

Re-restoration of all ceramic crown using cast post and core in a young male patient-A Clinical Report

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Abstract

For esthetically and functionally sound restoration of endodontic ally treated tooth usually post and core is considered as best treatment option. The dentist usually faces problem in restoration of tooth which has undergone trauma, fractures, endodontic-access preparation, canal instrumentation and other idiopathic causes. In such instances, it is necessary to evaluate, diagnose and resolve esthetic problems using a combination of endodontic, periodontal and prosthetic treatments. Cast metal post-core systems have an extended history of successful use due to their superior physical properties. This case report presents a way to re-restore fractured porcelain fused to metal crown with all-ceramic crown over a cast post and core. The function of a post is to mainly assist and prevent the abutment, on which a crown is cemented, from fracturing such that the abutment separates from the root, at a fracture plane that's located approximately and theoretically at the extent of the crown (or ferrule) margin. A post essentially improves the ferrule effect that's provided by the fixed denture prosthesis.

Keywords: fractured crown, cast post-core, zirconium crown, inlay wax pattern, direct technique..

Introduction

The usual procedure for fabricating a cast post and core is to fabricate the post-and-core pattern with the use of inlay wax.[1] Fracture of an endodontic ally treated and restored tooth by a ceramic crown within the esthetic zone makes a challenge to the clinician.[2,3] A patiently ways wants a cosmetic and functionally sound prosthesis at the most earliest possible.[4] Rebuilding the core followed by making an impression for a new crown fabrication may be an option, but if only crown is fabricated without giving the post-core the strength of the prosthesis will be very poor because of poor mechanical retention and it will lead to fracture and failure of the prosthesis.

It is not only time-consuming but also financially demanding.[5] Over the years, a spread of techniques are developed and suggested by different authors to retrofit the crown.[6,7] A cast post and core is utilized when the post space is not a good match for a prefabricated post and core or when the dentist considers it a more appropriate treatment option. The cast post and core procedure involves the dental laboratory, so placing it is a 2 session process. There are two ways of manufacturing a cast post and core: direct method and the indirect method. In the direct method, a wax pattern is produced by placing a

preformed wooden carved post into the post space and to build up the tooth of proper dimensions. When this procedure is completed, the pattern of post and core was removed from the tooth structure and sent to the dental lab. The technician will make a duplicate post and core using metal alloys by casting the wax pattern. In the indirect method, an impression of the post space and adjacent teeth and gingival is taken. The impression is then used to construct a suitable post in the dental laboratory. The impression will have to capture the post space, so a fluid impression material will be inserted into the root canal with a specific file: the Lentulo file carrier. In most of the cases, a partial impression is taken using the two-step technique. Then the cast is poured and wax pattern is fabricated on the master cast and casting of the post is done. When the post and core device is designed on a molar or premolar (teeth that can have more than a single root canal), a single unit post and core device can have two or three posts. A wide variety of post systems are available ranging from traditional cast metal posts to newer fiber posts.

Depending on the extent and severity of the fracture, retrofitting the crown on a fractured core may be a preferred option. [5] Excessive loss of dental hard tissues poses difficulties for the esthetic outcome of subsequent prosthetic restorations. Nevertheless, the

existing crown should fit precisely on the pre-existing finish line. [8] A core or a post improves the bio-mechanical stability of an abutment or FPD if it can prevent either of these failures. It is also important to ensure that the cast post-core is firmly cemented to the tooth surface to provide adequate retention for the restoration and adequate protection of the remaining tooth structure, it should yet be easily removed if retreatment will be required.[9,10] In the anterior zone, use of all-ceramic crowns has gained wide acceptance due to their optical and esthetic properties. However, those same properties, such as translucence, are a limitation when a metallic post is being placed under the crown. This case report presents a way to re-restore fractured porcelain fused to metal crown with all-ceramic crown over a cast post and core.

