



REATTACHMENT OF FRACTURED ANTERIOR TOOTH: A CASE REPORT

Endodontics

Dr. Radhika S. Bijwar	Post Graduate Student, Conservative Dentistry and Endodontics, VYWS Dental College & Hospital, Amravati, Maharashtra, India, 444602
Dr. Shrikant A. Shingane	Professor, Conservative Dentistry and Endodontics, VYWS Dental College & Hospital, Amravati, Maharashtra, India, 444602
Dr. Yogesh L. Tandil	Professor and HOD Conservative Dentistry and Endodontics, VYWS Dental College & Hospital, Amravati, Maharashtra, India, 444602
Dr. Sagar H. Mohkar	Reader, Conservative Dentistry and Endodontics, VYWS Dental College & Hospital, Amravati, Maharashtra, India, 444602
Dr. Neelam V. Rahul	Senior Lecturer, Conservative Dentistry and Endodontics, VYWS Dental College & Hospital, Amravati, Maharashtra, India, 444602
Dr. Shraddha R. Wankhade	Post Graduate Student, Conservative Dentistry and Endodontics, VYWS Dental College & Hospital, Amravati, Maharashtra, India, 444602

ABSTRACT

Aims & Background: This case report aims to manage dental trauma by reattaching with the patient's own tooth fragment. Reattachment of fractured tooth fragments by various technique offer advantage over other treatment such as function, shape, texture of the surface **Case Description:** The present case report of reattachment in which complicated crown fracture of upper lateral incisor treated using fibre post **Clinical Significance:** fragment reattachment represents a conservative and effective solution for managing crown fractures in both emergency and long-term restorative contexts.

KEYWORDS

Trauma, Reattachment Fracture Tooth, Fiber Post

INTRODUCTION

Dental trauma during childhood and adolescence is a common occurrence, with approximately one in four individuals experiencing some form of oral injury, particularly among males [1]. Among these, traumatic injuries to the anterior teeth are the most frequently reported due to their prominent position in the dental arch. The maxillary central incisors are especially susceptible to trauma, as they are located in a vulnerable position and are frequently affected during motor vehicle accidents, sports injuries, or domestic falls [2].

The risk of anterior tooth fractures increases significantly in individuals with severe overjet, overbite, or anterior open bite [3]. The mechanism of injury typically involves the transmission of high-impact energy to a localized area on the tooth crown, resulting in structural damage. Most traumatic injuries involve the enamel and dentin without pulpal exposure [4].

Crown-root fractures represent a relatively small percentage—between 0.3% to 5%—of traumatic dental injuries but require complex and multidisciplinary management due to their severity [5]. The choice of treatment is influenced by several factors, including the patient's age, the severity and location of the fracture, the degree of biological width involvement, pulpal status, availability and condition of the tooth fragment, occlusion, esthetic demands, treatment timing, and patient expectations [6].

Fragment reattachment was first introduced by Chosack and Eidelman in 1964 and has since gained popularity among clinicians for its minimally invasive nature and predictable esthetic outcomes [7]. Although direct composite resin restorations are traditionally used for fractured anterior teeth, they have drawbacks such as color mismatch and wear over time. In contrast, fragment reattachment, when feasible, often provides a superior long-term esthetic and functional outcome [8].

In young patients, anterior tooth fractures in permanent dentition can significantly affect esthetics, function, and phonetics. A variety of restorative options have been developed, including composite restorations, post-and-core systems, fragment reattachment, and full-coverage crowns following orthodontic or surgical extrusion, crown lengthening, or, in severe cases, extraction followed by implant placement or fixed partial dentures [9].

Among these, the reattachment of a patient's own tooth fragment is a conservative and viable alternative when the fragment is available and in usable condition. Fragment reattachment offers several advantages over conventional techniques:

- Superior esthetics with life-like translucency
- Comparable incisal edge wear to adjacent natural teeth
- Reduced chair-side time
- Minimal or no invasion of the biologic width
- Economical solution
- Positive emotional and psychological response from the patient [10]

Timely and appropriate management of traumatic anterior tooth fractures is crucial, especially in younger patients. Fragment reattachment should be considered the first line of treatment when conditions permit, due to its many clinical and psychological advantages.

