

Case Report

Key and a key way cast post core system for posterior divergent canals

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ABSTRACT:

Gross destruction of permanent natural molars results in complex restorations. Among them are the cast post core crowns, especially when a tooth has divergent roots and two posts with different angulations need to be placed inside the post space. We present restoration of mandibular left second molar with a key and a keyway system of cast posts and a core. The fabrication was done indirectly on a working cast and the two individual components of the core were cemented together over which a metal ceramic crown was placed.

Keywords: caries, endodontic, post space, elastomers.

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INTRODUCTION:

Conservation of natural tooth structure is basic care in preventive prosthodontics. When natural teeth are grossly decayed, efforts to save the tooth becomes mandatory, especially if the particular tooth is key to efficient mastication. The use of post within the endodontically treated tooth dates back to 1911, when first method of inserting a prefabricated plastic post was described.¹ Since then, different materials and different methods have been described in the literature on tooth restoration. Generally restoration of grossly decayed tooth is done either by a prefabricated or a custom made post and core. The use of cast post core is versatile since it strengthens the already weakened tooth structure.

The use of cast core is particularly important in young patients with severe caries. Cast post core can be used for a single tooth or a series of multiple teeth.² Its use as a foundation restoration for patients requiring full mouth rehabilitation³ has added advantages that includes the possibility of changing the axial inclination of teeth to bring the tooth/teeth into occlusion.^{4,5} However, the main difficulty during fabrication of a cast post core either directly or

indirectly, is their fabrication and placement in a tooth which has divergent root canals like a maxillary molar. Different systems and techniques of splitting the post core in the posterior teeth have been mentioned in the literature.⁶⁻⁹

This article describes the restoration of a grossly decayed mandibular left second molar with a custom made 2 part post and core involving a key and a keyway mechanism through fabrication of a pin and a hole. The degree of difficulty in the case was with the access and visibility in the posterior region.

CASE REPORT

A young male patient aged 32 years reported to the department of prosthodontics with chief complaint of broken posterior tooth in the lower jaw after he had undergone a root canal treatment in the same tooth about 9 months back. Patients' family, medical, social and drug history were non contributory to an existing condition or its treatment. Dental history revealed the patient had developed severe pain in relation to mandibular left second molar about ten months back following which he had sought treatment from a

private health care worker in his place. Extra oral and intra oral examination revealed normal clinical features for both soft and hard tissues except for the affected molar which had developed gross destruction of the coronal portion (**Fig 1A**). An intra oral periapical radiograph showed the presence of three root canals with divergence of distal root in the middle third of the distal root between mesial and distal canals (**Fig 1b**). The relation with alveolar bone was assessed for feasibility of the placement of ferrule, since the tooth was clinically diagnosed to receive a cast post core and a single crown as a conservative treatment option. Other non-conservative treatment options were rejected by the patient that included extraction of the tooth.

Patient went for an oral hygiene maintenance program following which the prosthetic treatment was started by removing the gutta percha from two canals (mesio buccal and the distal canal). Post space was prepared within the canal using passo reamer (Kerr, Romulus, MI, USA) and the two canals were prepared with natural angulation thus converging towards the occlusal surface. The post core was fabricated using an indirect technique that involved making of a putty reline impression (Reprosil, Dentsply/Caulk; Milford, DE, USA) of the root canal in which the light body was supported by an old endodontic reamer within the canal. The cast was poured with Type IV dental stone (Ultrarock, Kalabhai Dental, India) and a 2 part wax pattern (Harward, Germany) was fabricated with one part being a pin (key) and the other post and core in which a hole (keyway) was made for placement of the pin. A plastic pin was used to form the template for the pattern of the key. The assembly was cast in base metal alloy (**Fig 1 c**).



Figure 1: (A) Intra oral view (B) Periapical radiograph showing divergent canals (C) Cast post core with a pin and hole (D) Cast post core adjusted on cast (E) periapical radiograph for verification of post core fit (F) 2 part post core cemented to natural tooth (G) metal ceramic crown cemented to mandibular left second molar

The assembly was adjusted for occlusal clearance on the working cast (**Fig 1d**). A radiograph was taken to verify the fit of the 2 part post and core assembly (**Fig 1e**). After verifying the fit of the post core assembly, the core part was cemented first with zinc phosphate cement while the second part (key) was inserted through the hole within the core and cemented in place (**Fig 1 f**). A metal ceramic crown with occlusal porcelain was given over the cast post core (**Fig 1 g**). The patient was put on follow up for a period of six months. On his subsequent visits he claimed to be satisfied with the treatment outcome.

DISCUSSION

The decision to choose the restoration type for a grossly decayed tooth is always based on the understanding of the properties of the basic dental materials rather than clinical factors. However, clinical factors are associated with post core correction of malaligned teeth as discussed in the literature.^{10,11} Within the restorative branch, treatment options for grossly decayed teeth ranges from pin amalgam restorations, partial veneer crowns, prefabricated and custom cast post core restoration. The choice between prefabricated and custom cast depends upon the amount of natural tooth structure remaining in a particular tooth and the presence or absence of number of surfaces of the tooth.¹² A cast post core restoration strengthens the weakened tooth besides providing retention to the crown. The fabrication of a cast post core should be done preferably by an indirect technique since it has many advantages over direct technique. The 2 part post core system can be of various types like sliding type, split type, individually designed like use of pins, clips or cementing two separate components individually.

One of the advantages of divergent canals is that an increased length of the post is not required to have a mechanical advantage. The roots of posterior teeth are considerably shorter than anterior teeth. Moreover use of two posts within one tooth does not put the tooth into a danger of fracture due to post. A critical aspect of cast post core of this type is the fit within each other. Although radiographic verification of the fit can be achieved in term of the external surface of the post with the natural tooth, the fit of the key within the keyway cannot be verified since both are metallic and cannot be seen on the radiographs. Radiographic evaluation of cast post core however is must before final cementation.¹³

CONCLUSION

The key and key way system of cast post core is easy to fabricate since the key can be prepared from any of the prefabricated objects. Whenever divergent canals are encountered the design can be easily mastered by the clinician and the laboratory technician.

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