Case Report

A 23-years-young male patient reported to the Department of Prosthodontics, Crown and Bridge at Rama Dental College Hospital & Research Centre, Kanpur, with a chief complaint of fractured porcelain fused to metal crown of maxillary left lateral incisor (#22) in an accident. He complained of poor esthetics and wanted to get it replaced immediately to improve his looks and smile. During the treatment planning session, the patient was advised all possible treatment options. He opted for cast metal post-core restorations followed by all ceramic crown restoration. On intra oral examination fractured #22 with lost coronal structure was observed (fig.1), with healthy gingiva and canine guided occlusion without loss of vertical dimension with adequate over jet and overbite. The occlusion was analyzed preoperatively, both clinically and by taking the diagnostic impression and mounting the models on a semi-adjustable articulator. Radiographic examination revealed root canal treated #22 (fig.2). The prognosis of the teeth and the retention of the definitive restorations would have been questionable without providing the support of cast post-core as foundations. Several investigators have reported that dowels placed endodontic ally treated teeth with severe coronal destruction increase fracture resistance.

Diagnostic impression was made and post space preparation was done with pesos reamer leaving the 4 mm of gutta-percha at apical end of root canal to maintain a good seal. An intraoral per apical radiograph was obtained to evaluate the post space preparation of #22. Wooden matchstick was carved to made the impression of the post space in the canal, melted inlay wax was coated over the wooden stick to take the impression layer by layer until satisfactory

fit was achieved(fig.3). Wax pattern was carved over the post to create the core part (fig.4). The core of the wax pattern was fabricated at an inclination of 20 degree palatal to the long axis of the root of the fractured tooth to achieve satisfactory aesthetics. The guidance for the same was obtained by the inclination of the adjacent central incisor. If the core was not subjected to inclination, the post would have remained in the direction of the long axis of tooth. Cast post-core was finished and polished for the cementation (fig.5). This shows drastic change in the labio-palatal inclination created by custom post and core. The fit of the cast post and core was first assessed and then it was luted with glass ionomer cement. The remaining tooth structure was prepared with shoulder finish line on labial and palatal side in #22 (fig.6,7). Rubber base impression was made with heavy body (putty material) and light body. The cast was poured in die stone. The shade selection for all ceramic crown was done in natural daylight with the adjacent teeth. All ceramic crown was made for #22 and cemented with luting glass ionomer cement (fig.8). The patient reported no discomfort on 3 months of follow-up and was very satisfied with the prosthesis (fig.9).



Figure 1: Fractured maxillary lateral incisor with reduced clinical crown height.



Figure 2: Preoperative radiograph.



Figure 3: Fabrication of post-core with inlay wax with wooden carved matchstick.



Figure 4: Final wax pattern of post and core.



Figure 5: Fabricated, finished and polished cast post-core for restoration.



Figure 6, 7: Cast post-core cemented with luting GIC and finish line prepared over the remaining tooth structure for all ceramic crown.



Figure 8: All ceramic crowns restored over the cast post-core with luting GIC.

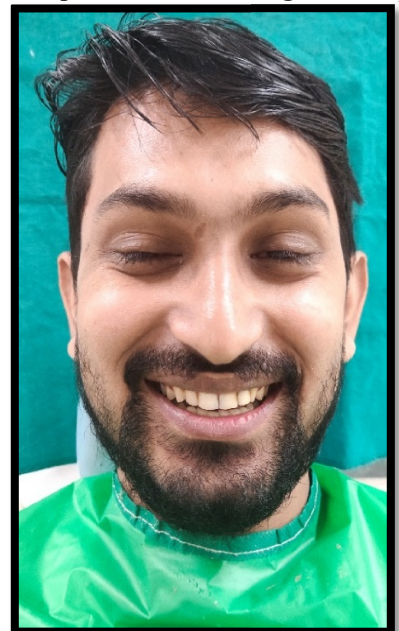


Figure 9: Post operative patient's frontal view with satisfactory result.