Case Report

A 29-year-old male patient reported to the Department of Conservative Dentistry and Endodontics at VYWS Dental College and Hospital with the chief complaint pain and mobility in upper front region of jaw. The Patient presented to the hospital with a history of trauma resulting from a motor vehicle accident that occurred five days ago. On clinical examination revealed a complicated root fracture of the maxillary right lateral incisor 12 and Ellis class II fracture with maxillary right incisor 11 (fig.1). The fracture line was oblique extending in apical direction from labial to palatal surface. The margin on palatal surface was located about 2mm from the free gingival margin and was easy to be probed with a periodontal probe. The fractured fragment was attached to the root and to the palatal gingival tissue and was very mobile. The intraoral periapical radiograph indicated complete root formation with closed apex and no periapical radiolucency. The radiograph also showed fracture of crown at cervical level.(fig 2) Of the various treatment options explained to the patient, he preferred to retain the fractured fragments. After taking written consent, it was planned to perform single visit root canal treatment (RCT) on 12 followed by reattachment with fiber post reinforcement. After 2 weeks, pulp sensibility test in #11 to be assessed and if non vital RCT to be carried out.



Fig 1. Preoperative Clinical Image of Complicated Crown #12 & Ellis Class II # 11

Local anesthesia was administered (1cc Lidocaine 2% with 1:80,000 epinephrine) and the fractured segment in relation to 12 was atraumatically removed using a forceps. (fig.3) Remnants of pulp tissue from the fractured fragment were removed. It was then cleaned with 2% chlorhexidine solution and stored in saline (fig.4). Access was initiated and working length was determined using intraoral periapical radiograph (fig.5) After thorough cleaning and shaping of root canal using Protaper gold rotary system, copious irrigation was done was done by using 5.25% sodium hypochlorite and saline, followed by obturation of the canals using sectional obturation technique.



Fig 2. Preoperative Radiograph



Fig 3. Clinical Image After Removal of the Fractured Fragment From Tooth 12

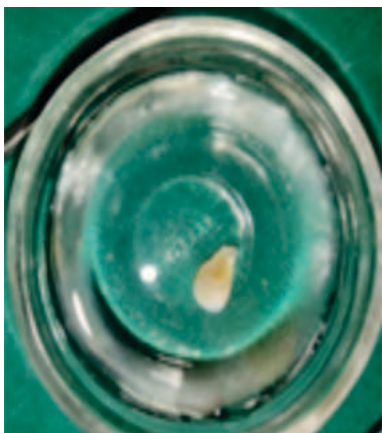


Fig 4. Tooth Fragment Stored in a Saline



Fig 5. Working Length Determination

Post space was prepared using size1 Peeso reamers and esthetic post(fibre reinforced-FRC postec plus) of size 0 was selected. Assessment of post was done radiographically after adjusting the post length. The fractured fragment was removed from distilled water and tried on the cut end of fiber post. A groove was made on the fractured fragment so that it fits well on the root without any interference from the post. After confirming the desired fit, it was again stored in distilled water. The prepared post space was etched with 37% phosphoric acid for 15 sec. It was then rinsed thoroughly with water and excess water was removed with a cotton pellet. After that bonding agent (Tetric N-bond Universal, Ivoclar) was applied on the etched surface as well as the post. The adhesive was air thinned and cured for 10sec. The post was then luted with resin cement (Luxacore, DMG, Germany) with 2mm of its coronal portion extending into the chamber. Excess cement oozing out of canal was removed with cotton applicator tip and then light cured for 40sec. A periapical radiograph was taken to ensure the proper cementation of post.

The fractured fragment was removed from distilled water and tried on the cut end of fiber post. Enamel bevel was given on the remaining tooth structure. After confirming the desired fit, it was again stored in distilled water (Fig. 6).



