



SALVAGING ANTERIOR TRAUMATIZED ANTERIOR TEETH WITH RICHMOND CROWNS: A CASE REPORT

Dental Science

Dr. Sidhant Sudan	M.D.S.- Prosthodontics, Crown And Bridge & Implantology
Dr. Rahul Puri Goswami	M.D.S.- Prosthodontics, Crown And Bridge & Implantology Senior Resident (Dept. Of Dentistry), Jawahar Lal Nehru Medical College, Ajmer
Dr. V. K. Sudan	B.D.S., Retd. Dental Officer
Dr. Manoj Upadhyay	M.D.S.- Oral And Maxillofacial Pathology Senior Resident (Dept. Of Dentistry), Jawahar Lal Nehru Medical College, Ajmer
Dr. Manoj Upadhyay	M.D.S.- Oral And Maxillofacial Pathology Senior Resident (Dept. Of Dentistry), Jawahar Lal Nehru Medical College, Ajmer
Dr. Gurjot Singh Sodhi	M.D.S.- Prosthodontics, Crown And Bridge & Implantology Assistant Professor (Dept. Of Prosthodontics), Guru Nanak Dev Dental College, Sunam
Dr. Shanti Prasad Maurya	M.D.S.- Conservative and Endodontics Senior Resident (Dept. of Dentistry), Jawahar Lal Nehru Medical College, Ajmer

ABSTRACT

Maxillary central incisor is most commonly affected tooth during trauma followed by maxillary lateral incisor and mandibular incisors. Trauma to the anterior tooth requires urgent care because of essentiality of preserving natural tooth. When complicated crown fracture occurs it necessitates endodontic treatment and restoration of fractured crown segment with post in the canal. Fabricating a restoration which can serve clinically long term without any sign of complication and fulfill the functional and esthetic requirement is very hard to achieve in excessively damaged tooth especially when it is in the esthetic zone.

The Richmond crown can be a good treatment alternative for restoration of such teeth. The Richmond crown was introduced in 1878 and incorporated a threaded tube in the canal with a screw retained crown. It was later modified to eliminate the threaded tube and was redesigned as a one piece dowel and crown. This case report shows restoration of badly mutilated anterior central incisors teeth with Richmond crown which can fulfill the esthetic and functional demands of the patient.

KEYWORDS:

richmond crown, cast post, dowel.

Introduction

In the teen and young adult years dental injuries result from motor vehicle accidents, sports, falls and due to fighting and pushing. The most vulnerable tooth is the maxillary central incisor, followed by the maxillary lateral and the mandibular incisors. A major predisposing factor in dental injuries is overjet of the maxillary incisors.^[1]

The goal of restorative dentistry and endodontics is to retain the natural teeth with maximal function and pleasing aesthetics. The successful treatment of a badly broken tooth with pulpal disease depends not only on endodontic therapy but also on good prosthetic reconstruction.^[2,3]

Various techniques have been introduced to address coronoradicular stabilization but custom made post and core has been regarded a "gold standard" in post and core restoration. Bregman et al reported 90.6 % success rate after 6 years of service for custom cast post.^[4,5] Richmond crown, a single-piece post-retained crown with a porcelain coat, engineered to function as a bridge retainer which is customized, post and crown system as both are single unit and casted together.^[6,7,8]

Case report

A 15 yr old boy reported to Sudan Dental Clinic, with the chief complaint of poor esthetics and moderate pain in the front region of the upper jaw. He had history of trauma due to fall from stairs, sustaining injury to the front upper teeth 3 month back.

