International Journal Dental and Medical Sciences Research
Volume 5, Issue 1, Jan-Feb 2023 pp 627-630 www.ijdmsrjournal.com ISSN: 2582-6018

Successful Rehabilitation Of Grossly Carious Maxillary Central Incisors Using Richmond Crown – A Case Report

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Submitted: 05-02-2023 Accepted: 17-02-2023

ABSTRACT: The goal of endodontics and restorative dentistry is to retain natural teeth with maximum function and pleasing esthetics. Endodontically treated grossly destructed teeth, if left unrestored for prolonged duration may lead to drifting, tipping and supraeruption. All these results in lack of interocclusal space,which in turn leads to issues in fabrication of restorations. The successful treatment of badly broken tooth depends on good endodontic therapy, good restorative and prosthetic reconstruction, which can be achieved by giving ferrule, placing post – core and crown. The Richmond crown was introduced in 1878 and incorporated a threaded tube in the canal with a screw retained crown and it was later modified in 1930 to 1 piece dowel and crown.

KEYWORDS: Post and core, grossly carious teeth, Richmond Crown, Post endodontic restoration

I. INTRODUCTION

Present era of dentistry is focusing mainly on conservation of tooth structure, restoring its function and bring back its esthetics.Whenever remaining crown structure is inadequate to retain the crown then post and core plays a major role in increasing retention and resistance of the tooth. Post and core also have some complications like dislogement of post and core assembly, fracture of root or post and periodontal injury.

Restoration of endodontically treated teeth is always a challenge to the dentist.Grossly carious tooth or tooth with fracture with more than two third of crown structure is lost, in such cases we need additional retention from the tooth, especially after root canal therapy. In such type of cases post and core is advised. If such cases are having deep bite and very less overjet, then prosthetic crown placement is very difficult. Richmond crown can be given in such cases.

Richmond crown is a single-unit, post-retained crown with a porcelain facing, which is designed to function as a bridge retainer. Richmond crown is not a post - core system, but it is a customized castable post and crown system, in which both (i.e., crown and post) are casted together. It is easy to make cast metal restorations with the use of posts for long term retention [1].

II. CASE REPORT –

18 years old, female presented with complaints of decayed and broken upper front teeth and wanted to restore it urgently. Clinical examination revealed that the tooth was badly broken down / fracture due to caries. Radiographic evaluation of tooth shows straight root canal and widening of periodontal ligament space. Vitalitytest was done, which revealed that tooth was non vital.

TREATMENT PLAN-

- Objectives: Prosthetic rehabilitation of fractured central incisors following endodontic treatment.
- Methods: Endodontic treatment of the fractured tooth followed by post space preparation and finally rehabilitating it with Richmond Crown, to make it aesthetically pleasing.

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Fig 1 -Preoperative clinical photograph

Fig 2 - Preoperative radiograph

An occlusal model was made to assess the amount of space available for the post endodontic restoration and it was found that there was noticeable reduction in overjet and overbite, then planned for Richmond's Crown.

After completion of endodontic treatment, following steps were followed.

- Coronal 2/3rd of Gutta percha (GP) was removed and Post space was prepared with the help of Peeso reamer leaving 1/3rd of GP in the apical portion of the root canal.
- Canal was coated with light body impression material and then a small piece of wooden wedge, coated with light body, was placed in the canal and the final impression was made with alginate with stock metal tray.
- Impression was poured with die stone and thereby cast was formed.
- The wax pattern on the cast, the post and core were all made using an indirect technique, and try in was done in the patient's mouth.
- The pattern was seated and examined on the model cast, and further it was tried once again in the patient's oral cavity.
- An intraoral periapical radiograph was taken to check the proper seating of the post and core, finally ceramic build-up was done over the core and in shade selection, Vita - B2 shade was finalized.
- After checking for the adequate marginal adaption and aesthetics, the Richmond Crowns were cemented with Glass Ionomer Cement

