



Research Paper

## Reattachment of Fractured Tooth Segment in Minimally Invasive Way - A Case Report

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### Abstract

Dental trauma frequently results in coronal fractures of the front teeth. Root canal therapy followed by reattaching the fractured segment with fiber post reinforcement is a viable alternative in cases of complex fractures where the fractured segment is present and there is close approximation of the segment to the intact tooth. Reattaching a fractured piece is a quicker, less involved process that offers immediate relief, better aesthetics, and function restoration. The present case report is of a 11-year-old boy with an uncomplicated crown fracture of permanent maxillary right central incisor and a palatal uncomplicated crown-root fracture of his permanent maxillary left central incisor . The fractured fragment was reattached using nano-filled dual-cure composite resin and tooth restored with composite resin. The fragment showed opaque discoloration that reduced over time but still persisted after 1 year. During the follow-up period, no unfavorable radiographic changes were seen. The prognosis of the teeth was favorable with good esthetic results. Keywords: Fragment reattachment, Fragment rehydration, Periodontal health, Root fracture, Uncomplicated crown.

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### I. INTRODUCTION

The anterior teeth are relatively vulnerable to trauma. According to reports, 37% of trauma cases include the upper central incisors. Traumatic injuries most frequently affect the upper and lower lateral incisors, as well as the upper canines, after maxillary incisors.[1-4] Dental trauma that affects both primary and permanent teeth frequently takes the form of anterior tooth coronal fractures. It significantly affects a patient's social and psychological well-being.[5,6]

Tooth fragment bonding has become more and more popular because of its numerous advantages, including anatomical qualities, color, and surface appearance. It can deliver enduring aesthetics and a positive psychological reaction.[6]The following are some factors that affect how coronal tooth fractures are treated:[7-9]The size of the fracture (biological width, endodontic involvement, alveolar bone fracture).

Traumatic Dental Injuries (TDIs) are frequently seen in children and young adults, comprising 5% of all injuries. TDIs in children in the 5-12 years age group show a high prevalence, with at least 20% - 30% of 12-year-old children experiencing TDIs at least once, with the typical injury being an uncomplicated crown fracture [1]. According to a recent systematic review, the prevalence of TDIs in India range from 1% to 76%, with the maxillary anterior being the most common region. The prevalence of TDIs was found to be 12% for age groups > 6 years.[1,4,6]



**Fig. 1. Preoperative clinical**

One of the ways to manage coronal tooth fractures in cases where there is minimal or no damage to the surrounding periodontium and intact fractured fragment is to reattach the tooth fragment. Reattaching the fragment to the fractured tooth is a conservative approach to achieve optimum aesthetics as the tooth's original shape, colour, and texture are preserved, eliciting a positive psychological response [5,4]. Various studies (cite) have presented evidence of predictable long-term results of fragment reattachment compared to using a direct composite material.[7,8,9]

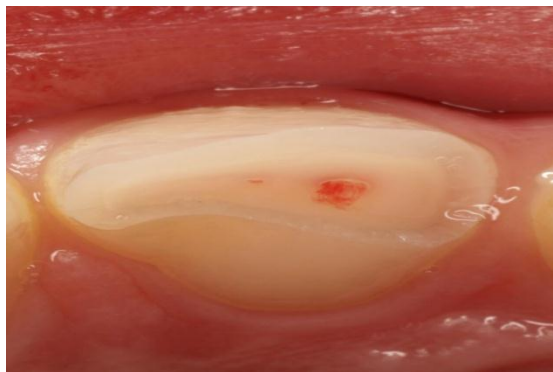


**Fig. 2 - Fractured tooth segment**

Tooth fragment bonding has become popular due to its various advantages such as anatomical features, color, and surface appearance.[10,11] It can furnish positive psychological response and long-lasting aesthetics [12,13]. Bonding is one of the simplest and least expensive procedures, and some dentists describe it as the best method to make corrections of teeth in low bite pressure areas.14,15] This article describes the bonding of tooth fragment in a 10.5-year-old child with no serious breakage or pulp exposure.

