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REATTACHMENT OF FRACTURED TOOTH FRAGMENT WITH FIBER POST- A CASE REPORT

Dental Science

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ABSTRACT

Coronal fracture of anterior teeth is a common sequelae to dental trauma among children and adolescents. Traumatized anterior teeth require immediate functional and esthetic repair due to its psychological impact on the patient. One of the treatment modalities is reattachment of the dental fragment when the tooth fragment is available and there is no or minimal violation of the biological width. Patient cooperation and understanding of the limitations of the treatment is of utmost importance for good prognosis. The present case report describes management of a complicated fracture of maxillary left central incisor treated endodontically, followed by luting of post and reattachment of the same fragment.

Reattachment of fractured tooth fragments offers a viable restorative alternative, because it restores tooth function and esthetics with the use of a very conservative and cost-effective approach.

KEYWORDS

I.INTRODUCTION

Most common traumatic dental injuries affecting permanent teeth are uncomplicated and complicated crown fractures[1]. A fracture that involves enamel, dentin and pulp is referred to as complicated crown fracture, which has an incidence of 18 - 25 % of all dental injuries[2].The maxillary incisors are the most commonly affected teeth due to their position in the maxillary arch, forming 96% of all crown fractures[3]. The most common etiology of trauma in permanent dentition is fall followed by traffic injuries, acts of violence and contact sport [4].

A fractured anterior tooth requires immediate clinical attention and, if untreated, can cause damage to dentition and even have a psychological impact on the patient [5]. Management of complicated crown fractures is a multifactorial process influenced by the extent and pattern of fracture, restorability of fractured tooth, secondary injuries, presence/absence of fractured tooth fragment and its condition for use, occlusion, esthetics, finances, and prognosis [6].

In case of complicated fractures where the fractured segments are closely approximating, root canal treatment (RCT) followed by reattachment of the fractured segment with fiber post reinforcement is a feasible option [6]. Reattachment of original tooth fragment maintains tooth's original anatomic form, color, surface texture; it can restore function, can result in a positive psychological response and is also conservative, esthetic, and cost effective restorative option[7]. It has been suggested that fiber post luted with resin cement increases the retention of the segment and also provides a monoblock effect [8].

The present case report describes management of a fractured maxillary right central incisor treated endodontically, followed by reattachment of the same fragment.

II. CASE REPORT

A 40 -year-old male patient was referred to the Department of Conservative Dentistry and Endodontics, Government Dental College, Thiruvananthapuram, with a chief complaint of broken upper front tooth following an accidental fall [Figure 1]. The broken tooth fragment was brought by patient wrapped in a dry handkerchief with an elapsed time of 4 hours. The fragment was immediately transferred to saline solution[Figure 2]. Clinical examination revealed an oblique crown fracture on 21, with normal mobility, probing depth and no associated soft tissue injuries. Periapical radiograph revealed an intact periodontal ligament space, complete root formation, and no root fracture. A diagnosis of complicated crown fracture with respect to maxillary left central incisor was made [Figure 3a]. Medical history was noncontributory. The fit of the fractured fragment was checked and found to be satisfactory. Hence it was planned to perform single visit root canal treatment (RCT) on 21 followed by reattachment with fiber post reinforcement.

The procedure was explained to the patient and consent was obtained. The teeth were isolated using rubber dam under local anesthesia (2% lignocaine with epinephrine 1:100,000, Pharma Health Care Product, Mumbai). Access was gained through the fractured region. The coronal pulp tissue was removed and the chamber was irrigated with 5.25% sodium hypochlorite (NaOCl) and normal saline. Initial negotiation of the root canal was performed with a No.10 K-file and an initial working length radiograph was taken [Figure 3b]. The root canal was cleaned with 17% ethylenediaminetetraacetic acid (EDTA) and 5.25% sodium hypochlorite. Master cone radiograph was taken for confirmation [Figure 3c]. The root canal was dried with absorbent paper points and obturated with 2% gutta percha points and seal apex sealer.

Post space was prepared using GG drills and Peeso reamers[Figure 3d]. Esthetic post of diameter 1.1mm (Tenax Fiber Trans, Coltene/Whaledent Inc.,USA) was selected and fit was checked [Figure 3e]. The fragment was prepared for reattachment by giving an external chamfer bevel on both the fragment and the tooth. A groove was made on the lingual aspect of the fragment so that the post when placed in the canal gets locked into that groove as a means of additional retention. The fit of post to root canal as well as to the tooth fragment was confirmed prior to adhesive procedures.

