

Case Report: Split To Strengthen: Modified Cast Post To Rehabilitate The Multirooted Teeth

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Abstract: The replacement of missing tooth structure and rehabilitate the destructed part of teeth has been practiced by various cultures for thousands of years. Restoring grossly decayed teeth are always challenging for endodontist, especially in case of multi rooted teeth with or without divergent roots. A tooth with extensive coronal destruction due to carious process, sometime poses difficulty in fabrication of FDP, The post core is often required to gain support from the remaining tooth structure. In a multirooted tooth where more than one root were used as support the path of insertion of post is difficult, those cases can be saved by using split cast post and core. Endodontically treated tooth with total loss of coronal tooth structure and loss of cavity walls, multiple posts in both the roots appear necessary so as to achieve proper retention for the core material. This is a simple and scientific multidisciplinary approach towards management of grossly decayed tooth. Cast post and cores have many advantages, especially the retention and resistance they provide and strength to already weakened tooth structure. Cast post with cores should not bind within the root canal. This technique has been used for a long time and with positive results recognized by many authors. In this clinical case report restoration of an root canal treated carious mandibular first molar, directly restored and rehabilitated with split-cast post and core. [Attur K Natl J Integr Res Med, 2020; 11(2):107-110]

Key Words: multi rooted teeth, split cast post and core, multiple posts

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Introduction: The conservation of a molar with high coronary destruction is influenced by a number of parameters: correctness of the endodontic treatment, the amount of remaining dentin, the degree of implantation of the root, the volume and their convergence, the type of reconstruction which was used, tooth position in the arch and the number of adjacent teeth¹.

Restoration of grossly destroyed endodontically treated teeth is a challenging task for the practitioner and requires careful treatment planning. Endodontic treatment of a mutilated tooth may prove unfruitful if it is not well restored to bear the forces of occlusion. So the options of prosthetic reconstruction should be well considered before attempting endodontic treatment on badly broken teeth². In such cases post is the choice of restoration as it serves to retain core. The treatment option we chose to restore the coronary morphology for a split cast post and core, because the remaining coronal dentine level is minimal, which although induces stress at the level of the dentin it is stiffer and stronger³. The difficulty of the case consisted of the fact that, due to extensive coronary damage, extended both in surface and depth, the pulp chamber floor at the level of the mesio-buccal root was much diminished, thus there is a risk of fracture. Badly broken molar was preserved by using multiple posts in the divergent canals¹. Non

parallel accessory posts was used as it increased the retentive surface area of the cast post and core, minimized the chance of root perforation during tooth preparation and also redistribute the forces of occlusion. If the teeth that more than half of its crown structure lost the post with core build-up may be required to restore such teeth. Teeth with extensive loss of tooth structure, especially where no cavity wall is remaining, the insertion of posts appears necessary to provide for core material retention.

Traditional teaching says, that post space preparation should leave a minimum of 3-5 mm of Gutta-Percha in the apical portion to maintain an adequate seal; however 3 mm of Gutta-Percha provides an unreliable apical seal therefore at least 4-5 mm of apical Gutta-Percha is recommended, if possible, or at least equal to the length of the crown. In teeth with divergent roots when two separate posts are used, aforementioned recommended post length may not be necessary⁴. The divergent posts provide adequate retention even with much shorter post length. A single unit metal cast post in molar tooth with divergent root canals is difficult to fabricate because of the differential path of insertion of the posts. Multiple posts like split post may create splitting force when cemented as separate posts. This lock and key post and core were designed with the aim of ease of insertion

in molar tooth with divergent roots and retention also providing an interlocking feature to resist the spitting forces.

An ideal post system should have the ability to distribute the functional stresses evenly along the root surface and produce minimal stress during placement and cementation⁵.

Case Report: A 34-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, with the chief complaint of pain in lower left back tooth region. Extraoral examination revealed no significant findings. Intraoral examination revealed grossly decayed 36. The tooth was not tender on percussion. The tooth was not mobile and non responsive to any pulp sensitivity tests.

