

Management of a Traumatic Tooth: Restoring the Natural Way!Mahalaxmi Yelapure¹, Roopali Tapashetti², Mithra Hegde³, Shishir Shetty⁴**ABSTRACT**

The most commonly occurring dental injuries among children and adolescents are the crown fractures of the anterior teeth. Of the various options available for management of coronal tooth fractures, the most conservative and esthetic approach is reattachment of the fractured fragment. This approach imparts natural appearance to the tooth with minimal or no loss of the biologic width. It is a simple procedure, provides positive psychological reassurance and also restores function and natural form. The present case report describes a clinical technique showing the reattachment of coronal fragment of a fractured maxillary central incisor after trauma, using direct fiber-reinforced post system. **Conclusion:** Reattachment of fractured tooth fragments is a viable option for the clinician and the patient, because it restores function and esthetics using a very conservative and cost-effective approach.

Key words: - Dental trauma, fractured crown fragment, fragment reattachment, fiber post, resin composite

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INTRODUCTION

Trauma along with the fracture of anterior teeth is a painful and an embarrassing experience for a young person demanding immediate attention; both

because of the physical disfigurement and the psychological impact.

Crown fractures of the anterior teeth are the commonest form of dental trauma which is usually seen in children and young

adults. Most of these dental injuries involve the anterior teeth, especially the maxillary central incisors (because of their placement in the arch), whereas the maxillary lateral incisors and mandibular central incisors are involved with a lesser frequency. It usually a single tooth that is affected; however, multiple teeth can get traumatized when there are road traffic accidents and sports' injuries.^[1, 2]

Traumatized anterior teeth require immediate attention for the functional and esthetic repair. A number of techniques have been developed to restore the fractured crown. Conventionally such injuries were restored post-endodontically using a post & core with a full coverage restoration.

The treatment of such cases requires many a factors to be considered before commencement ; like i) extent of fracture, ii) pattern of fracture iii) restorability of the tooth, iv)presence of the fractured tooth fragment, v) occlusion and vi) esthetics.^[2, 3] It was *Tennery* to first report the re-attachment of a fractured fragment using acid-etch technique.^[3]

The treatment modalities vary from simple reattachment of fractured fragment to a complex interdisciplinary approach. Reattachment of fragment offers many advantages. It provides a long lasting esthetics and retention of lifelike translucency. There is minimal sacrifice of the remaining tooth structure with maintenance of original tooth contours and contacts. Incisal edge wear is at a rate similar to that of the adjacent teeth and comparatively lesser when direct composites are used.^[4]

Replacement of fractured portion involves less treatment time, also being conservative and cost effective. Most importantly, it imparts a positive emotional and a feeling of social well being to the patient.

In cases of complicated fractures, to avoid the preparation of the fractured tooth, the inner space of the pulp chamber can be used for reinforcement whenever endodontic therapy is indicated.^[2, 5, 6]

Resin based restorative materials are often used to restore the fractured teeth. Due to the poor mechanical resistance of these

materials, approaches such as incorporation of fiber posts have been used to overcome the same. Tooth-colored fiber posts were introduced in the 1990's and they have several advantages. They are esthetic, bond to tooth structure, modulus of elasticity similar to that of dentin, but still require preparation of dentin to fit into the canal.^[7] Hence, a new clinical approach for reattaching the fractured fragment has been reported in this article.

CASE REPORT

A 19-year-old female patient reported at the outpatient department of Department of Conservative Dentistry and Endodontics of the institute, a week after she

met with a road traffic accident. Patient's general and medical histories were noncontributory. There was no visible trauma to the soft tissues when examined intra and extra orally. After recording the history, clinical and radiographic examinations were conducted. It was seen that the patient sustained a cervical crown fracture with respect to the right maxillary central incisor extending subgingivally on the palatal aspect without any violation of the biologic width. [Fig 1(A) (B)]. Radiograph revealed intact apical periodontium with complete root formation. Electric pulp tests gave a negative response.

