demanding meticulous root canal preparation and precise post design—it provides superior strength compared to prefabricated alternatives.[15] Custom cast posts resolve the issue of bonding the post to the core and can be easily removed if retreatment is needed. Additionally, it offers improved aesthetics, especially for anterior teeth, and is adaptable for teeth with complex root canal structures.

However, great care must be taken to avoid excessive removal of tooth structure, which could compromise the root, and to ensure the post's length and diameter are optimized for the increased durability of the treatment. A meticulously performed cast post and core stands out as a dependable option when dealing with endodontically treated, badly broken-down anterior teeth.

The result obtained from the present case was extremely rewarding, and the custom-made post adapted exceptionally well to the walls of the prepared root canal, thereby enhancing the long-term outcome and durability of the treatment.

4. Conclusion

When dealing with a tooth that has undergone a severe amount of structural loss, a cast post and core is one of the reliable alternatives. This procedure underscores the importance of appropriate case selection, precise post placement, and the use of high-quality materials to ensure the restoration's long-term success. While newer alternatives exist, cast posts and cores continue to be a valuable tool in endodontic and restorative dentistry, offering both durability and strength for patients with considerable tooth loss.

The outcome of the current case was extremely satisfying in terms of restoring a severely damaged tooth, which was brought back into function utilizing a custom-made cast, a ferrule, and a core over it to support and strengthen the final prosthesis. Follow-up assessments at 6 months (**Figure 11**) of the present case, with a stable post and core and crown, along with healthy gingival margins, have confirmed that the restoration remains stable, functional, and aesthetically pleasing—highlighting the ongoing relevance of this treatment approach in modern dental practice.

5. Conflict of Interest

None.

6. Source of Funding

None.

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