Reattachment of Fractured Tooth-Series of 2 Case Reports

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Abstract

Most common consequences of trauma is the crown fracture, mainly maxillary anterior tooth due to its forward positioning in the arch. Understanding the outcome of the planned treatment gives an idea regarding the prognosis of that particular treatment. Various options are available for the treatment of fractured tooth. Among all reattachment of fractured coronal segment to that tooth provides instant esthetic, as it restores the original form, colour, contour, surface texture and also gives a psychological comfort to the patient. This clinical case report focuses on the successful reattachment of two fractured coronal crowns using glass-fibre reinforced composite post. Since, both of the fractured teeth were of complex type, endodontic treatment was performed for both of the cases. At the end, a natural-looking restoration is achieved.

Keywords: *Crown fracture; Fractured coronal segment reattachment; Glass-fibre reinforced Composite post; Natural-looking restoration.*

Introduction

Fractures of the coronal portion of anterior teeth are most common during trauma. Esthetic discrepancy due to fractured tooth may induce psychological distress to the patient. Retaining the natural tooth with the same quality and function is a challenge in the field of dentistry. Prognosis of fractured tooth also depends on the position of crack line. More apically the split of the tooth extends, poor is the prognosis of that particular tooth. Due to the lack of ability to explore and to seal the fracture line in splitted tooth, prognosis of the split tooth mainly anterior is considered as poor.[1] Out of all trauma to the dental hard tissue, coronal fracture of anterior tooth represents 18-22%, 28-44% are simple fracture (involves enamel and dentin), 11-15% are of complex fracture (involves enamel, dentin and pulp).[2] From which maxillary central incisors involves 96%, because of its position in the arch.[3]

Ideally, the broken part of the tooth should be restored with composites. Since colour mismatch, periodical wear and staining are the major drawback of composite, it would better to restore the tooth with its fragment, if the fractured segment is available, as it provides good and long term esthetics. Additionally reattachment permits restoration of the particular tooth with very minimal sacrifice of the remaining tooth structure. In case of complex fracture, endodontic treatment is required along with it post placement is required in some cases. Many other treatment alternatives are available for fractured tooth-like: orthodontic extrusion, flap surgery, crown lengthening, composite restoration, ceramic crown, etc. Few authors have shown that reattachment of fractured tooth provides, immediate esthetic (same colour, contour and surface texture), maintains occlusal function, provides excellent time management and also cost-effective than any other treatment.[4]

This article will discuss about two coronal fractured anterior teeth and their treatment using reattachment of the fractured segment.

Case Report 1: A 24-year-old patient named Deepu Prasad Sahoo reported to the department of conservative

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dentistry and endodontics, Institute of dental sciences, S'O'A University, Bhubaneswar, with the chief complain of pain and mobility of the upper front tooth. He gave the history of trauma due to fall from the bike before 2 days and immediately after the accident, fracture of the coronal segment of upper left incisor had occurred. On extraoral examination, no laceration of soft tissue or swelling was found. On intraoral examination, Ellis class III fracture was seen with the tooth 21. Fracture was of oblique type extending from the gingival third of labial surface to the level of CEJ in the lingual surface (Figure 1a, b). Radiographic examination confirmed the same (Figure1c).

After administration of local anaesthesia (2% lignocaine and adrenaline 1:200,000; Lox, Neon Laboratories, Mumbai, India), affected tooth and adjacent teeth were isolated with a rubber dam (Hygienic Dental Dam, Coltene Whaledent Inc., Germany). Fracture segment is carefully removed from the affected tooth (Figure1d) and was stored in a physiologic saline solution. Single sitting root canal treatment was performed for the tooth 21 along with sectional obturation (Figure2). Post space is prepared and the appropriate size of fibre post (Angelus, Londrina, PR, Brazil)was checked for the proper fit. In the centre of the separated fragment, a trough was created. Post size was adjusted in such a way that, it would fit properly into the trough. That means when the post is placed inside the canal, the emerging part of the post should adequately fit into the created trough when the broken fragment was attached to its original position of the tooth.

Dual cure luting cement (Para core resin cement, Coltene, Whaldent).was used for luting. Etching and bonding of both the root canal space and separated segment was done according to manufacture's instructions. Luting dual-cure cement was placed inside the root canal space and in the fractured segment. One coat of luting cement was also coated along the fibre post and was inserted into the root canal space and soon after this, the broken fragment was attached to the tooth and slight pressure was applied to tightly bind the fractured segment to the intact portion of the tooth (Figure2). Excess cement was removed at the whole tooth was light-cured (Figure 8, 9). Finishing and polishing of the complete tooth was done.