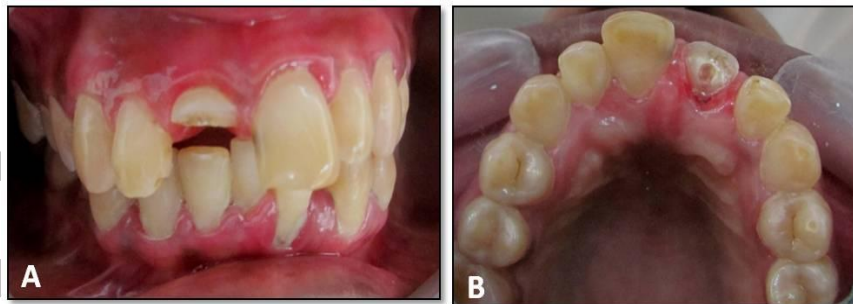


FIGURE 1-(A) Fractured maxillary right central incisor (B) Palatal view

The patient had preserved the fractured crown fragment after the accident and had stored in normal saline as per the advice of a local dentist, whom she had consulted immediately. Since the patient expressed a keen desire to maintain the tooth and restore it; a detailed treatment plan

was explained to the patient, which included endodontic treatment followed by reattachment of the fractured crown fragment using a fiber post. A thorough inspection of the fractured crown fragment was done and checked if the margins adapted well to the tooth. [Figure 1 (C)]



FIGURE 1-(C) Fractured crown fragment

Endodontic therapy was carried out on the tooth. [Fig 2 (A)]The root canal orifice was sealed with an interim restoration.

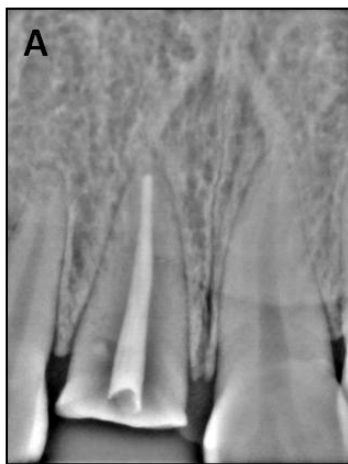


FIGURE 2 -Radiograph-(A) Endodontic treatment completed

Since the fracture line extended subgingivally on the palatal aspect, the patient was referred to the Department of Periodontics for a surgical crown lengthening procedure. 5 days later; after confirming the healing of gingival complex, reattachment of the fractured crown fragment was initiated. Post space was prepared in the canal with corresponding drills to receive the fiber post. The pre-fabricated post (X PostTM, Dentsply) was tried in the canal for proper length and adaptation. [Figure 2 (B)]

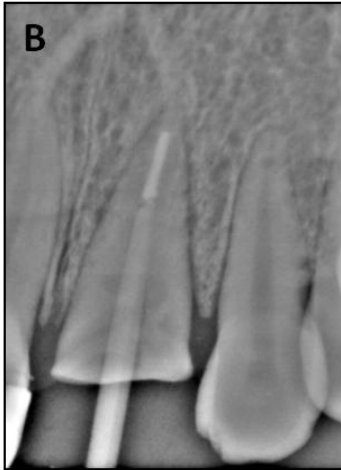


FIGURE 2 Radiograph (B) Post fit tried

The crown fragment was cleaned with 2.5% sodium hypochlorite to clear away the pulpal remnants, rinsed and finally dried.

A slot was prepared on the inner surface of the fragment so as to receive the post with composite resin.[Fig 3(A)]



FIGURE 3-(A) slot preparation

The prepared slot was etched (DeTrey® Conditioner 36) for 15 seconds, rinsed and dried; bonding agent (Prime & Bond NT,Dentsply) applied, both to the crown fragment and the post and cured for 30 seconds. Composite (Esthet•X, Dentsply DeTrey, Konstanz, Germany) and the post were placed into the box-like preparation, the whole unit was inserted into the canal to get a good approximation of the fractured fragment and cured for 10 seconds. The whole unit was then withdrawn from the root and again cured for 30 seconds. This complete unit resembled a Richmond Crown. ^[7, 8] [Fig 3 (B) & (C)]

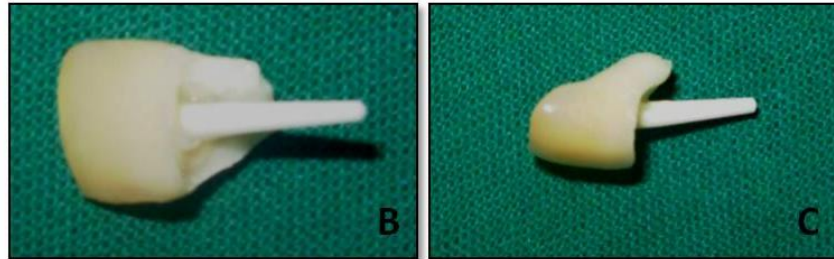


FIGURE 3- (B) & (C) The post with the crown resembling “RICHMOND CROWN”

The canal was prepared according to the manufacturer’s instructions to receive the above mentioned unit of post with the crown fragment. Resin luting cement (core-X flow, Dentsply) was applied onto the post and the whole unit was then fit in the canal. [Fig 2 (C)]

Excess cement was cleared; the margins were cured and polished with the composite polishing kit (Shofu composite polishing kit, SHOFU Inc, Japan). [Fig 4 (A)] The occlusion was carefully checked and adjusted. The patient was sent after instructing to avoid exerting heavy functional loads on the tooth and to follow regular oral hygiene care procedures.