On examination clinically and radiographically 11 and 21 had complicated crown fracture and revealed fracture line involving enamel, dentin and approximating pulp. [Figure 1,2]



Figure 1: Intraoral condition



Figure 2: Preoperative radiograph

The treatment options were explained to the patient as extraction followed by tooth replacement or endodontic treatment followed by custom made cast post. All about the advantages, disadvantages, cost/benefit and prognosis of treatment options were discussed with

the patient. The decision was made for replacement with a Richmond crown following endodontic therapy. Access opening in 11 and 21 was done and canals were cleaned and shaped and obturated with gutta-percha using lateral condensation technique. [Figure 3,4,5]



Figure 3: Working length confirmation

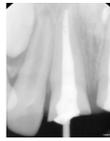


Figure 4: Obturated 11



Figure 5: Obturated 21

In this case report, Richmond crown was planned instead of prefabricated posts because of major loss of tooth structure. The post space was prepared with peeso reamer drill up to size #04 to remove remaining cement/weak dentine layer taking care to not to disturb apical seal.

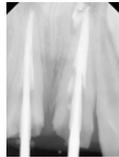


Figure 6: Post space prepared

The remaining crown structure was prepared circumferentially for metal ceramic crown with shoulder finish line buccally and chamfer, palatally. Incisal edge was then given with crown ferrule effect for better retention. [Figure 7]

For making the custom post in 11 and 21 green stick was flown in thin consistency inside canal and orthodontic wire was used for axial support for post. Post was removed from canal and checked for defects and deficient areas. The material was again added in deficient areas and reinserted until a snug fit was achieved.

For making final impression, the custom made post were placed in the 11 and 21 canals over which light body was injected around the prepared tooth, putty impression material was loaded in stock tray, and final impression was made. [Figure 8]



Figure 7: Prepared crown with ferrule



Figure 8: Final impression

The impression was then poured with die stone and wax pattern was fabricated. Metal try in was done before ceramic build up. [Figure 9,10]



Figure 9: Custom made post core



Figure 10: Metal try-in

Ceramic build up was carried out and final prosthesis was checked for fit and occlusion. Assembly was cemented in situ with resin modified glass ionomer cement (GC Fujicem). The case was followed for 6 months in which no root fracture, no loosening or dislodgement of post, and no secondary caries were detected. [Figure 11,12]



Figure 11: Final prosthesis in mouth



Figure 12: Prosthesis 6 months follow-up

Discussion

For more than 250 years, clinicians have written about the placement of posts in the roots of teeth to retain restorations. In the late 19th century, the "Richmond crown," a single-piece post-retained crown with a porcelain facing, was engineered to function as a bridge retainer. Richmond crown is a customized, castable post and crown system as both are single unit and casted together over which ceramic is fired and cemented inside canal and over prepared crown structure having same path of insertion.^[7,9,10] Ferrule collar is incorporated to increase mechanical resistance, retention apart from providing anti-rotational effect.^[11,12]

Few indications for Richmond crown are grossly decayed or badly broken single tooth where remaining crown height is very less. The advantages of this design are custom fitting to the root configuration, little or no stress at cervical margin, eliminates cement layer between core and crown so reduces chances of cement failure. However certain disadvantages include, that it is time consuming, require multiple appointments and acts as a wedge during occlusal load transfer.^[9,12,13,15]

A single unit post-core crown restoration has various advantages over its multiple unit counterparts. When the post and core are two separate entities, flexion of the post under functional forces stresses the post core interface, resulting in separation of core due to permanent deformation of post.^[16,17] Breakdown of core eventually results in caries or dislodgement of crown. The combined effects of thermal cycling, fatigue loading and aqueous environment test the bond between materials and cause breakdown of the materials over a period of time. Therefore, it is desirable to unite the post, core and crown in one material for long term stability. By decreasing the number of interfaces between components, the single unit restoration helps to achieve a "monoblock effect".^[18,19,20]

Conclusion

1. Retention and resistance to fracture are two important factors that must be achieved with post-and-core retained restorations.
2. When placing post the dentist must evaluate each tooth individually to determine the best approach to determining the

maximal fracture resistance.

3. Custom made post and core restorations are a good treatment option for treating teeth fractured near the gingival margin or those with minimal tooth structure.

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