

# Tooth Reattachment Case Series: Preserving the Natural Esthetics and SME

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## Abstract

Coronal fractures of the anterior teeth are common sequelae of dental trauma. A fractured anterior tooth requires immediate clinical attention as it not only causes pain but also affects patient socially and psychologically. Complicated crown fracture although less common, pose a greater challenge to the clinician. The main objective while treating such cases is successful pain management and immediate restoration of function and esthetics. There are several treatment modalities for such conditions, one of the alternative for managing such tooth fractures is the reattachment of the dental fragment when the tooth fragment is available and there is no or minimal violation of the biological width. This procedure is economical, less complicated and can provide immediate treatment with better and long-lasting esthetics. It also restores tooth function and provides a positive psychological response as tooth's original anatomic form, color, and surface texture are maintained. Prognosis of the case highly depends on patient cooperation and understanding of the limitations of the treatment. This paper present the immediate management of 3 cases treated endodontically followed by reattachment of the same tooth fragment using glass-fiber reinforced composite post. This re-established the functions and esthetics of the patient in single visit.

*Key Words: Dental health, Tooth, Crown fracture.*

## Introduction

Crown fractures have been defined as fractures of the coronal portion of the tooth involving enamel and dentine [1]. It represents a high proportion of all traumatic injuries to the permanent dentition with most commonly affected tooth being maxillary central incisor due to its vulnerable position in the mouth [2,3]. This often has a severe impact on the social and psychological wellbeing of a patient. Therefore, the primary goal of treatment of fractured crown is aesthetics and functional rehabilitation of the tooth [4].

Treatment planning is based on factors such as: Time interval between the injury and treatment initiation, position and level of fracture, stage of root development, involvement of pulp, availability of fractured tooth fragments, involvement of biologic width, soft-tissue and alveolar bone injury [1,5-7].

With the available materials, techniques and advancements in adhesive dentistry, esthetics treatments have become simpler and predictable [8]. However, a multidisciplinary approach aids in achieving the aforementioned goals. Various treatment approaches have been indicated for fractured teeth including: fragment removal followed by restoration; fragment reattachment; gingivectomy and osteotomy (crown lengthening); orthodontic extrusion with/without gingivoplasty; forced surgical extrusion; vital root submergence; extraction followed by surgical implants or fixed partial denture [9,10]. Many of these techniques are invasive and have certain limitations such as multi-visit appointments, high cost, stabilization (splinting) and less conservative in nature [11]. However, fragment reattachment is preferred and is a viable alternative to conventional approaches as it is a simple, conservative, and economical approach [12]. Chosuck et al. [13] published the first case report on reattachment of a fractured incisor in 1964 in which complicated tooth fracture was managed by endodontic treatment followed by cast post and core. The post and core were fitted to the prepared tooth fragment and then cemented to the remaining tooth structure. It restores tooth function and provides a positive psychological response as tooth's original anatomic form, colour, and surface texture are maintained with a better aesthetic result. Also, the use of natural tooth substance clearly eliminates the problems of differential wear of restorative

material and unmatched shades [13].

The purpose of this article is to report three cases with the immediate management of crown fractures by fragment reattachment.

## Case Presentation

### Case 1

A 30-year-old male patient reported to the Department of Conservative Dentistry and Endodontic with the chief complaint of fracture in upper front tooth after biting on a hard substance. Past dental and medical history was non-contributory. Clinical examination revealed fracture in the maxillary right central incisor extending obliquely i.e. labiopalatally. No pulpal exposure was evident and the fractured segment could be closely adapted to the remaining crown structure. On radiographical examination, intact periodontal ligament space with complete root formation was seen with no signs of root fracture. The patient responded normally to the pulp sensibility testing (both heat and cold test). On wedging test, no movement of fractured segment was significant.

The rebounding procedure was explained to the patient and informed consent was obtained. The 37% Phosphoric acid was applied for 15 seconds as etchant, rinsed for 10 s and air dried. Caution was taken not to desiccate the surfaces. Later two coats of adhesive were applied using applicator tip for-10 seconds and light cured for 10 seconds. This was followed by introduction of flowable composite resin using intracanal tip and cured for rebounding. Finishing and polishing were done using diamond stones and a composite polishing kit.