Fig 3-After completion of root canal

Fig 4 - Occlusal radiograph was taken to evaluate the tooth bud of missing tooth # 12 because it was congenitally absent

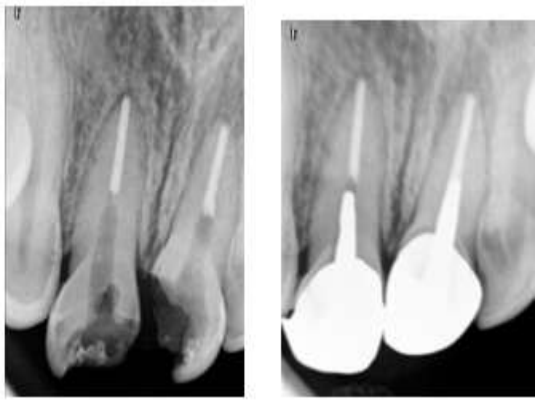

Fig 5 -Post space preparationandTry in

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Fig 6 - Cementation of Richmond Crown

Fig 7 - Try in

Fig 8 - Cementation of Richmond Crown

III. DISCUSSION –

Restoration of endodontically treated teeth is always a major concern to the dentists. Loss of excessive tooth structure due to caries / fracture / developmental anomaly is always a challenge in restorative procedures. As remaining tooth structure is not enough to retain large prosthesis.[2] Post and core treatment has been practiced successfully since ages.[3]

Alternative procedures can also be performed like crown lengthening procedure, orthodontic extrusion to manage arc of rotation during oblique forces. There are so many causes of post and core failure like recurrent caries, endodontic failure, periodontal disease, post dislodgement, cement failure, post core separation, loss of post retention, core fracture, post distortion, post fracture, tooth fracture, root fracture. Sometimes corrosion of post is also seen as a cause of failure of post and core. [4 – 6] So, to overcome forementioned problems Richmond Crown was advised in patients in less overjet, deep bite and very less occlusal clearance.

The Richmond crown was introduced in 1878 and was incorporated as single unit post-retained crown with porcelain facing. Initially, it was having a threaded post in the canal with a post retained crown, which was later modified to eliminate the threaded tube and was redesigned as a 1-piece cast dowel and crown. The design of Richmond Crown includes casting of post and crown coping as single unit over which ceramic is fired and cemented inside the canal and over prepared crown structure having same path of insertion. To increase mechanical resistance ferrule collar is incorporated, retention apart from providing autorotational effect. Major technical drawback of this design is that excessive cutting in making two different axis parallel which results in weakening of the tooth and also it increases the stresses at post apex causing root fracture. Few indications for Richmond crown are grossly decayed or badly broken single tooth where more than two third of crown structure is lost and in cases with steep incisal guidance [7](in cases having deep bite and very less overjet).

So, in the above-mentioned case there was more than half of the tooth structure was decayed, less overbite and deep bite was there, so it was an ideal indication for Richmond Crown. The advantages of this design are that the post is custom fitting to the root configuration, negligible or no stress at cervical margin, high strength, availability of adequate space for ceramic firing and incisal clearance, elimination of cement layer between core and crown, so it will reduce the chances of cement failures.[8].

As there are advantages of Richmond Crown, there are some drawbacks operators should know, like it is technique sensitive and relatively expensive and modulus of elasticity is higher than dentine, more number of appointments needed. Although any number of post designs may be used in a clinical situation, success is dictated by the remaining tooth structure available after endodontic therapy [9].

IV. CONCLUSION

Although implant popularity is increasing day by day, yet post and cores has its own importance in restoring grossly carious or fractured teeth as it requires less time / cost and provide better aesthetic results. There are many post-and core materials / techniques available for the

clinician in a variety of clinical procedures and thus each clinical situation must be evaluated on an individual basis. Richmond crown is very much indicated in situations with very less incisal clearance to accommodate the collective thickness of core, cement and crown put together.

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