Divide to reinforce: Split cast post to rehabilitate a maxillary multirooted tooth -A case report.

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Abstract

Restoration of endodontically treated teeth with extensive coronal destruction is a common challenge in prosthodontic rehabilitation. Multirooted posterior teeth present additional difficulties due to divergent root canals and increased occlusal forces. Custom cast post and core restorations remain a reliable option for restoring teeth with minimal remaining tooth structure because they provide superior adaptation, retention, and resistance form. The split cast post and core technique is particularly useful in multirooted teeth with divergent canals, as it allows the placement of a primary post and auxiliary post along different paths of insertion while maintaining a unified core structure. This case report describes the prosthodontic rehabilitation of an endodontically treated left maxillary second molar using a split cast metal post and core followed by a full coverage crown. The technique allowed passive placement, improved retention, and favourable distribution of occlusal stresses within the roots.

Keywords: Cast post and core, endodontically treated teeth, multirooted teeth, prosthodontic rehabilitation, split post.

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Introduction

Restoration of endodontically treated teeth is a major concern in prosthodontics due to the significant loss of tooth structure following caries, trauma, or previous restorations. Such teeth often require a post and core foundation to retain the final prosthetic restoration and to restore the lost coronal structure.[1] Posts are primarily used to retain the core restoration and should not be considered as a reinforcement for the tooth root. Proper selection of post design, material, root length, root diameter is essential for long-term success. [2] Custom cast post and core systems have long been considered the gold standard in cases where there is extensive loss of tooth structure, because they provide accurate adaptation to the root canal morphology and better retention compared to prefabricated posts. [3]

However, restoration of multirooted teeth with divergent canals presents a clinical challenge. Fabrication of a single rigid post that simultaneously fits multiple canals may create difficulties in achieving a common path of insertion and may lead to stress concentration within the root structure. In such situations, the split cast post and core technique provides a practical solution. This technique involves fabrication of a primary post with a core along with an auxiliary post placed in another canal, allowing passive insertion while improving retention. Split cast post and core is mainly indicated in endodontically treated multirooted teeth with divergent canals where a single path of insertion is not possible. This

also provides anti-rotational resistance to the core restoration. [4]

The concept of multiple posts in divergent canals has been discussed in prosthodontic literature for decades as an effective method to restore severely damaged posterior teeth. [5] Previous studies have shown that the use of accessory posts increases the retentive surface area and distributes occlusal forces more evenly along the root surfaces. [6]

The present case report describes the prosthodontic rehabilitation of a grossly decayed endodontically treated left maxillary second molar using a split cast metal post and core technique followed by a full coverage porcelain fused with metal crown.

Case Report

A 23-year-old male student reported to the Department of Prosthodontics with the chief complaint of difficulty in chewing on the upper left posterior region of the mouth for the past three months. The patient gave a history of root canal treatment in relation to the left maxillary second molar approximately four years earlier followed by porcelain fused metal crown fabrication on the same. The crown was dislodged three months ago.

Clinical Examination

Intraoral examination revealed that tooth 27 was grossly decayed with extensive loss of coronal tooth structure. Only minimal tooth structure remained above the gingival margin. The tooth was asymptomatic and showed no tenderness on percussion or palpation. Periodontal evaluation revealed healthy gingival tissues with normal probing depths.

Radiographic examination using an intraoral periapical radiograph revealed a previously endodontically treated tooth with adequate obturation and no signs of periapical pathology. Considering the severe loss of coronal tooth structure, a post and core restoration followed by a full coverage porcelain fused with metal crown was planned. (Figure 1A)

Post Space Preparation

Removal of gutta-percha from the palatal canal and distobuccal canal was performed using Gates-Glidden drills while maintaining an apical seal of approximately 4–5 mm. The canals were prepared carefully to receive the post while preserving the radicular dentin.