Figure 1a, b: Fracture was of oblique type extending from the gingival third of labial surface to the level of CEJ in the lingual surface; c. Radiographic examinationd. Removal of fractured segment

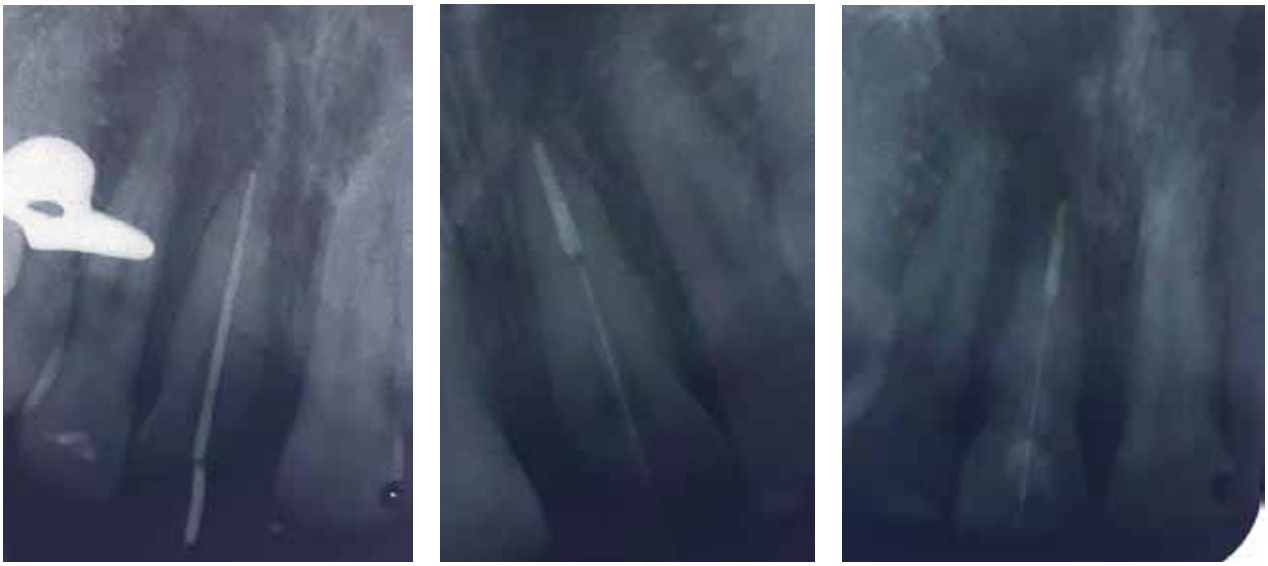

Figure 2. Post treatment radiographic examinations

Figure 3a, b. Reattchement of fractured segment 1

Case Report 2: Another patient named Sunil Biswal visited to the department of conservative dentistry & endodontics, Institute of dental sciences, S'O'A University, following trauma with fracture and pulpal exposure in the coronal segment of the right lower lateral incisor. No visualized trauma was seen in the intraoral and extraoral soft tissue regions. On clinical (Figure4a) and radiographic examination (Figure 4b), Ellis class III # was seen. Fracture line was of horizontal type involving gingival 3 rd of both the facial and lingual surface irt 42. Similarly, after administration of local anaesthesia (2% lignocaine and adrenaline 1:200,000; Lox, Neon Laboratories, Mumbai, India), fracture segment was carefully removed (Figure 4c) and stored in physiologic saline solutions. Complete root canal treatment was done for that particular tooth with MC selection (Figure 4d). Etching, bonding was done for the root canal space and intact coronal portion of the clinical crown and also in the fractured portion of the crown as per manufacturer's instructions. A fibre post (Angelus, Londrina, PR, Brazil) was placed exactly in the same manner as described in the previous case. Reattachment of fractured segment was done with the help of the fibre post (Figure 4e, f).