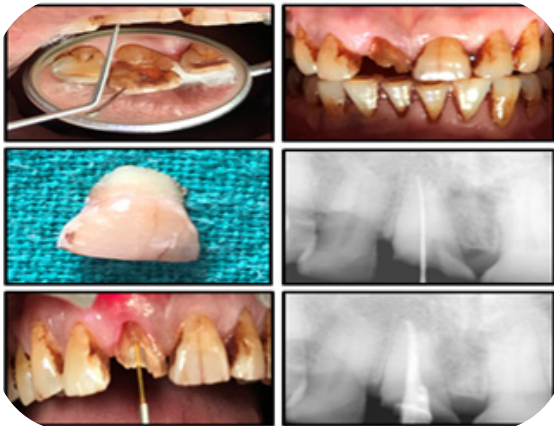
The patient again reported after 2 weeks with the same chief complaint. On clinical examination, fractured maxillary right central incisor extending obliquely-i.e. Labiopalatally was evident with no pulpal exposure. The fractured segment could be closely adapted to the remaining crown structure. The radiographs revealed intact periodontal ligament space with no signs of root fracture. The patient gave delayed response to the pulp sensibility testing (both heat and cold test). On wedging test, significant mobility of fractured buccal segment extending below CEJ was observed.

So, the decision of removal of fractured segment was taken

before any definitive treatment planning.

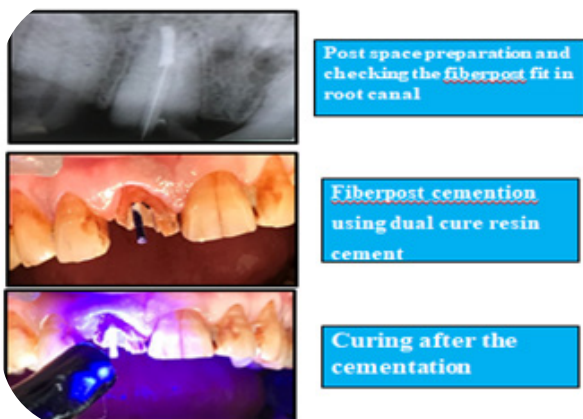
After local anaesthesia administration, the fractured segment was removed and stored in saline. Treatment plan of single-visit root canal treatment followed by reattachment of the fractured segment using a fiber post as reinforcement was formulated. The procedure was explained to the patient and informed consent was obtained.

The coronal access cavity was prepared under magnification and working length was established 1 mm short of the apex with #50 k file (IAF). The canal was enlarged with hand instruments till size #60 followed by circumferential filling technique followed by canal disinfection using diode laser. Obturation was done with gutta-percha and resin based sealer (AH Plus root canal sealer) using lateral compaction technique (Figure 1).



**Figure 1:** Obturation was done with gutta-percha and resin based sealer using lateral compaction technique.

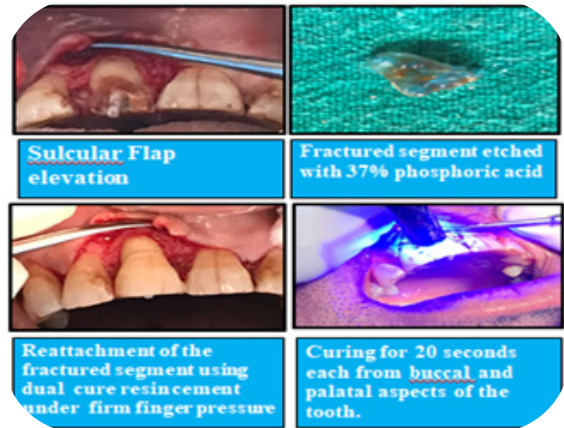
Later, heated plugger was used to remove the gutta percha, leaving 6 mm of the apical seal. Post space was prepared using peeso reamers #3 and corresponding fiber post (size#1 Reforpost, Angelus, Londrina, PR, Brazil) was checked for the fit and the desired length was cropped. The coronal portion of the post was marked and an additional internal groove was prepared within the dentine of the fractured fragment part. The post was later cleaned with alcohol. Further, the root canal space was filled with the self-adhesive resin cement (RelyX U200, 3 M ESPE, and Germany) using an intracanal mixing tip and the post was seated. The excess resin cement was removed, and the remaining cement was photoactivated for 20 seconds to ensure adequate polymerization of the cement (Figure 2).



**Figure 2:** Treatment plan of single-visit root canal treatment followed by reattachment of the fractured segment using a fiber post as reinforcement was formulated.

After post cementation, sulcular flap was raised until the fracture site was completely exposed. The tooth was cleaned

with the microbrush and checked for the fit and adaptation. After attaining adequate isolation, reattachments of the fractured segment using self-adhesive resin cement (RelyX U200, 3 M ESPE, Germany) under firm finger pressure. Light activation for 20 seconds was done from buccal and palatal aspects of the tooth. This was followed by flap repositioning and sutured. Finishing and polishing was done. Patient was recalled after 7 days of surgery for suture removal (Figure 3).



