



RESTORATIVE STRATEGIES FOR TOOTH FRACTURE : INTEGRATION OF FIBER POSTS & FRAGMENT REATTACHMENT FOR AESTHETIC ENHANCEMENT

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ABSTRACT Effective management of anterior tooth fractures is essential not only for the restoration of function and esthetics but also for the psychological well-being of the patient. With advancements in adhesive dentistry, reattachment of the patient's original tooth fragment has become a highly conservative and preferred approach. This technique allows for the preservation of natural dental anatomy, color, and translucency while enabling rapid functional and esthetic rehabilitation with minimal loss of tooth structure. This case highlights the clinical efficacy of fragment reattachment combined with fiber post reinforcement in restoring esthetics, function, and patient confidence in a conservative and time-efficient manner.

KEYWORDS : Fragment reattachment, dental trauma, Glass fiber post, Dual cure resin

INTRODUCTION

Fracture of an anterior tooth is a common dental emergency, particularly in children and young adults, and requires prompt intervention. If left untreated, such injuries may lead to pulpal and periapical complications, and can have a significant psychological impact on the patient due to impaired esthetics and delayed treatment outcomes.¹

The primary goal in managing these cases is the prompt restoration of esthetics and function, which also helps improve the patient's emotional well-being and self-esteem.²

Treatment planning for anterior tooth fractures is a multifactorial process. These include the extent and location of the fracture line, involvement of the pulp, restorability of the remaining tooth structure, injury to adjacent teeth or soft tissues, availability and condition of the fractured fragment, occlusion, esthetic demands, financial considerations, and the patient's age.³

Based on pulpal involvement, crown fractures are classified into complicated (involving the pulp) and uncomplicated (no pulpal exposure) fractures.⁴

Traditionally, treatment modalities for fractured anterior teeth have included composite restorations, laminate veneers, crowns, and post-and-core supported prosthesis. While effective, these methods are often invasive, time-consuming, and compromise healthy tooth structure.⁵

When the fractured tooth fragment is available and in good condition, fragment reattachment presents a highly conservative and biologically favourable treatment option. This technique supports the principles of "minimal intervention" and "biological restoration," preserving natural esthetics, surface texture, incisal translucency, and occlusal relationships while maintaining original tooth morphology.⁶

The use of glass fiber-reinforced posts, luted with resin cement, not only enhances retention of the fractured segment but also provides a monoblock effect. This improves stress distribution and reinforces the restored tooth, making it more resistant to future fracture.⁷

This case report presents the successful management of a complicated crown fracture in an anterior tooth using a conservative reattachment technique reinforced with a glass fiber post, demonstrating the clinical practicality and esthetic advantages of this approach.

Case Report

A 27-year-old female patient presented to the department of conservative dentistry and endodontics, with a coronal fracture of the maxillary left central incisor caused by accidental fall at home 2 days

before. Clinical examination revealed an oblique crown fracture on #21 extended from cervical 3rd of crown on labial aspect to 2 mm sub-gingivally on lingual aspect. Periapical radiographs revealed an intact periodontal ligament space, complete root formation, and no root fracture in relation to tooth #21. (Figure 1) The probing depth was normal and the teeth had no associated soft tissue injuries. A diagnosis of complicated crown fracture with respect to maxillary left central incisor was established. The patient's medical history was noncontributory. All the treatment options were thoroughly explained, and the patient agreed to proceed with the evaluation of fractured fragment followed by reattachment procedure. Informed consent was obtained. Local anesthetic using 2% lidocaine and 1:80,000 adrenaline was given and the fractured segment in relation to #21 was atraumatically removed. The tooth fragment was thoroughly rinsed with 2% chlorhexidine to remove any pulpal tissue and then stored in normal saline to prevent discoloration and dehydration.



Fig 1: Pre-Operative Presentation wrt 21

Single-visit endodontic therapy was planned. Root canal treatment was carried out and obturation was done by using sectional method maintaining 5 mm apical seal. Post space was prepared using peeso reamers #3 and #4. The 1.3 diameter post (Angelus, REFORPOST, Londrina, Brazil) was tried in the canal and adjusted to the desired length. A groove was prepared on the palatal side of the fractured fragment using a round bur corresponding to the length and the diameter of the fiber post.