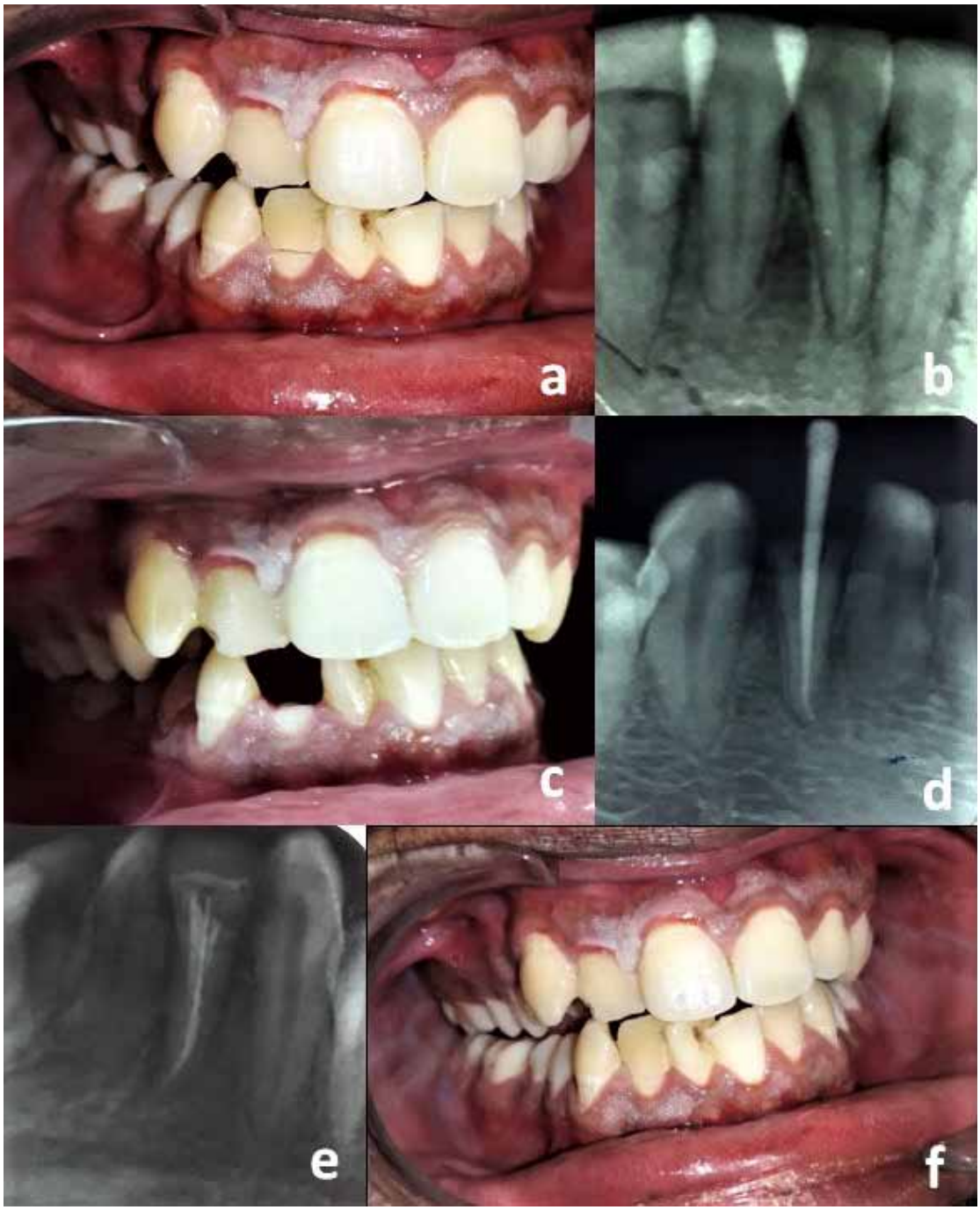

Figure 4a. Clinical examination; b. radiographic examination c. removal of fractured segment; d. complete root canal treatment; e, f. reattachment of fracture segment

Discussion

Treatment and prognosis of the fractured tooth depends on many factors like, patients age and habits, the thickness of enamel available for bonding, the property of the dentinal tubules in the young patients (wideness & wetness), size and thickness of fractured fragment for adhesion, bacterial contamination of the dentin and pulp.[5] A genuine dental treatment after trauma is a challenge for preventing the psychological & biological impacts.[6] According to many authors, reattachment provides an excellent result for the management of the anterior fractured tooth as it maintains the original colour, contour, translucency, surface texture, function

and occlusal alignment.[7-9] Clinicians follow many technical varieties for the reattachment of the fractured segment. The treatment options executed by the authors in the last 10 years case reports on- the reattachment of the fractured segment of anterior tooth,those were published in various journals (Table no. 1).

Table 1. Few case reports on reattachment of fractured segment of anterior tooth, those were published in various journals in last 10 years.

