



# Management of complicated crown fracture in maxillary incisor using fragment reattachment - 5-year follow-up

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## ABSTRACT:

Complicated crown-root fractures of maxillary incisors are a relatively common occurrence in cases of trauma to the facial region. Patients with such fractures are in acute pain and usually require emergency care on their first clinical visit. Pain management and restoration of function, esthetics, and phonetics should be the prime objective in handling such patients. The reattachment of fractured tooth fragments is a relatively simple procedure that provides natural esthetics and conservation of tooth structure. This case report describes such a reattachment procedure in a complicated crown-root fracture and its success at 5 years of follow-up.

**KEYWORDS:** Anterior tooth Trauma, tooth fragment, pulpectomy

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## I. INTRODUCTION:

The increased incidence of traumatic injuries to anterior teeth is a consequence of leisure activities, where the most common injuries are crown fractures. These manifestations can vary from simple enamel-dentin fracture to complicated crown-root fracture or root fracture [1]. The prevalence of dental traumatic injuries in permanent and primary dentition has been reported to be 58% and 36.8% respectively [2]. Estimates are that about a quarter of the population under 18 years of age, sustains traumatic injuries in the form of anterior tooth fracture [3], out of which, 80% are central incisors and 16% are lateral incisors [4]. This is due to their anterior location and protrusive eruptive pattern [5]. Uncomplicated enamel and dentin fracture is most common while those involving crown and root with pulpal exposure constitute only 5–8% of all traumatic injuries [6-7]. Such trauma is generally more prevalent in males than females with the reported ratio being 2.5:1.0 [8]. Predisposing factors to dental trauma include Class II div 1 malocclusion [9], a large overjet (>3.0 mm) [10], incompetent lips, absence of mouth guards while playing sports, etc. [2].

Various techniques have been advocated for restoring fractured teeth viz. resin crowns, stainless steel crowns with or without window preparation, pin-retained inlays, and complex ceramic restorations [11]. Unfortunately, all these techniques imperil the tooth structure and also are aesthetically inferior. Moreover, they could not be used in case of an emergency [12]. During the 70's, adhesive composite restorations almost became a standard procedure in the treatment of crown fractures in children, adults, and sometimes in elder persons. Other treatment options include porcelain laminate veneers, porcelain fused to metal crowns, and all ceramic crowns [13].

Fractured tooth fragments can also be re-attached, with little to no additional preparation, with the help of acid-etch technique and composite resin [14]. The advantages of tooth fragment reattachment over conventional composite restoration include conservation of tooth structure, a favorable wear mechanism, color match with the remaining crown portion, preservation of incisal translucency, maintenance of original tooth contours, preservation of identical occlusal contacts, color stability of the enamel, cost-effectiveness, and a convenient single visit treatment [15-17].

This case report describes a case where fragment reattachment was carried out using a glass fiber composite post and composite resin.

**CASE REPORT :** A young patient in his middle childhood reported to our Outdoor Patient Department with the chief complaint of a broken upper front tooth. On eliciting the pertinent history, it became apparent that the patient had suffered from trauma 2 days ago when while playing a wooden stick hit him on the affected tooth. There was a lag of two days as the patient did not tell his parents about it for fear of being scolded. However, when his tooth began to hurt, he told his father who brought him to the dental clinic. The history did not reveal any relevant medical, dental, or personal afflictions. The patient was well-oriented to time, place, and person with normal build and gait. Extra-oral examination revealed competent lips and a bilaterally symmetrical face. On intra-oral examination, the patient was in the permanent dentition stage, with Angle's class I malocclusion bilaterally. The oblique fracture was evident in the maxillary right central incisor with the palatal margin extending 2 mm subgingivally. The tooth fragment was still attached to the palatal gingiva and exhibited extensive mobility in the bucco-palatal direction Fig1(a). The tooth tested negative for electrical and thermal pulp tests. An IOPA Xray was done for the involved tooth which revealed a crown fracture Fig 1(b).



Fig. 1: a) Intra-oral pre-operative photographs

Fig. 1: b) Pre-operative IOPA

A diagnosis of complicated oblique crown-root fracture was made. Hence, it was decided to initially manage the case conservatively. The fractured fragment was reattached with flowable composite resin and both maxillary central incisors were splinted with a flexible wire splint. The tooth was to be subsequently pulpectomized, however, during access cavity preparation the fragment separated Fig 2(C).