### **Case Presentation**

A 11-year-old child presented along with her father after falling down the stairs two days before and having one of her front central tooth broken (#11), as shown in Figure 1. She brought the fragment of the broken tooth (Figure 1) stored in a plastic container in order to get the fragment glued back on the tooth and was complaining tooth sensitivity while exposing to air and drinking.



**Fig. 3; B: Right Buccal view;**

A comprehensive intraoral and radiographical examination (Figure 8 A) was performed to diagnose, locate, and measure the extent of tooth breakage. Clinical examination revealed a class II fracture. It was found that tooth #11 was intact and immobile after fracturing, with no sign of gingival inflammation. A vitality test was conducted to evaluate the blood supply to the tooth, and a sensitivity test (thermal cold test) was performed to assess the sensory response. The outcomes were positive, and a normal response was noticed. (Figure 2,3)

Fragment of tooth #11 was cleaned and checked with the broken tooth in order to ensure that no part was lost. The fragment was in good condition and fit reasonably well on the fractured tooth. However, the perceptible shade difference was observed between the broken tooth and the fragment due to the dehydration of the broken fragment during the last two days. Both the father and daughter were informed about the difference in hue and shade. On their consent to proceed with the reattachment procedure, the fragment was stored in saline (for one hour) until reattached with the tooth. (Figure 3,4)



**Fig. 4 PALATAL VIEW**

Topical and local anesthesia was administered to the patient. Bevels were created on a broken tooth to help in increased retention. The beveling was performed from the palatal as well as the buccal surfaces. Vitrebond was used to fix the retentive holes into the dentin. Next, a self-etching primer was applied for 20 seconds and light-cured according to the manufacturer's instructions. Next, a broken tooth and a fragment were air-dried gently. Dual cure flowable composite with A2 shade was applied on the broken incisal edge of the tooth and the fragment. The fragment was positioned accurately and photopolymerized for 20 seconds each from the labial and palatal sides. After successful completion of the procedure, instructions were given to the father and patient to avoid hard foods (Figure 5,6).



**Fig. 5;** Occlusal view of the cervical limit of the fracture on 11

The patient was recalled for a follow-up after six weeks. A peri-apical radiograph was taken to examine the lamina dura, periodontal ligament space, and bone socket. Vitality of pulp and blood flow was determined by a pulp sensibility test. The findings were positive, and the tooth was functioning normally. (Figure 6,7,8B,9)



**Fig. 6** Postoperative image with reattached tooth fragment in 11

Again, follow-up examinations were carried out at a 18-month interval, and the tooth was functioning normally and esthetic was pleasing (Figure 8B,9,10). The difference in shade had become unnoticeable.

The highest fracture resistance was attained by chemically cured composite, followed by light cured resin, and the lowest by just dentin bonding agent.



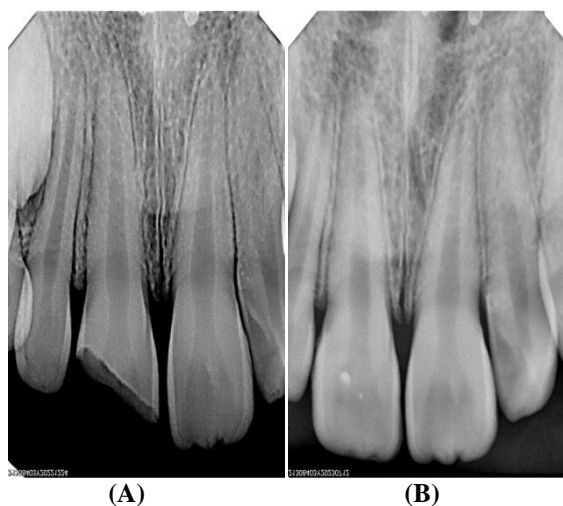
**Fig. 7** Postoperative image with reattached tooth fragment in 11 the same day