Fig 6. Post Operative Clinical Image After Fractured Fragment Reattachment with 12

Self-etch adhesive was applied on the exposed surface of the tooth as well as in the fractured fragment. The adhesive was air thinned and light-cured for 10 seconds. Groove in the fractured fragment was filled with flowable composite, and the exposed fibre post was also luted with the same. The fragment was repositioned and cured for 40sec. from palatal, labial, and incisal surfaces. A periapical radiograph was taken to ensure the proper cementation of the post as well as fragment (fig.7) The occlusion was checked and postoperative instruction were given to the patient. Composite restoration was done to improve the esthetic and mask- fracture line.



Fig.7. Final Radiograph of Fiber Post and Reattachment of Tooth Fragment

After 2 weeks, patient was recalled and pulp vitality was assessed with #11 was vital. Composite restoration was carried out with #11. The patient was kept on periodic review after every month and it was observed that both endodontic and restorative treatment remained clinically acceptable through each visit.

DISCUSSION

The reattachment of dislocated tooth fragments has emerged as a preferred treatment option in restorative dentistry due to advancements in adhesive systems and dental bonding technologies. This method preserves natural tooth structure, offering superior aesthetic outcomes by avoiding issues such as differential wear, shade mismatch, and challenges in replicating natural contour and texture, which are common with artificial restorative materials [11]. A comprehensive treatment plan requires careful evaluation of periodontal, endodontic, coronal, and occlusal parameters. Successful reattachment is contingent upon appropriate management of biological considerations, choice of materials, and application of suitable techniques [12].

Historically, Tenerry was among the first to report the use of the acid-etch technique for fragment reattachment in 1988, paving the way for contemporary adhesive protocols. Over the years, continuous improvements in bonding agents, composite resins, and tooth preparation designs have significantly expanded the scope and predictability of this conservative technique acceptably through each visit.[13]

Numerous preparation designs have been proposed to enhance both the durability and aesthetics of fragment reattachment. Among these, the circumferential enamel bevel technique, introduced by Simonsen in 1979, involves creating a 45° bevel on the enamel margins of both the fractured fragment and the remaining tooth structure. This preparation facilitates optimal acid etching and bonding by aligning enamel prisms perpendicularly to the etched surface and aids in concealing the fracture line beneath composite resin. However, in a later publication (1982), Simonsen proposed an internal enamel groove, highlighting that labial composite bands tend to discolor over time, diminishing the esthetic benefit of beveling.

Additional Techniques Documented in the Literature Include:

External chamfer at the fracture line post-bonding, V-shaped enamel notch, Internal dentinal or enamel groove, Superficial over-contouring of the restorative material at the fracture line, particularly in complicated fractures involving the pulp.[14]

Despite these variations, studies such as that by Dean et al. reported no statistically significant difference in fragment retention between beveled and non-beveled preparations, suggesting that while these methods may enhance aesthetics, they may not necessarily influence long-term bond strength. In cases where the fracture involves two-thirds or more of the crown structure, post-reattachment is frequently recommended. Both custom-cast posts and prefabricated posts have

been utilized successfully. Prefabricated posts are favored in many instances due to their clinical efficiency and elimination of the laboratory stage. The post aids in mechanically locking the fragment to the tooth, thereby reducing stress and providing structural support, particularly after endodontic treatment.[15]

However, this technique has limitations. The fracture resistance of reattached teeth is generally restored to only 50–60% of an intact tooth. Furthermore, the hydration status of the fragment is critical. Prolonged dehydration leads to reduced bond strength and increased brittleness of the fragment. Studies have shown that rehydration can partially restore strength, underscoring the importance of minimizing extra-oral time and maintaining hydration prior to bonding [16]. In this case, fiber-reinforced post was used for reattaching the fractured fragment with the tooth after completion of endodontic treatment was planned as FRC posts have several advantages over metal posts. Their principal advantages are that they are tooth colored, passive, bend along with dentin upon being flexed as their elastic modulus is similar to that of dentin. Reattachment using the FRC post which is bonded into the root canal enhances the retention of the crown's fractured fragment. The increase in fracture resistance is due to the combination of elastic and adhesive characteristics. Thus, both the tooth and post move and flex as a single unit, which ensures the favorable stress distribution[17]

Given the psychosocial and economic impact of anterior dental trauma, fragment reattachment offers a valuable, conservative treatment modality. It provides a time-efficient, cost-effective, and aesthetically pleasing solution that not only restores function but also plays a critical role in preserving the patient's psychological well-being.