Procedure for reattachment

The prepared post space and tooth fragment was etched for 15 seconds using 37% phosphoric acid (DPI Tooth conditioner gel, Dental Products of India, Mumbai, India). It was then rinsed thoroughly with water and excess water was removed with absorbent paper points. The post was etched (10% H_2O_2 for 20 minutes) and silanated. The adhesive (Prime & Bond NT, Nanotechnology Dental adhesive, Dentsply, St. Paul, MN, USA) was applied on the etched surfaces as well as the post. The adhesive was air thinned and light-cured for 10 seconds. The post was then luted with resin cement (Multilink, Ivoclar, Vivadent) with 2mm of its coronal portion extending into the chamber. The fragment was then verified for a fit with the tooth surface to ensure a proper adaptation. Tooth fragment was reattached using resin cement and it was made sure that groove got locked with the post. Excess cement was removed and polymerization was done from both buccal and palatal side. A groove was made on the line of reattachment and filled with microhybrid composite [FILTEK SUPREME, 3M ESPE], finished and polished. [Figure 4a,b].

Postoperative instruction regarding preventing loading of the anterior teeth was given to the patient. The patient was kept on periodic review and it was observed that both endodontic and restorative treatments remained clinically acceptable through each visit. The clinical and radiographic pictures after 1 year revealed favorable healing [Figure 5].

Fig. 1

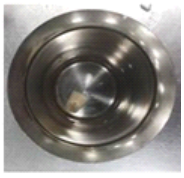

Fig.2

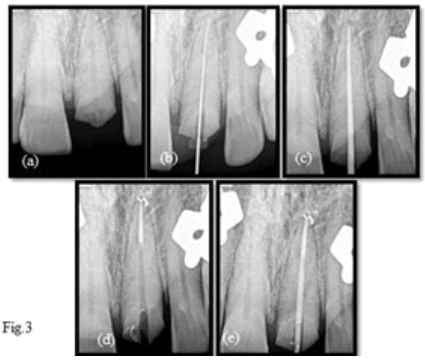

Fig.3

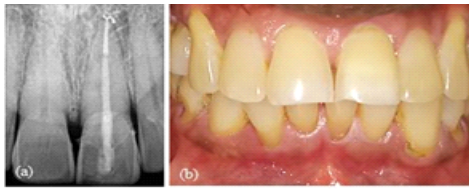

Fig.4

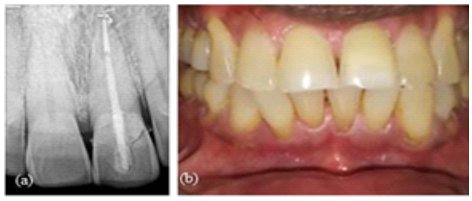

Fig.5

Figure 1: Fractured 21, **Figure 2:** Fractured segment stored in saline, **Figure 3(a)** Pre-operative radiograph, **(b)** WL determination, **(c)** Master cone ,**(d)** Post space preparation, **(e)** Fit of the fiber post in the canal, **Figure 4a,b:** Post-operative radiograph and photograph, **Figure 5a,b:** One year follow up radiograph and photograph

III. DISCUSSION

Conventional methods employed in the restoration of fractured teeth include partial and full coverage crowns, laminate veneers, and composite resins all of which are time consuming, high priced, and non conservative[9]. First described by Chosack and Eidelman in 1964, restoration of fractured teeth using the dental fragment offers a fine way to reinstate the natural shape, contour, surface texture, occlusal alignment, and colour of the fragment [10]. A growing number of case reports in the literature suggests that reattachment of a fractured tooth fragment is a viable approach for the treatment of coronal fracture of anterior teeth when the fractured segment is available [5,6].

The success of the reattachment depends on several factors, hydration of the fractured segment being the most important factor. This is necessary to maintain the vitality and original esthetic appearance of the tooth and also ensures adequate bond strength [9]. In the present case, hydration was ensured by storage in sterile isotonic saline.

By using glass fiber post and with recent advances in adhesive techniques and materials one can create a monobloc, a multilayered structure with no inherent weak inter-layer interfaces. The unique advantage of this system is that it reinforces the teeth structure through this concept. It is also reported that the use of a fiber post with fractured teeth, as it interlocks the two fragments, minimizes the stress on the reattached tooth fragment [11]. An additional chamfer was also given on labial surface which was filled with microhybrid composite after reattachment. Reis et al in 2002 showed improved fracture resistance with this additional procedure [12].

If the fracture line is supragingival, the procedure for reattachment will be straight forward. However when the fracture site is sub gingival or intraosseous, orthodontic extrusion with a post retained crown may be necessary. When there is a substantial associated periodontal injury and/or invasion of the biological width, the restorative management of the coronal fracture should also consider the rehabilitation of those associated tissues [13]. In the present case fracture was supragingival and hence no other periodontal procedures were carried out.

IV. CONCLUSION

Immediate esthetic management of traumatic injury demands proper planning which should be based on sound knowledge of the techniques available and their indications, along with risk benefit ratio. Tooth fragment reattachment procedure offers an ultraconservative, safe, fast, and esthetically pleasing result when the fractured fragment is available. Reattachment of the dental fragment as a restorative procedure has become possible with the improvement of adhesive techniques and restorative materials. Future reports may need to focus on reporting longer followup to bolster the evidence in favour of this treatment option.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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