**Figure 3:** This was followed by flap repositioning and sutured.

At 1 year follow-up, the tooth showed acceptable results both clinically and radiographically with perfect adaptation. No morphological changes of the direct restorations or marginal discoloration were evident (Figure 4).



**Figure 4:** The tooth showed acceptable results both clinically and radiographically with perfect adaptation.

**Case 2**

A 24-year-old male patient injured in a road traffic accident reported to the department of Conservative-Dentistry and endodontic with the chief complaint of pain and broken upper front tooth following trauma a day ago. Past dental and medical history was not relevant.

On clinical examination, upper left canine had horizontal fracture line in the middle third of the tooth involving enamel, dentin and pulp. The fragment was mobile and loosely attached to the crown. No trauma to the soft tissues was observed. The tooth was sensitive on percussion. Upper left central incisor and lateral incisor also had fracture of incisal third of crown.

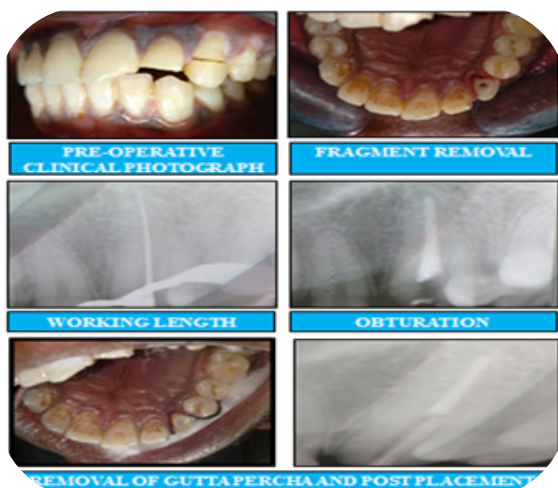
Patient responded normally to the cold and heat sensitivity test. On radiographic examination, horizontal fracture line was observed. Root formation was complete with intact periodontal ligament space. No evidence of intrusion or extrusion injuries was seen.

A diagnosis of complicated crown fracture in relation to the left

maxillary canine (Elli's class 3) was made. A treatment plan was formulated to root canal treatment followed by reattachment of the same tooth fragment using glass-fiber reinforced post in single visit.

After informed consent, Local anesthesia was administered (Lignocaine 2%). Fracture segment was completely removed with minimal force followed by disinfection with 2% chlorhexidine and preserved in physiological saline solution.

Endodontic treatment was carried out routinely as case 1.6 mm of gutta percha was removed from the coronal part of the root canal using heated plugger and post space was prepared using peeso reamer till size [3]. A corresponding prefabricated fiber reinforced post (size 1, Reforpost) was selected and cemented into the canal using self-adhesive resin cement (RelyX U200). Retentive hole was prepared in the fragment to accommodate the head of the post (Figure 5).



**Figure 5:** A corresponding prefabricated fiber reinforced post (size 1, Reforpost) was selected and cemented into the canal using self-adhesive resin cement (RelyX U200).

An Enamel bevel was prepared all around the remaining tooth structure as well as the fractured margin of the segment and the fractured margin was approximated to check its fit. Both the fragments and teeth were etched using 37% phosphoric acid for 30 seconds and rinsed. Adhesive agent was applied and distributed evenly using a mild air blast from a three way syringe. The bonding surface and pulp cavity was loaded with flowable composite and firm pressure was applied to the coronal fragment to closely oppose it to the tooth. It was then light cured for 40 sec. Finishing and polishing of the restoration were carried out and the occlusion was checked. Postoperative instructions were given and patient was recalled after 24 hr for check-up. The case has been under review for 10 months and the esthetics and function seems satisfactory (Figure 6).



**Figure 6:** Retentive hole was prepared in the fragment to accommodate the head of the post.

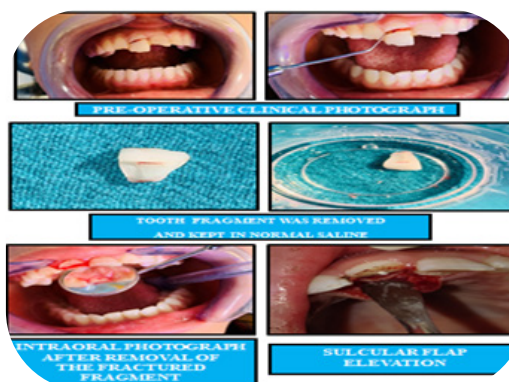
**Case 3**

A 18 year's old female patient reported with a chief complaint of severe pain and a broken front tooth region after an accident in the morning of the same day.

