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International Journal of Current Research
Vol. 9, Issue, 11, pp.61585-61588, November, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

CASE REPORT ON RESTORATION OF BADLY BROKEN, ENDODONTICALLY TREATED POSTERIOR TEETH

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ARTICLE INFO

Article History:
Received 15th August, 2017
Received in revised form
26th September, 2017
Accepted 25th October, 2017
Published online 30th November, 2017

Key words:
Richmond Crown,
Post Endodontic Restoration,
Cast Post,
Interocclusal Space

ABSTRACT

Success of endodontic therapy depends upon combination of a three dimension fluid tight obturation along with adequate post endodontic restoration to make the pulpless teeth to function as an integral part of the dental arch. Post endodontic coronal restoration is important to prevent ingress of microorganisms into coronal pulp. When endodontically treated posterior teeth (with and without coronal coverage restorations) were compared, a significant increase in the clinical success was noted when cuspal coverage crowns were placed on maxillary and mandibular molars and premolars. Often, we come across an endodontically treated tooth with little or no clinical crown in routine clinical cases. In such cases, additional retention and support of the restoration are difficult to achieve. The Richmond crown can be a good treatment alternative for restoration of such teeth. This case report discusses on Richmond crown as a post endodontic restoration of a badly mutilated mandibular first molar tooth.

Citation: Dr. Mohamed Idris, Dr. Alvin Joseph, Dr. Nandakishore and Dr. Sudheer, K.A. 2017. Case report on Restoration of badly broken, endodontically treated posterior teeth", *International Journal of Current Research, Vol. 9, Issue, 11, pp.61585-61588, November, 2017*

INTRODUCTION

The prime goal of endodontics is to retain the natural teeth in its position with maximal function andto provide pleasing aesthetics (Rosenstiel *et al.*, 1995). It is generally agreed that the successful treatment of a badly broken tooth with pulpal disease depends not only on endodontic therapy but also on good prosthetic rehabilitation of the tooth following endodontic therapy (Weine, 2003). Whenever remaining crown structure is deficient to retain full coverage crown, a post and core is required to increase retention and resistance form of tooth. However post and core procedure can give rise to complications such as grater stress concentration in root causing root or post fracture, dislodgement of assembly, hypersensitivity of Ni-Cr ions, loss of restorative seal and periodontal injury (Mishra *et al.*, 2015). Richmond crown is best indicated solution in such conditions.

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The Richmond crown was introduced in 1878 and was incorporated as single piece post-retained crown (Smith, 1998). In this case report, Richmond crown as a post endodontic restoration modality has been discussed.

Case report

A 26 year-old male patient reported to the Department of Conservative Dentistry and Endodontics, Rajarajeswari Dental College and Hospital, Bangalore with C/O pain in the lower right back tooth region. History of pain since 7 days, aggravating on cold and hot beverages and night while sleeping. On examination of oral cavity it was found that tooth 46 had extensive caries with crown fracture of thedistolingual cusp. On soft tissue examination there was no science of abscess or sinus tract opening seen in relation to 46 region. Intraoral periapical radiographic revealed deepocclusal caries involving the pulp with fracture on the distolingual cusp. No periapical changes were noted. Hence it was diagnosed as chronic irreversible pulpitis. It was decide to undergo multivisit root canal treatment followed by post endodontic restoration.

Figure 1. Pretreatment intra oral photograph showing extensive caries with crown fracture of the distolingual cusp

Figure 2. Pre operative intra oral periapical radiograph

Root canal treatment was initiated under local anesthesia using 2% lidocaine with 1:200,000 epinephrine. Access opening was done and working length was determined using ingles radiographic method and conformed with apex locator (jmorita root zx mini). The pulpal tissue remnants were extirpated with barbed broach, canal space preparation was done with k-files and NiTi rotary files (Mtwo 10, 15, 20, 25) with intermittent irrigation was done using sodium hypochlorite (3%) and saline to flush out the debris and the root canals dried with paper points coated with zinc oxide eugenol sealer using lentilospiral finally obturation done using single cone gutta-percha. Access cavity was restored with cavit temporary restorative material

Figure 3. Working length determination

Figure 4. Master cone selection

Figure 5. obturation

Figure 6. Post space preparation

The patient was recalled after 5 days for evaluation. No post-operative pain or discomfort was noted. In this case, Richmond crown was planned as post endodontic restoration as it can be a better option instead of custom made post and core because of major loss of tooth structure and lack of occlusal clearance for conventional metal crown. Guttapercha was removed from distal canal with gates Gliddendrill (size 1 to 4), care was taken not to disturb the apical seal.