## **II. Discussion**

Modern dentistry has become more refined. It has enabled us to do things that were never thought to be possible. In modern dentistry, cosmetic dentistry is gaining widespread popularity as it has assisted in improving the appearance of the teeth, mouth, and smile of a common man.[1,2,15,16]

In the management of any traumatic dental injury, the time elapsed since the injury is crucial in the decision-making process for treatment. In this case, as the time elapsed, since the injury was 15 days old and the patient was already symptomatic, the endodontic management was initiated immediately and fragment reattachment was deferred till the second appointment. This not only allowed for gingival healing following the gingivectomy but also helped prevent any endodontic flare-up with either teeth.[17-19]

Management of a crown–root fracture with subgingival extension is a complex process, but adherence to the IADT guidelines has shown considerable success. However, in this case, the fragment



**Fig. 8 A,B; - Preoperative radiograph and Postoperative radiograph**

reattachment was done according to the guidelines but the tooth was restored with composite resin only and not a post-retained crown as the majority of the crown structure remained on the alveolar segment of the affected tooth and the crown–root ratio was maintained. Furthermore, a composite resin restoration has a favorable subgingival reaction with the formation of junctional epithelium and connective tissues adjacent to subgingival restorative materials in humans. This also provides good adaptability of the reattached fragment to the tooth with favorable esthetics.[20-22]



**Fig. 9 Preoperative clinical after 7 days**

According to Cavalleri and Zerman reattached crown fragments appear to have a better long-term prognosis than composite resin restorations.[23] If the extra-oral time of the fractured fragment increases, dehydration of the fragment can occur. Therefore, it is advised that the fragment be stored in a medium such physiologic saline to avoid this condition. The majority of resin cements and resin-based composite core materials can be joined with fiber- reinforced posts through fabrication.[24]

The location of the fracture, the size of the fracture remnants, the patient's periodontal health, pulpal involvement, the maturity of root formation, biological width invasion, occlusion, and time are all factors that might affect the scope and viability of such restorations. Post-placement serves to hold the coronal section via a friction bond and aid in preventing dislodgment non-axial forces in addition to bonding.[23,25]



**Fig. 10;** Post-Operative Buccal View after 18 months

Various studies have been conducted to study the influence of the bonding system employed on the treatment outcome [4]. Reis et al. [26] concluded that fracture resistance depends on both the materials used and prior preparation, highlighting their equal importance. In contrast, Chazine et al. [9] and Bruschi et al. [25] reported that the outcome was independent of the selection of materials. Hence, there exists a lack of agreement in the literature demonstrating the absence of a defined protocol for reattaching a fractured tooth fragment. We attempted to use a combination of techniques to customise the treatment approach as per the patient-related factors to obtain the best possible outcome. All the techniques have shown optimum results, and one of the key factors in our clinical observation was the importance of early reporting and the pre-treatment of the fragment before reattaching.[27,28]

There are many techniques for reattaching the fragment; however, studies show that the original mechanical strength of the tooth cannot be restored to its full [11]. Nevertheless, it is possible to retain a reattached tooth for a long period of time with some mechanical resistance. Once a broken tooth fragment is bonded back in place, prevention measures should be adopted to avoid tooth trauma.[26,27] (Figure ,1,10)

### **III. Conclusion**

Reattachment of fractured tooth fragments offers a viable restorative option for the clinician because it restores tooth function and esthetics with the use of a very conservative and cost-effective approach. Also provide immediate natural esthetics and functional rehabilitation.

#### **Conflict of interest disclosure**

There are no known conflicts of interest in the publication of this article. The manuscript was read and approved by all authors

#### **Compliance with ethical standards**

Any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

#### **Acknowledgments**

All authors contributed equally to this manuscript

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