The palatal canal was selected as the primary canal for the main post because of its larger diameter and relatively straight path. The distobuccal canal was used as the auxiliary canal for the secondary post. (Figure 1B)

Pattern Fabrication

A direct technique was used to fabricate the post pattern. The canals were lubricated with a separating medium and acrylic post pattern was fabricated. As it has a multirooted tooth with widely divergent canal, a split cast post design was planned. The primary post was fabricated in the palatal canal using auto polymerizing acrylic resin and incorporated into the core structure. The resin was mixed and adapted into a thin cylindrical form to create a custom acrylic post. The canal was lubricated with petroleum jelly and the resin was applied using the brush–bead technique. The pattern was inserted during the dough stage and relined repeatedly until a snug fit within the canal was achieved. Care was taken to prevent polymerization within the canal by repeatedly loosening and reseating the pattern during the rubbery stage. After complete polymerization, the pattern was removed and any undercuts were carefully identified and trimmed. Using the same technique, a post pattern was fabricated for the distobuccal canal. The core was then formed by placing self-cure resin in the pulp chamber and attaching it to the distobuccal post pattern. The previously fabricated palatal post pattern, coated with petroleum jelly, was inserted into the palatal canal through the unpolymerized core resin to create a path of insertion and withdrawal. After complete polymerization, the pattern was removed. The final pattern represented a split cast post and core

consisting of a distobuccal post with an attached core and a separate palatal post that engaged a corresponding pathway within the core. (Figure 1C)

Casting Procedure

The post and core pattern were invested separately and cast using base metal alloy through the lost wax casting technique. After casting, the restoration was finished and polished to achieve a smooth surface and accurate fit. (Figure 1D)

Try-in and Cementation

The cast post and core were tried intraorally to verify passive seating within the canals. The auxiliary post was inserted first, followed by the primary post and core assembly. Radiographic verification confirmed accurate adaptation of the posts. The restoration was cemented using luting cement. (Figure 1E and 1F)

Crown Fabrication

After cementation of the cast post and core, tooth preparation was completed to receive a full coverage porcelain-fused-to-metal crown. Final impression was made and the crown was fabricated using conventional laboratory procedures. Occlusion was checked and adjusted.

The definitive crown was cemented using glass ionomer cement. (Figure 1G)

Discussion

Successful restoration of endodontically treated teeth depends on the amount of remaining tooth structure, the presence of ferrule, root morphology, and the biomechanical properties of the restorative materials.[7]

Cast post and core restorations have been widely used in prosthodontics because they provide excellent adaptation and retention within the root canal system. They are particularly useful in teeth with minimal coronal tooth structure where prefabricated post systems may not provide sufficient retention.[8]

In multirooted teeth, divergent canals often make it difficult to fabricate a single post that can be inserted simultaneously into multiple canals. Attempting to force a rigid post into divergent canals may result in internal stresses and potential root fracture.[9]

The split cast post and core technique addresses this problem by dividing the post system into two components: a primary post and core, and an auxiliary post. This design allows passive insertion while improving retention and resistance to rotational forces.[10] Studies have shown that accessory posts increase the retentive surface area and enhance the stability of the core in teeth with extensive structural loss.[6] The technique also distributes occlusal forces more evenly across the roots, reducing the risk of root fracture. The auxiliary post placed in the other canal acts as an anti-rotational element the presence of two posts in different canals prevents the core from rotating around the primary post, thereby increasing the stability of the restoration.

Another important factor contributing to the success of such restorations is the ferrule. The presence of at least 2 mm of sound tooth structure above the finish line significantly improves fracture resistance and longevity of the restoration.[11]

The palatal canal of maxillary molars is generally preferred for placement of the primary post because it is larger and more aligned with the long axis of the tooth. Auxiliary posts placed in buccal canals provide additional retention and prevent rotational movement of the core.

Kumar L et al had also fabricated similar post and core to treat a grossly decayed mandibular molar and after 1-year clinical follow-up, the prosthesis exhibited no evidence of failure and the patient was satisfied with its function and esthetic. [4]

Bass EV had undergone similar treatment modality for restoration of grossly decayed maxillary and mandibular molars and concluded with the success of the prosthesis in long term.[9,12] In the present case, the split cast post and core technique provided excellent retention and stability while allowing passive insertion of the restoration. The final prosthetic rehabilitation with a porcelain-fused-to-metal crown restored both function and integrity.

Conclusion

The split cast metal post and core technique is an effective method for restoring grossly decayed endodontically treated multirooted teeth. It allows passive placement in divergent canals, improves retention, and distributes occlusal stresses more evenly within the roots. When combined with adequate ferrule and full coverage restoration, this technique provides predictable long-term results. Therefore, the split cast post and core system remains a valuable prosthodontic option for rehabilitation of severely compromised posterior teeth.

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FIGURE