CONCLUSION

Fragment reattachment serves as a valuable treatment option, preserving natural tooth structure while restoring both function and appearance.

Clinical Significance

The reattachment technique described provides significant advantages for both clinicians and patients. Utilizing the patient's own tooth fragment allows for superior esthetic integration and reduces the need for extensive tooth preparation. In cases where the fracture extends below the alveolar bone crest, adjunctive procedures such as orthodontic extrusion or surgical crown lengthening may be necessary to ensure optimal clinical outcomes. Overall, fragment reattachment represents a conservative and effective solution for managing crown fractures in both emergency and long-term restorative contexts.

REFERENCES

- Andreasen JO (1970) Etiology and pathogenesis of traumatic injuries. A clinical study of 1,298 cases Scandavian Journal of Dental Research 78(1-4):329-342.
- Zerman N & Cavelleri G (1993) Traumatic injuries to permanent incisor Endodontics and Dental Traumatology 9(2):61-64
- Lise DP, Vieira LC, Araújo É, Lopes GC. Tooth fragment reattachment: the natural restoration. Oper Dent. 2012 Nov-Dec;37(6):584-90. doi: 10.2341/12-063-T. Epub 2012 Jul 7. PMID: 22770482.
- Badami V, & Reddy SK (2011) Treatment of complicated crown-root fracture in a single visit by means of rebonding Journal of the American Dental Association 142(6): 646-650.
- Olsburgh S, Jacoby T, & Krejci I (2002) Crown fractures in the permanent dentition: Pulpal and restorative considerations Dental Traumatology 18(3): 103-115.
- Taguchi CM, Bernardon JK, Zimmermann G, Barattieri LN. Tooth fragment reattachment: a case report. Oper Dent. 2015 May-Jun;40(3):227-34. doi: 10.2341/14-034-T. Epub 2014 Dec 23. PMID: 25535781.
- Kothare SS, Choubey S, Das A. Fragment Reattachment of an Uncomplicated Crown-Root Fracture: A Case Report. J South Asian Assoc Pediatr Dent 2020;3(1):30-33.
- Rinku B Reattachment of fractured tooth using fibre post: A Case Report International Journal of Medical and Health Research 2021; vol 7(2):72-74
- Meiers JC and Kazemi RB. "Chair side replacement of posterior teeth using a prefabricated fiber-reinforced resin composite framework technique: A case report". Journal of Esthetic and Restorative Dentistry 17.6 (2005): 335-342
- Pooja Mehra "Reattachment of Fractured Anterior Tooth: A Case Report." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 2, 2018, pp. 20
- Simonsen RJ. Restoration of fractured central incisor using original tooth fragment. J Am Dent Assoc. 1979;98(1):47-48.
- Dean JA, Avery DR, McDonald RE. dentistry for the child and adolescent 8th ed St. Louis: Mosby;2004p. 242-243.
- Tenerry J.Reattachment of fractured incisor fragment: A case report. Quintessence Int.1988;19(11)
- Fatima S, Rahman Z tooth fragment reattachment: Interim or a Permanent
- Nujella B, Kumari S, V Sujana, Reddy S Reattachment of complicated tooth fracture: An alternative approach Contemp clin dent 2012; 3:1242-4
- Mojirade A, Funmilayo A, Olaide G Reattachment of fractured anterior tooth : A 2 year Review of case IJOPRD 2011;1(2):123-127
- Anand VS, Somasundram U. Management of Crown Fractures by Reattachment with Minimal Intervention Approach. J Oper Dent Endod 2020;5(1):56-61