

# CAST METAL DOWEL CORE: A RESTORATION OF CHOICE POST & CORE SYSTEM IN POST-ENDODONTIC TREATMENT - A CASE REPORT

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## ABSTRACT

Endodontically treated tooth may be restored as a single unit within the arch or as an abutment within a fixed restoration for the long term conservation and function of the tooth. The decision to use a post to restore the endodontically treated tooth depends on a need to restore lost coronal tooth structure with a core. Post placement significantly improves the prognosis of the tooth which may be used as abutment for removable or fixed prosthesis. This case report describes in detail the basis of cast post and core fabrication with its clinical advantages.

## INTRODUCTION

The overwhelming success of endodontic therapy has allowed the retention of more teeth within the dental arch. However, post-endodontic restoration has been a challenge to restorative dentist which presents a dilemma on deciding the type of restoration with long term success for its use as individual unit or as abutment for removable or fixed prostheses.<sup>1</sup>

Loss of tooth structure at crown and root surfaces from the combined effects of prior disease like dental caries, continued occlusal trauma, and overzealous endodontic instrumentation weaken the non-vital tooth furthering it more susceptible to tooth fracture.<sup>2</sup> Endodontically treated teeth on animal studies are found to have lost 9 % moisture more than the vital tooth, and additionally endodontic procedures reduce tooth stiffness by

5 % attributed primarily to the access cavity opening procedure.<sup>3</sup> Rivera *et al.*<sup>4</sup> stated that the effort required to fracture the dentin may be less on non-vital or endodontically treated tooth because of dehydration and potentially weaker intermolecular collagen cross links.

Restoration to endodontically treated tooth replaces missing tooth structure, maintains function and esthetics, and protects against the fracture and infection. Thus severe loss of tooth structure warrants the tooth to be restored using post and core before restoring it with crown restoration. Historically, Pierre Fauchard in 1728 described the technique of pivoting the teeth to allow a post fabricated from precious metal to be fitted and secured into the canal prepared with watchmaker's reamer.<sup>5</sup>

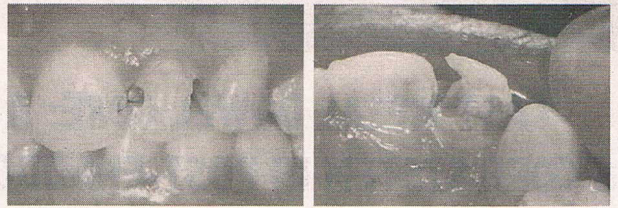
## CASE REPORT

A twenty four years old female presented to dental office of Kathmandu Model Hospital, Kathmandu with a chief complaint of pain in upper anterior region. She had a previous history of dental caries and tooth colored restorations in the same region. On examination, maxillary lateral incisor on left side was filled with large composite resin restoration on the proximal and palatal surfaces, the enamel was slightly discolored, and tooth was tender on percussion. Electric vitality test indicated the tooth to be non-vital, diagnostic radiograph was avoided as the patient was in her second trimester of pregnancy.

The treatment was started with the removal of previous restorations (Fig 1a, 1b); the pulp chamber was found to be exposed without the substantial layer of dentin over the pulp chamber and was filled with remnants of necrotic pulp. Access cavity preparation was done using no. 4 round bur and no. 701 tapered bur, canal preparation was done using step-back technique. Calcium hydroxide dressing was given and was scheduled to leave for six weeks till the final restoration would be done.

The patient reported to dental office after the delivery almost after one year. During the period the healing was uneventful and there was no complaint according to the patient. The root canal therapy was continued and canal obturated with lateral compaction technique. On post-treatment radiograph, the obturation of the root canal was satisfactory without the evidence of peri-apical radiolucency (Fig 2, 3).

As there was a minimal remaining of coronal tooth structure present due to the carious exposure and due to endodontic procedures, it was decided to go for cast metal post and core with porcelain fused to metal crown as post endodontic restoration.



(Fig 1a, 1b labial and palatal views of grossly decayed maxillary left lateral incisor after the removal of previous restorations)



(Fig 2 pre-treatment radiograph)  
(Fig 3 post-treatment radiograph)

## DOWEL CORE FABRICATION PROCEDURE

The post space was prepared using paeso reamer. The direct resin pattern for the post and core was implied; in which the resin pattern was made using a suitable rough surfaced wooden tooth pick which loosely fitted to the prepared space. Slight excess length of the tooth pick was used so as to hold and move the pattern. The canal was lubricated with petroleum jelly and dough staged self cure acrylic resin was packed on to the wooden post pattern and seated up to the depth of the prepared canal. The pattern was removed and resealed few times to check the path of withdrawal. Resin was added coronally to form the core in slight excess and gross tooth preparation was done over it (Fig 4). Then the pattern was removed, invested and casted (Fig 5). The finishing preparation was done prior to the cementation of the metal dowel core (Fig 6a, 6b, 7a, 7b). After the cementation, the hydrocolloid agar impression was made and porcelain fused to metal crown (Fig 8a, 8b) was fabricated. The PFM crown was cemented using glass-ionomer luting cement.