Discussion

For rehabilitation of traumatised anterior teeth, both aesthetic and mechanical aspects should be considered. Post and core is considered as the foundation for restoration. The main purpose of this procedure is to provide retention for the core restoration and to build the lost coronal structure. Post and core can be prefabricated post with composite build up or one piece custom made post-core.[11] The custom made post and core is indicated in various situations wherein gross tooth structure is lost, anterior deep bite, teeth with wider canals and where a change in angulation is required especially in anterior region of mouth where aesthetics is the prime concern.[12] Custom cast post and core is preferred over prefabricated post for any change in labiopalatal and mesiodistal angulation of proclined or angulated teeth to provide proper alignment. Custom cast post and core can be shaped until satisfactory aesthetic is achieved although, the core might not be in the same axis as the post or the root. However, in prefabricated post core system, the core is built around the post after post cementation in the prepared canal so that if tooth is rotated or more labially inclined, the post will remain in the direction of the long axis of that tooth. Any alteration in angulations', performed by the core shaping around the prefabricated post, usually leads to an unsupported core due to loss of coronal extended post during preparation. The functional loading of the crown over the unsupported core might result in fracture thereby, complicating the treatment. Therefore, the only treatment option in such cases is the change in angulations' with custom cast post and core followed by fabrication of PFM or all ceramic (zirconium) based crown.

Conclusion

Selection of suitable post and core system is challenging and should be guided by knowledge of their indications, advantages and disadvantages, as well as the amount and quality of remaining tooth structure and aesthetic requirements. The aesthetic rehabilitation of traumatised labially inclined tooth poses tough challenge to the dentist. Custom cast post offers advantages in form of higher strength, precise fit with minimal luting surface and inherent anti rotation mechanism. In this case report, considering the age and aesthetic concerns of the patient we provided cast post-core and all ceramic (zirconia) crowns as a treatment plan which was cost effective, had long lasting results and provided desirable aesthetics.

References

- [1] Massoud YA, A method for fabricating a cast post and core that is esthetic when used under an all-ceramic crown. *J Prosthet Dent* 2002;88(5):553-4.
- [2] Rosen H, Dissolution of cement, root caries, fracture, and retrofit of post and cores. *J Prosthet Dent* 1998;80(4):511-3.
- [3] Lee JH, A Digital Approach to Retrofitting a Post and Core Restoration to an Existing Crown. *J Prosthodont* 2017;28(7):1-4.
- [4] Hannon SM, Breault LG, Kim AC, The immediate provisional restoration: a review of clinical techniques. *Quintessence Int* 1998;29(3):163-9.
- [5] Patil PG, Tay K, Modified technique to retrofit the crown on fractured core. *J Interdiscip Dent* 2016;6(1):50-53.
- [6] Jahangiri L, Feng J, A simple technique for retrofitting a post and core to a crown. *J Prosthet Dent* 2002;88(2):234-35.
- [7] Berksun S, Rebuilding core foundations for existing crowns using a custom-made template. *J Prosthet Dent* 2005;93(2):201-03.
- [8] Mascarenhas K, Aras MA, Fernandes AS, Repair of fractured abutment teeth under pre-existing crowns: An alternative approach. *Indian J Dent Res* 2013;24(1):136-38.
- [9] Raygot CG, Chai J, Jameson DL. Fracture resistance and primary failure mode of endodontically treated teeth restored with a carbon fiber-reinforced resin post system in Vitro. *Int J Prosthodont* 2001;14(2):141-45.
- [10] Akkayan B. An in vitro study evaluating the effect of ferrule length on fracture resistance of endodontic ally treated teeth restored with fiber-reinforced and zirconia dowel systems. *J Prosthetic Dent* 2004;92(2):155-62.
- [11] Smith CT, Schumann N. Prefabricated post and core systems: an overview. *Compend Contin Educ Dent* 1998;19(10):1013-20.
- [12] Shah NP, Gaikwad AM, Ram SM, Nadgere JB. Masking conventional metallic cast post for enhancing esthetics. *J Contemp Dent* 2016;6(1):85-89.

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