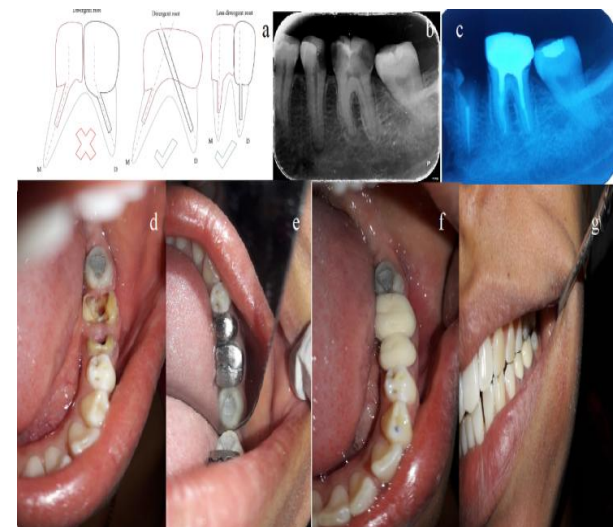
On radiographic examination, radiolucency was involving pulp in 36. Chronic irreversible pulpitis was diagnosed. A comprehensive treatment plan was made consisting of two phases: endodontic phase and restorative phase.

Endodontic Phase: After excavation of caries unsupported tooth structure was removed. Access cavity was refined and working length was established. Biomechanical preparation was completed. At second appointment patient was asymptomatic, so obturation was completed with 6% taper number 25 single cone gutta percha using AH plus as a sealer. Patient was recalled after one week; there were no clinical signs and symptoms. Restorative phase was planned

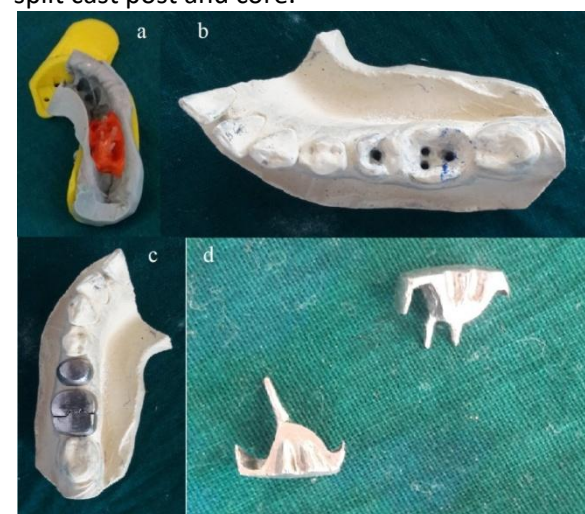
Restorative Phase: Using peeso reamer numbers 1–3 (1.1mm diameter) post space of length 5mm (leaving 6mm of gutta-percha apically) was prepared in the mesiobuccal and mesiolingual canal taking care that at least minimum of 1mm of dentin remains around the canal. Similarly post space was prepared in the distal canal using peeso reamer numbers 1–4 (1.3mm diameter) of length 6mm (leaving 7mm of gutta-percha apically). Impression of root canals were taken with putty by indirect technique. Casting of the mesial portion was done and the fit was checked. Dovetail to interlock the mesial and distal section was not prepared as final buildup was to be held together by the fixed cast restoration. Both the castings were luted with type II GIC. Core preparation was finished for porcelain fused to

metal crown. Rubber base impression was taken and was temporized for 3 weeks.

- a) Schematic diagram.
- b) Preoperative radiograph showing grossly decayed 36.
- c) IOPAR of luted and finished split cast post and core.
- d) Preoperative intraoral photograph showing grossly carious tooth.
- e) Luted and finished split cast post and core.
- f) Post operative view.
- g) Post operative view in occlusion



- a) Impression. b) Cast fabrication after indirect impression of post space preparation. c) Assembly of mesial and distal sections of split cast post and core. d) Mesial and distal sections of split cast post and core.



Advantages Of Split Cast Post And Core⁶.

Consider The Following:

1. Preservation of more tooth structure.
2. Provision of antirotation preparation.

3. Core retention as it is an inherent part of at least one post.
4. Retention of core.

Disadvantages Consider the following:

1. Placing the cast post and core requires additional operative and lab procedures. It is technique sensitive.
2. Preparing the tooth to accommodate the post requires removal of additional tooth structure.
3. The post can complicate or prevent future endodontic retreatment if this becomes necessary.