The alignment of the coronal fragment was verified with the post in place. After preparing the post space with peeso reamer, etching of the root canal of the fractured tooth and fiber post with 37% orthophosphoric acid gel was done for 15 sec. It was then rinsed and dried. Acid etching was also applied on the fragment for 15s, and then it was thoroughly rinsed and dried using cotton pellet. Following this ParaBond Non-Rinse Conditioner was dispensed into the mixing well and applied into the prepared post space with a brush and then was dried using a gentle stream of air for 2sec. Following this, one drop of Parabond Adhesive A was mixed with one drop Adhesive B into the mixing well and then mixed adhesive components were applied into the prepared post space preparation of the root canal and dried using a gentle stream of air for 2sec. Root canal post space was completely coated with the mixed Paracore material and the post was inserted into

the root canal using gentle pressure. Excess ParaCore material was removed using the proper instrumentation followed by light curing for 30sec.

At the end, occlusion was checked, and postoperative instructions were given to the patient. Immediate post-operative radiograph was taken. Clinical and radiographic examinations were carried out after six months. (Figure 2)

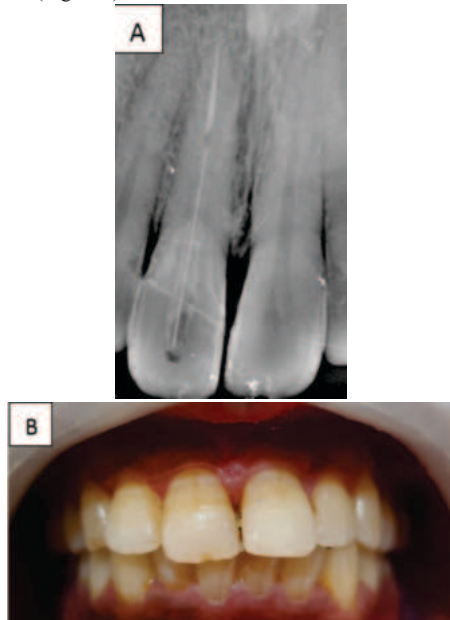


Fig 2: Post-Operative Presentation; A: Post-Operative IOPA wrt 21 - RCT; B: Post Operative Frontal view

DISCUSSION

When compared to other procedures, such as partial and full coverage crowns, laminate veneers, and composite resins, tooth fragment reattachment is a more conservative, affordable, and less time-consuming treatment option.⁸

The type of treatment depends on pulp vitality and the stage of root development or resorption. In complicated fractures, RCT followed by reattachment of the fractured segment with fiber post reinforcement is a feasible option.⁹

First described by Chosack and Eidelman in 1964, restoration of fractured teeth using the dental fragment offers a fine way to reinstate the natural shape, contour, surface texture, occlusal alignment, and colour of the fragment.¹⁰

A wide variety of treatment protocols are available for reattachment procedures. Some authors prefer tooth preparation in the form of external chamfering, over contouring, or internal dentinal groove before bonding to aid in retention.¹¹

Recent case series by Gogoi et al. (2023)³ and Kallel et al. (2021)¹² reaffirm the value of fragment reattachment emphasizing that preserving the patient's original tooth anatomy not only improves esthetics but also supports emotional well-being after trauma. Lakshmaiah et al. (2023)² and Sucharita et al. (2021)⁸ emphasized a minimally invasive philosophy in managing crown fractures, advocating fragment reattachment as a biologically respectful alternative to full-coverage restorations. They also noted the importance of proper case selection and hydration of the fragment.

Kumari et al. (2012)¹³ highlighted that fragment reattachment offers an immediate esthetic solution with psychological benefits, due to the preservation of natural form, texture, and color. Another important consideration is the rehydration of the fractured fragment. Hydration of the tooth fragment helps maintain the original aesthetic appearance and prevents the desiccation of the collagen fibrils and network. A dehydrated fragment will exhibit decreased bond strength, fracture resistance, and poor translucency.

A study by Farik et al. ¹⁴ observed a significant decrease in strength and

fracture resistance when the dry time is more than one hour, highlighting the importance of keeping the fragment moist.

In the present case, a conservative approach was adopted and the fractured fragments were reattached with the use of post for retention. Post provides excellent retention with long-term stability of the restored portion, no tooth preparation was performed to conserve the tooth structure, prevent the difference in color perception between tooth and composite resin, and allow adequate adaptation of the fragments. According to a recent systematic review by Poubel et al.¹¹ simple tooth fragment reattachment is the preferred reattachment technique, due to its ease of execution and tissue preservation.

Finally, to ensure the restoration longevity, the fiber length in the root must be superior to that in the crown. The part exceeding the root should therefore be totally exploited to penetrate the fragment while keeping it away from occlusal stress.⁴

CONCLUSIONS

In conclusion, tooth fragment reattachment—especially when combined with root canal treatment and fiber post reinforcement in complicated fractures—provides a functional, esthetic, and biologically acceptable solution. It represents a valuable treatment modality that aligns with the principles of modern conservative dentistry.

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