FIGURE 4-(A) Immediately after reattachment

The patient was recalled after 3 and 6 months intervals for a supportive periodontal therapy and assessment of the status of the reattached crown fragment. [Fig 4 (B)] At 12 months follow up, the tooth was asymptomatic and no discoloration of the crown was seen. [Fig 4 (C)]

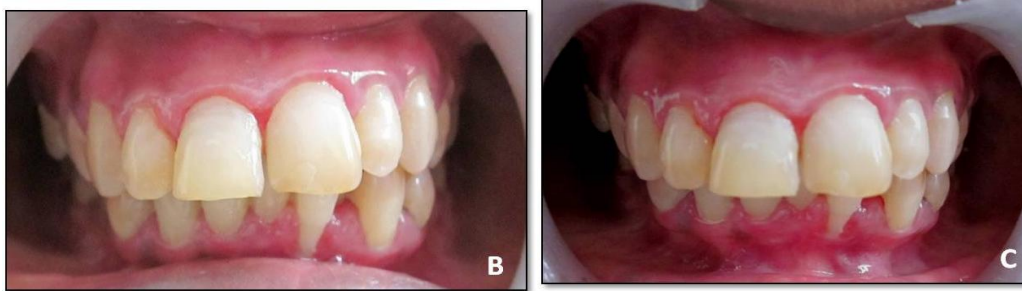


FIGURE 4- (B) After 6 months (C) After 12 months

DISCUSSION

The fracture of a tooth is a traumatic incident for a young patient, but it is also seen that there is a positive emotional feeling and desire of social well being attached towards preserving the natural tooth structure.^[6]

Crown fractures must be approached in a systematic & clinically indicated manner to achieve a successful final restoration. The clinician has a very important role to play in the management of such traumatic cases and so he has to take into account of every possible option available to save what is natural; of course without failing to think about the long term prognosis.

The noteworthy advancements in bonding systems, techniques and resin composites have made possible the

reattachment of tooth fragments a procedure which no more offers only a temporary restitute, but rather a permanent restorative treatment rendering a favorable prognosis.

The important aspect of making a provision for this treatment option is to make sure that the fractured fragment is available and very much intact.^[9] Clinical trials and long-term follow-up studies have reported that esthetic and functional success can be achieved when the present advancements in adhesive and bonding materials and techniques are used for reattachment.^[10,11]

The advantages of this treatment include, retention of form, natural anatomy, original feel of natural tooth, color, wear in a similar pattern as that of adjacent tooth, a positive psychological response to the patient and the cost factor.^[2]

In cases of complicated fractures, the space provided by the pulp chamber can be used as an inner reinforcement so as to avoid further preparation of fractured tooth whenever endodontic therapy is indicated.⁽²⁾ The use of post increases retention as well as distributes the stress along the root and helps fractured crown to permanently bond to the root. Connecting the fiber post with the resin cement creates a monoblock effect imparting retention to the fractured fragment.^[12]

In the present case it was possible to reattach the fractured fragment as it was found intact and a good approximation could be achieved. The fractured crown fragment fit exactly with the remaining tooth structure without any intervening space. Also, the approximation was very good since the post and the crown fragment were inserted as a single unit and good curing of the composite was possible as it was cured in an extraoral manner.^[8]

Various materials have been used in the past for cementation of fractured fragments; like glass ionomer cements, cyanoacrylate, 4-methacryloxy ethyl

trimellitate anhydride (META)/methyl methacrylate (MMA) tri- n- butyl borane (TBB), dual cure resins.⁽¹³⁾ Studies have shown that eventually, chemical or dual cure resin cements exhibit change in color which is attributed to the presence of the amine accelerators. However, composite resins present better color stability and sustained esthetics even over a period of time.^[14, 15]

CONCLUSION

Reattachment of tooth fragment is a fast, conservative and an esthetically pleasing treatment modality; provided the fractured crown fragment is available and approximates exactly with the remaining tooth.. This treatment option has become possible with the improvement and advancements in adhesive techniques and restorative materials. Fiber reinforced resins not only allow creation of esthetic restorations but also preserve and reinforce the tooth structure.

Such treatment modalities make it possible to provide a feel of naturalness to the patient and hence a sense of psychological well being. These can be recommended more frequently, by

attempting more number of similar cases with longer periods of follow-up.

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