A post-and-core system is placed in a grossly carious tooth to restore the bulk of the coronal portion of the tooth to facilitate the subsequent restoration of the tooth by means of an indirect extracoronary restoration⁷.

As the tooth was grossly destroyed due to dental caries the decision of post and core build up was taken. In cases involved with severe damage or complete loss of the coronal structure, a post is usually inserted in the root canal in order to provide sufficient retention to the core structure especially when the restored tooth is an important abutment for a fixed restoration².

Prefabricated fiber post is also an option for management of such teeth but in our cases teeth structure was lost more than half of its structure hence the custom fabricated cast post and core decision was taken. Multiple factors must be considered in choosing a final restoration, essential considerations include the amount of remaining sound tooth structure, occlusal function, opposing dentition, and position of the crown in the arch, as well as length, width, and area of root⁴. Disadvantages of the cast metal post over fiber-reinforced composite posts have a favorable failure mode when compared with metallic posts. Various post system and post and core technique have been implemented in dentistry. The selected post and core technique must be conventional, morphologic, selective, and aesthetic, and resist radicular fracture⁸.

The recommended post length is three fourth of the root length with at least 4-5 mm apical Gutta-Percha remaining in the canal to ensure adequate apical seal. Making a single post in the distal canal may not give proper retention as well as long post space preparation along recommended length guidelines may predispose

toward iatrogenic error like perforation. Bass suggested when two posts are utilized in divergent roots adhering to this post length may not be necessary and shorter posts may provide adequate retention. In such scenario it may not be even essential to achieve a diameter of the post equal to one third of the root width³. In our case, two posts were decided to be placed, one in distal canal and the other in mesio-lingual and mesiobuccal canal. Since construction of two posts in a single unit is not possible because of the hindrance to the path of insertion in divergent roots hinder we decided to place the post and core in two units as split post and core⁶.

Tooth restored with two unit post system when subjected to splitting forces (like vertical and mesio-distal movement forces) may move independently facilitating fracture of the tooth. It was on this rationality that a lock and key design was incorporated to unify both the post into a single unit thereby increasing the fracture resistance against splitting forces. The key design was incorporated with secondary post placed in mesio-lingual canal to exactly fit in to the lock design. The primary and the secondary post were, therefore, held together to act as a single unit. This design may help in resisting the splitting forces on post and core by the vertical load and the mesio-distal movements of the tooth. In our case, tooth already destroyed grossly and some surfaces does not have the sufficient structure to provide a ferrule. Hence we have not provided the ferrule. In our case both were custom modified and unified with lock and key design⁴.

However considering the good outcome this can be justifiable. We also suggest that a single appointment lock and key post and core pattern can be fabricated by using inlay wax in primary post and core and acrylic resin for fabricating secondary post and core pattern³. This may also be achievable by using acrylic resin for fabricating both the primary, as well as secondary post and core pattern. Follow-up after 6 month and 1 year was carried out to check the success of the post and core by clinical and radiographic evaluation⁵.

Conclusion: The clinician should be knowledgeable in selecting the right type of post and core system to meet the biological, aesthetic and mechanical for each tooth. An ideal post system should have the ability to distribute the functional stresses evenly along the root surface, should be aesthetically compatible with definitive

restoration and surrounding tissue and produce minimal stress during placement and cementation. The existence of large coronary destructions due to carious process, at the clinical crown level of a mandibular molar tooth, creates particular difficulties.

Grossly decayed mandibular molars with all walls missing can also be successfully restored by split cast post and core. Depending on the amount of divergence between mesial and distal root which affects the straight line path of withdrawal of wax pattern, multisection split post and core or single post and core with auxiliary post can be fabricated for retention of crown.

Two short posts in divergent root are sufficient to provide retention instead of one long post. custom cast post is used when coronal tooth loss is moderate to severe. split cast post used here is in divergent roots, with canals not allowing the same path of insertion for both the posts. the first half of metal post is placed first in distal canal followed by second half in mesiobuccal and mesiolingual canal. This post and core system reduce the complex designs and ease of fabrication. the lock and key metal cast post and core mentioned in this case could be an effective method for the restoration of grossly destroyed molar teeth reducing the risk of root fracture⁴.

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