Type of fracture	Treatment followed	Reference
Case 1- Mid root fracture with grade III mobility. Case 2- Mid root fracture with grade III mobility.	Apical fractured segment was extracted and titanium endodontic implant was placed to preserve the natural tooth. Coronal segment was removed. The apical plug of MTA (open apex) with sectional obturation in the intact radicular portion. Reattachment of the coronal segment was done by fibre post.	10
Ellis class III fracture in both central and lateral incisors	Root canal treatment was done for both the teeth. Post space prepared in intact portion of the tooth. Fibre post were bonded to the fractured fragment and the whole thing was reattached to the intact tooth with dual-cure resin cement.	11
Crown-root fracture at the subgingival level with grade III mobility of fractured segment	1st line of treatment was Subgingival exposure of the fracture line. Root canal treatment was done followed by fibre post-placement along with GIC luting cement (Fuji II, GC International, Tokyo, Japan) for the reattachment of the fractured segment.	12
Two fractures in a single tooth- Ellis class III fracture (fractured segment was missing) and other line was on palatalside extending subgingivally.	Palatal fractured segment was first fixed to its original position with the help of composite resin followed by root canal treatment. 2mm post space was prepared and the composite resin was acted like a post and the rest of the tooth was build-up with composite resin.	13
Ellis class III fracture violating the biological width, where the fracture was extended upto the level of gingival in the labial aspect.	Osteoplasty and gingival recontouring were done to maintain the biological width. After root canal treatment post space is prepared. A hole was created on the fractured segment to fit the post and reattachment was done with the fibre post along with dual-cure composite bonding (Embrace WetBond, Pulpdent, USA).	14
Case 1- Ellis class III fracture at the cervical 3rd of crown. Case 2- Ellis class III fracture	Root canal treatment with fibre post for the intact portion of the tooth. Box like preparation was done on the fracture segment was reattached with the help of nanohybrid composite. Same as the previous one	15
Complicated Ellis class III fracture with mobile fractured segment	Root canal treatment of affected tooth followed by reattachment using composite resin.	16
Ellis class III fracture	Root canal treatment followed by post space preparation. Fractured fragment was prepared to receive the post which was 2 mm beyond the intact tooth surface after placement. Rest was built with a composite restoration.	17
Ellis class III fracture at the cervical 3rd level	Following root canal treatment reattachment was done with the help of fibre post and dual-cure resin cement (Para core resin cement, Coltene, Whaldent).	18
Ellis class III fracture involving middle 3rd of crown.	Root canal treatment followed by fracture segment reattachment with the help of flowable composite resin	19
Case 1- Ellis class III fracture at the cervical level and extended 2 mm subgingivally on the lingual aspect.	Case 1-Root canal treatment done followed by fibre post. Ginvial flap was raised to expose the fracture line. Fracture segment was reattached by preparing the segment to receive the coronal portion of the fibre post. Bonding was done by dual-cure cement.	20
Ellis class III fracture involving subgingival area on the palatal aspect.	Root canal treatment was done. The palatal gingival flap was raised to access the fracture line. Reattachment was done with the help of fibre post and dual-cure resin cement.	21
Split tooth involving the pulp with the loss of coronal tooth structure. Platally the fracture line was extended below CEJ.	Root canal treatment along with fibre placement was done for the tooth. Then the whole tooth was extracted and the fractured fragment was reattached to the tooth with the help of dual-cure resin. Tooth was repositioned back to its original position within 15.03 min and stabilized with fibre post and composite for 4 weeks.	22

Use of natural tooth to replace the missing part of the tooth structure eliminates the problem of shade mismatch and wear of restorative material. Additionally it provides fluorescence, opalescence and translucency. It was reported that reattachment of crown fragment provides long term prognosis than the composite restoration.[23] Amir *et al* reported there is no need of additional preparation over the tooth for retention purpose if the tooth is endodontically treated because; the space provided by the pulp chamber is enough to provide inner reinforcement.[24] Damaged tooth requires post-placement to retain the core, especially when more than half of the tooth structure is lost. Fibre post is mainly preferred by the clinicians because they are tooth coloured, has a modulus of elasticity similar to that of dentin, bonds to the tooth and have high fracture resistance. Fibre post along with the dual-cure adhesive creates a monobloc. Additionally, fibre post distributes the stress to the remaining radicular dentin. Resin luting cement provides good bond strength to the tooth. It has been suggested that surgery should be performed in those cases where the fracture line violates the biological width. Minimum of osteoplasty and osteotomy should be performed.[25] As described by authors from the above-mentioned table fibre post is the treatment of choice if the tooth is badly broken and it showed excellent result. Studies have shown that fracture resistance obtained from the intact tooth is greater than any other alternative technique and materials.[26,27] At the same time, the amount of strength required to maintain the function of the reattached fragment for long term use is not known. Bonding of post to the tooth structure increases the prognosis of the tooth by enhancing the post retention as well as reinforcing the tooth structure.[28] Overall resin-based adhesive along with the tooth coloured fibre post serves good esthetics, bonding and modulus between post and resin-based adhesives. Lastly, from the above discussion, we can say fractured anterior tooth can be successfully treated by using fibre post with the dual-cure resin cement.

Conclusion

Though various treatment options are available to treat the fractured tooth restoring the tooth by reattachment of the fractured segment is simple, economic and also provides good esthetics, translucency, contour, surface texture and function with a very conservative approach, most importantly patient's satisfaction.

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