(Fig 6 a, 6b labial and palatal views of cemented dowel core before tooth preparation)



(Fig 7 a, 7b labial and palatal views of cemented dowel core after tooth preparation)



(Fig 8 a, 8b labial and palatal views of porcelain fused to metal crown restoration)

## DISCUSSION

Any changes in the pulp chamber anatomy leads to extensive weakness of the tooth. The roof of the pulp chamber (which is considered an arch) collapses during access cavity preparation. Enlarging the coronal third for convenience to reach the apex makes the tooth still weaker leading to crown fracture. Thus the need for post arises for the retention of core and the supra-structure. In the present case there was only a thin layer of labial tooth structure remaining. To restore functional and esthetic requirements of the endodontically treated tooth, cast metal post and core was selected prior to fabrication of the porcelain crown. The primary purpose of the post was to retain the core where the tooth has sustained extensive loss of coronal structure; on the other hand core retained the final coronal restoration i.e. the crown. Thus the cast metal dowel core

serves as a single unit comprising of both post and the core.

Cast post and core is a passive but strong type of post indicated in the teeth where less than 1mm of dentin is present indicating that there should be no further tooth preparation for post.<sup>4</sup> It is custom fit to the root configuration and adaptable to even large, irregularly shaped canals and orifices. The post fits into existing morphologic form and diameter rather than additionally preparing the root to accept prefabricated type of post.<sup>4</sup>

Although various prefabricated posts are available; minimal loss of tooth structure while preparing for the custom post space, easily achievable ferrule effect desired for crown preparation and easy access to dental casting lab were the major factors in choosing this type of post and core.

Various studies have shown that the post itself does not strengthen or reinforce the tooth as the inherent strength, but its resistance to root fracture comes from the remaining tooth structure and the surrounding alveolar bone.<sup>6</sup> The tooth is weakened if dentin is sacrificed to place larger diameter post.<sup>3,4</sup> The design and fabrication of the final restoration that surrounds the tooth protectively is the ferrule effect, as no combination of restorative materials can substitute the tooth structure. This protection can be either incorporated into post and core or preferably in final crown itself.<sup>7</sup> The ferrule is a band that encircles the external dimension of the residual tooth.<sup>8</sup> Ferrule of the crown serves as a reinforcing ring to protect the root from vertical fracture. A ferrule with 1 mm of vertical height has been shown to double the resistance to fracture versus teeth restored without a ferrule.<sup>9</sup> Retrospective studies have shown that longer posts are associated with higher success rate however, three to six millimeter of apical gutta-percha must be preserved to maintain the apical seal. Guideline for post length may be equal

to clinical crown length or half to two third of remaining root or half of the root length supported by bone.<sup>3,8</sup>

## CONCLUSION

Cast posts are widely indicated since they restore the badly broken down teeth. Despite its weakening effect on tooth, the post is used when there is inadequate remaining coronal tooth structure to retain a core for an artificial crown.<sup>10</sup> Majority of single rooted endodontically treated teeth are indicated to be restored with post and core. The thin tapered roots of maxillary lateral incisors and allz mandibular incisors can be weakened substantially if instrumented overzealously to fit a prefabricated post. Hence custom made cast metal dowel cores are recommended post and core system for single rooted teeth when substantial coronal tooth structure is missing.<sup>10</sup>

## REFERENCES

1. Weine FS: Endodontic therapy. 4th Ed. p 65
2. Cheung W: A review of the management of endodontically treated teeth – post, core and final restoration. *JADA*; 136:611-619, 2005
3. Ingle JI, Bakland LK: Endodontics. 5th Ed. p 913-950, 2006
4. Rivera E, Yamauchi G: Dentin collagen cross-links of root filled and normal teeth. *J Endodontics*; 14:195, 1988
5. Trabet KC, Cooney JP (cited in): The endodontically treated tooth, restorative concepts and techniques. *Dent Clin N Am*; 28(4):923-951, 1984
6. Gordon J, Cristensen: Posts: necessary or unnecessary? *JADA*; 127:1522-1526, 1996
7. Hunter A, Flood A: The restoration of endodontically treated teeth. Part-1. Treatment planning & restorative principles. *Australian Dental Journal*; 33(6):481-490, 1988
8. Cohen S, Hargreaves KM: Pathways of the pulp; 9th Ed. Ép 786-821. 2006
9. Sorensen J A, Engleman M J: Ferrule design and fracture resistance of endodontically treated teeth. *J Prosthet Dent*; 63:529-536, 1990
10. Morgano SM, Rodrigues AHC: Restoration of endodontically treated teeth. *Dent Clin N Am*; 48:397-416, 2004