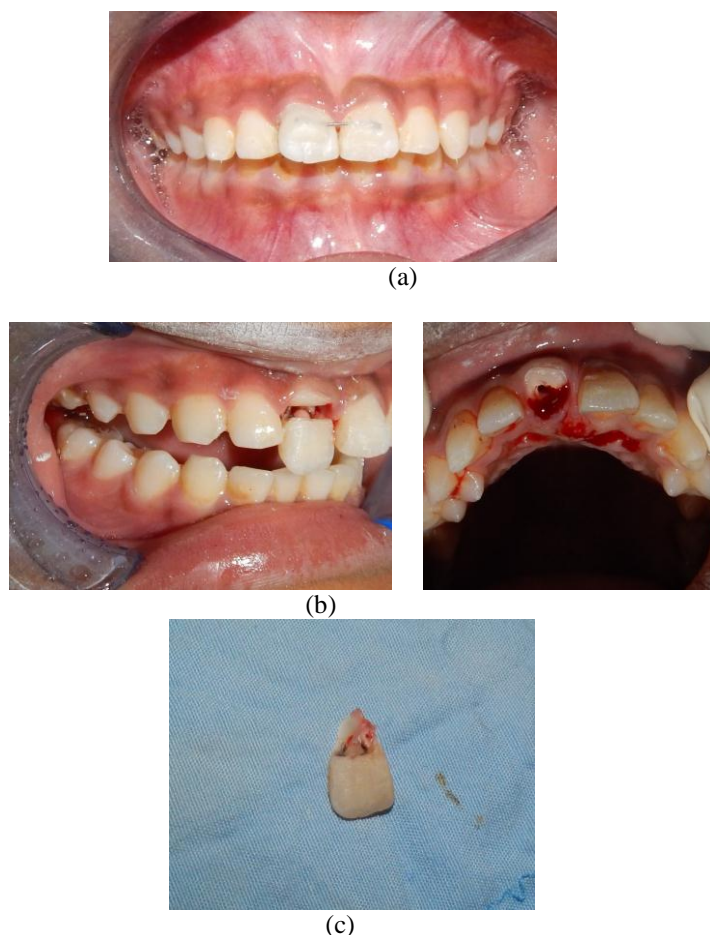


Fig.2: a) Reattached tooth fragment splinted to the adjacent tooth with flexible wire splint. b) Fragment separation during access preparation, c) Separated fragment

The treatment protocol was slightly modified. The fragment was removed and after cleaning off the pulpal debris, was preserved in normal saline solution. The tooth was endodontically treated and post space was prepared. Thereafter, a palatal mucoperiosteal flap was reflected, the area was isolated, and a glass fiber post was cemented using flowable composite resin. The fragment was then reattached using composite resin and the junction between the fragments smoothed, all the while maintaining adequate isolation. The flap was repositioned and sutured back in place Fig3 (A, B, C).



Fig.3: a) Obturated tooth with post space prepared, b) Reattachment of fractured fragment, c) Appearance after fragment reattachment procedure completion

**FOLLOW UP :** Patients was kept under regular follow ups. Patient was doing good clinically as well as radiographically. An IOPA x-ray was taken at 1 year follow up (Fig4) showed no abnormality. At 5 years follow up there was no evident pathological mobility, periodontal pocket formation, tenderness, or discomfort. The results achieved are satisfactory both clinically as well as aesthetically Fig5(a). The IOPAs reveal satisfactory bone level around the involved tooth and no pathological resorption Fig5 (b).



Fig.4: IOPA 1year after procedure

Fig.5(a) 5 year follow-up intraoral pics



Fig.5(b) 5 year follow up IOPA xray

## II. DISCUSSION:

Fragment reattachment as a treatment modality for complicated crown root fractures has been discussed in the literature mostly in the form of case reports or case series.

Belcheva (2008) [24] has published a review on the methods of reattachment of fractured incisors. The author discussed several factors based on the articles reviewed, which contributed to the success of fragment reattachment. It was observed that fragments dehydrated for more than 1 hour showed less fracture resistance as compared to hydrated fragments. Dehydration was not an issue in our case as the fragment was placed in normal saline immediately after being removed. It was further seen that preparing bevels, chamfers, notching and over contouring did not affect the fracture strength of the reattached fragment and that addition of an adhesive medium with good bond strength like composite resin is important to at least partially regain the lost strength. Regarding prognosis of the re-attached fragments it was seen that there is a lack of clinical data on this aspect. Andreasen et al (1995) [25] reported 50% and 25% retention after 5 and 7 years of follow up of 334 teeth treated using fragment reattachment technique. Based on these observations the author concluded that reattachment as a treatment modality is minimally invasive and esthetic method.

Complicated crown root fractures have been classified as N 502.54 according to WHO [21]. Our treatment modality was based on the recommendations given by the American Academy of Pediatric Dentistry (AAPD) [19]. However, gingivectomy, ostectomy, orthodontic or surgical extrusion was not required as the fracture line was supra-crestal and post fragment reattachment the aesthetics achieved were satisfactory. Reattachment has been hailed as being very conservative and a procedure that can help gain aesthetics immediately after the procedure as compared to other treatment modalities [20]. For young patients it can also serve as a transitional, if not definitive, restoration and can be later restored using veneers, laminates or crowns in case of failure of reattachment [18]. It has been recommended that if the fractured fragment is available,

reattachment of the fragment is the most desired treatment. Using a natural tooth fragment in a single appointment provides functional, esthetic and a very cost effective treatment to the patient [22].

Composite resin materials provide ease of use and good adhesive bond strengths. However, they require meticulous isolation of the area they are used in. Rubber dam isolation was not possible in this case, as a mucoperiosteal flap was reflected. Adequate isolation of the work area was achieved using cotton rolls, gauze pieces, gingival retraction cord and cheek retractors.

The fractured fragment was preserved in normal saline until being reattached to prevent de-hydration and subsequent loss of the natural color of enamel.

Follow up visits are critically important for any kind of traumatic injuries. It has been recommended that the patient be followed for 3, 6, 12 months and yearly for 5 years and esthetics, tooth mobility and periodontal status should be confirmed both clinically and radiographically at these follow up visits [23]. Jyothi M et al[26] has shown in case series on fracture reattachment using fiber post that reattaching tooth fragments with adhesive systems can be used successfully to restore fractured teeth with adequate strength.

Thus, it can be concurred that fragment reattachment using a fiber reinforced post and composite resin system is a safe, effective and conservative treatment option. This case demonstrates that this treatment modality for a complicated- oblique crown root fracture provides esthetic and functional rehabilitation for the patient.

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