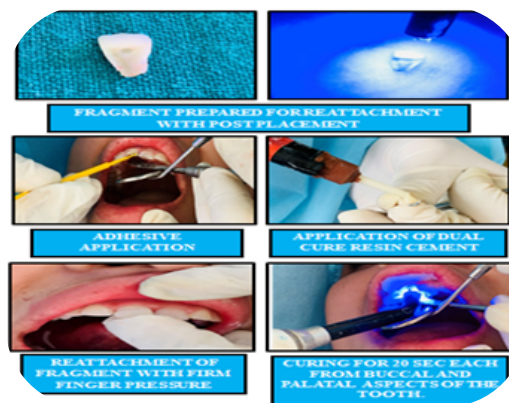
Clinical examination revealed a complicated fracture I.R.T-11 (Interactive Response Technology), with a fracture line running obliquely from the gingival third of the tooth on the labial aspect to subgingivally palatally and the fractured fragment still held by the palatal tissues. Ellis class II fracture of 21 was also noted. No significant hard or soft tissue injury other than tooth fracture was observed.

A radiograph indicated complete root formation and a closed Apex with no periapical radiolucency and no root fracture. Medical history was non-contributory

As the clinical situation was similar to the above cases, single visit root canal followed by reattachment was planned in a similar manner with respect to 11 and composite build up was performed on 21 (Figures 7 and 8).



**Figure 7:** Pre-operative clinical photography.



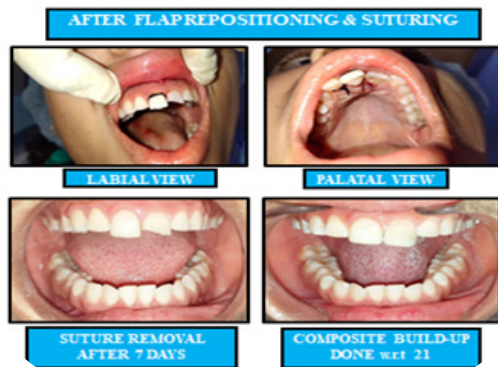
**Figure 8:** The clinical situation was similar to the above cases.

The patient was recalled for follow-up after 1 year, and the tooth was in normal function and esthetics and the patient was satisfied (Figure 9).

**Discussion**

The treatment modality chosen mainly depends upon the extent and location of the fracture [1]. If the clinician is able to retrieve a closely adapting fractured segment, reattachment of the segment should be the first preference. But it carries the possibility of detachment of the fragment as the resistance to fracture gained after reattachment is only 50–60% that of intact tooth. The longevity of this procedure is unpredictable. The success of reattachment depends on the hydration of the fractured fragment while outside the oral cavity [11]. In all the reported cases, once the fractured coronal segment was separated, hydration was ensured in sterile isotonic saline.





**Figure 9:** Final photography.

The segment reattachment technique has been widely accepted with the development of composites and resin adhesives. This technique requires only a thin layer of composite resin and restores the original form and color of the tooth that often provides the best aesthetic result [14].

Use of a fiber post luted with resin cements increases the retention of the segment by providing a monoblock effect and a multilayered structure with no inherent weak interlayer interfaces [15]. This helps in stress distribution to remaining radicular dentin, achieving higher bond strengths of the fractured segments with minimal inclusion of air voids [16,17]. Dual curing resin cement was used to allow polymerization even in those areas which would otherwise have left uncured due to the inability of light to reach in deeper areas. Resin based sealer was used to obturate the tooth planned for restoration with glass fiber posts as eugenol based sealers may inhibit the set of resin cements [18].

The reattachment procedure is straightforward if the fracture line is supragingival. However, when the fracture site is intraosseous or subgingival, electrosurgery, elevation of tissue flap, orthodontic extrusion with a post retained crown, clinical crown lengthening surgery with removal of alveolar bone, and removal of gingival overgrowth for access to the fractured site are all viable methods for bonding fractured component [19].

However, in first case, with minimal biologic width invasion, it was manageable to restore the biologic width by itself under assiduous plaque control. No osteotomy procedure was necessary. The advantage of the technique used is that the physiological periodontal attachment is restored and preserves the alveolar bone integrity.

In the second and third case, the favorable clinical outcome may have been a result of good adaptation of the fragment, associated with the sealing effect of the restorative material used and the proper fit and contour of the margin.

### Conclusion

- With the materials available today, in conjunction with an appropriate technique, esthetic results can be achieved with predictable outcomes.
- Thus, the reattachment of a tooth fragment is a viable technique that restores function and esthetics with a very conservative approach, and it should be considered when treating patients with coronal fractures of the anterior teeth, especially younger patients.

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