Figure 7. Tooth preparation

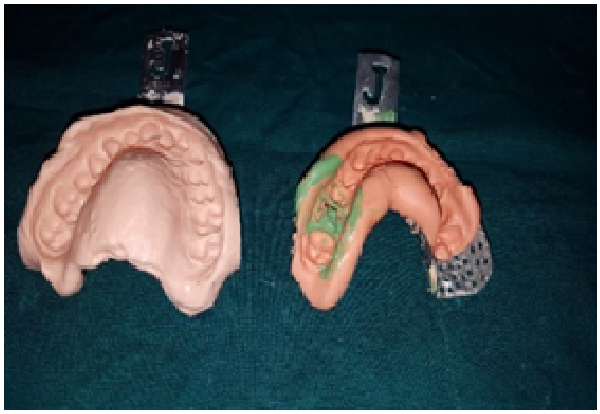

Figure 8. Impression

Figure 9. Cast

Figure 10. Model

Post space preparation was done with peso reamer drill (size 1to 3). Root preparation in the distal canal was done as conservatively as possible.

For making final impression, the distal canal was coated with light body impression material (Impressiv) and then a small piece of orthodontic wire, coated with light body was placed in the canal. Later light body was injected around the prepared tooth, putty impression material (Perfit) was loaded in stock tray and final impression is made. The impression was examined for defects in recording of post space. It was then poured with die stone and wax pattern was fabricated and it was send for casting procedure. Metal try in was done. Finally Cementation was done with glass ionomer cement.

Figure 11. Post-operative photograph

Figure 12. Post-operative intra oral radiograph

DISCUSSION

Endodontic treatment has been in practice since ages with high success rate but restorative part was not much understood previously. Whenever, a considerable amount of tooth structure is lost because of fracture/caries/secondary decay around previous restorations/during endodontic treatment, then remaining crown structure is not sufficient enough to retain large prosthetic crown (Hudis, 1986). When a considerable amount of tooth structure has been lost, because of caries or previous restoration or the endodontic treatment itself, special techniques are needed to restore such a tooth. This loss of tooth structure makes retention of a subsequent restoration problematicand increases the likelihood of fracture during function.

In these cases, crown lengthening can be done either surgically or by orthodontic extrusion to get the ferrule effect. Post and core procedure is most commonly used method for such cases (Fernandes *et al*., 2001). In early 1700s, Fauchard inserted wooden dowels in root canal of tooth with the concept that over a period of time wood would absorb fluids and expand, resulting in enhancement of retention of post but excessive expansion was frequently causing root fractures (4). In the mid-1800s, wood replaced metal as the post material, and the "pivot crown," a wooden post fitted to an artificial crown and to the canal of the root, was popular among dentists.Even endodontic treatment failure was very common in that era so development of new designs and material was very slow but in the 19th century metal posts came into existence over which porcelain crowns were screwed.

A device developed by Clark in the mid-1800s was extremely practical for its time because it included a tube that allowed drainage from the apical area or the canal. The Richmond crown was introduced in 1878 and was incorporated as single piece post-retained crown with porcelain facing (Smith, 1998). Few indications for Richmond crown are grossly decayed or badly broken single tooth where remaining crown height is very less and in cases with steep incisal guidance. The advantages of this design are custom fitting to the root configuration, little or no stress at cervical margin, high strength, availability of considerable space for ceramic firing and incisal clearance, 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, high cost, high modulus of elasticity than dentin (10 times greater than natural dentin) (Freedman, 1996). The teeth with minimal vertical tooth structure remaining for crown margins are subjected to flexion forces under function. As less cervical tooth structure is available, cervical stiffening from a more rigid post is needed to protect the crown margins and resist leakage. At the same time, force dissipation from a more resilient post is needed to resist root fracture (Cohen). Therefore, cast metal post systems were chosen in the cases discussed in this article.

Multiple unit of post core and crown restoration has several disadvantages over single unit system. The single unit restoration helps to achieve a" monoblockeffect "by decreasing the number of interfaces between components.

When post and core are two different entities, flexion of post under function forces causes stress development at post core interface resulting in permanent deformation of post and separation of core (Libman *et al*., 1995; Vinothkumar *et al*., 2011). Over a period of time the combined effects of thermal cycling, fatigue loading and aqueous environment test the bond between materials and cause breakdown of the materials (Ahn, 2003) Even though Richmond crown has many advantage the clinician must judge every situation on its individual merits and select the procedure that full fill the needs of case.

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