

Management Of Complicated Coronal Fracture By Reattachment Using Minimal Intervention**Technique- A Case Report**

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Abstract

Coronal fractures of the anterior teeth are a common form of dental trauma that mainly affects children and adolescents. The main objective while treating such cases is successful pain management and immediate restoration of function, esthetics and phonetics. Since the development of adhesive dentistry, there are several treatment modalities for such condition, one of which is the reattachment of fractured fragment itself. Reattachment of fractured fragment provides immediate treatment with better esthetics, restoration of function, cost- effective and is a faster and less complicated procedure. The procedure provides good and long-lasting esthetics, because the original morphology, color, and surface texture are preserved. This manuscript reports management of complicated crown fracture in a young

adult that was successfully treated by reattachment technique.

Keywords

Fragment reattachment, complicated fracture, Trauma, Fiber post, endodontically treated.

Introduction

Trauma of the oral and maxillofacial region occurs frequently and comprises 5% of all injuries for which people seek dental treatment. Among all facial injuries, dental injuries are the most common, of which crown fractures and luxations occur most frequently.^[1] The majority of dental injuries involves the anterior teeth, especially the maxillary incisors (because of its position in the arch), whereas the mandibular central incisors and the maxillary lateral incisors are less frequently involved.^[2]

Coronal fractures of the anterior teeth are a common form of dental trauma that mainly affects children and adolescents.^[3, 4]

The coronal fractures are classified according to WHO into uncomplicated crown fractures, such as enamel and dentin fractures and complicated crown fractures that associated with pulp and/or periodontal involvement.^[3] The uncomplicated and complicated crown fractures in children's teeth caused by trauma represent approximately 28–44 and 11–15%, respectively.^[5] It is estimated that a quarter of the population suffers from a minimum of one dental traumatic injury related to coronal fractures of the anterior teeth before the age of 18 years, the most common of which are attributed to falls, high - impact sports, and motor vehicle accidents.^[2,6]

Several factors influence the management of coronal tooth fractures, including extent of fracture (biological width violation, endodontic involvement, alveolar bone fracture), pattern of fracture and restorability of fractured tooth (associated root fracture), secondary trauma injuries (soft tissue status), presence/absence of fractured tooth fragment and its condition for use (fit between fragment and the remaining tooth structure), occlusion, esthetics, finances, and prognosis.^[7, 8, 9]

Coronal fractures must be approached in a systematic way to achieve a successful restoration.^[10] Various treatment modalities are available for management of fractured anterior teeth. Conventionally, composite restorations and post-and-core supported prosthesis are the most commonly used modalities.^[11] If the fractured tooth fragment is available, reattachment of the fragment is the most conservative option for restoration of such tooth. It involves the “*minimal intervention*” and “*biological restoration*”

concept, which aims to achieve maximum preservation of the natural tooth structure and esthetics.^[12] This technique was first reported by Chosack and Eildeman, where they treated the complicated crown fracture by root canal therapy and subsequently, cast post and core. Use of acid-etch technique for reattachment was reported by Tannery.^[13]

This case reports describes management of complicated crown fracture of maxillary incisor by reattachment of the fractured tooth fragment using glass fiber post to improve the retention.

Case Report

A 19 year old male patient presented to the Department of Conservative dentistry and Endodontics two days after sustaining trauma and complained of mobile and broken teeth due to fall from bike. Clinical examination revealed a complicated crown fracture of the maxillary left central incisor and uncomplicated fracture of maxillary right central incisor. The fracture line of 21 was supragingival on the labial side and palatal side. The fractured fragment of 21 was incompletely separated and mobile. Palatal gingiva and interdental papilla were neither inflamed nor edematous. Evaluation of periodontal status of the patient revealed the absence of periodontitis. The intraoral periapical radiograph showed the fracture line. There was no evidence of periapical pathosis No significant hard or soft tissue injury other than tooth fracture was observed.

On examination, the treatment options were presented to the patient including endodontic treatment for 11 and 21 in addition, adhesive reattachment of the coronal fractured fragment to the remaining tooth structure was planned for 21, to be followed by composite restoration of 11. To improve the tooth resistance and expand the bonding areas involved in the adhesive

reattachment technique, placement of a translucent glass fiber post was also planned with 21. The patient accepted the treatment plan.

After administering local anesthesia the fractured part was carefully removed using a forceps without incurring any damage. The extent of fracture was confirmed on fragment removal. The surface of fragment and pulp chamber was debrided and cleaned. The fragment was preserved in saline until reattachment to avoid discoloration and dehydration. Since the patient reported 2 days after the trauma, preservation of the tooth vitality was not feasible. Hence, Root canal treatment was performed with 11, 21.

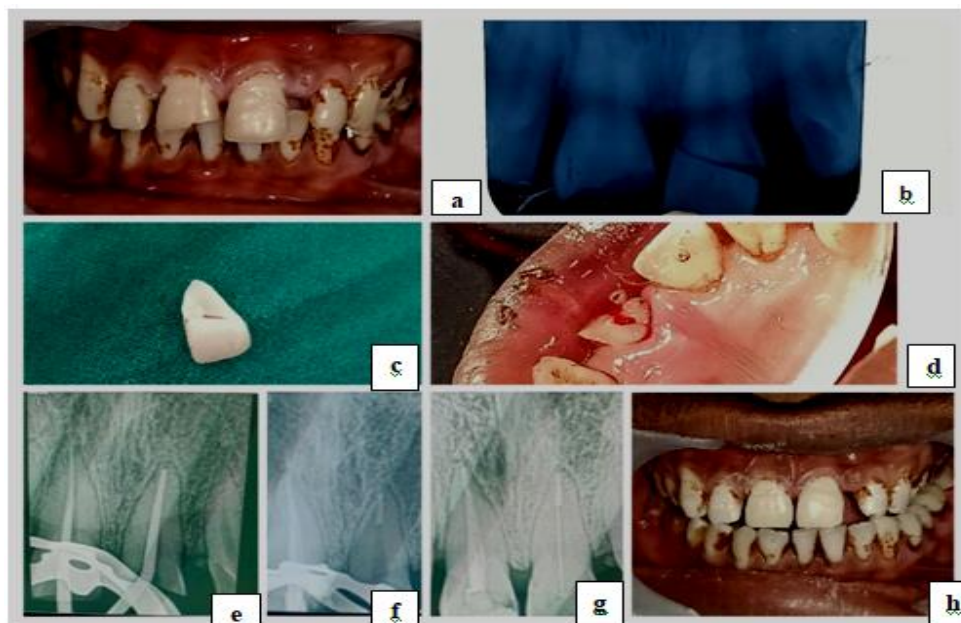
Root canal treatment was carried out immediately, an access cavity was prepared using Endo-access bur no. 2 (21mm, Size-2, Dentsply Maillefer, Tulsa, OK, USA), working length determined and biomechanical preparation was carried out with the help of ProTaper Next (PTN) Rotary files (25mm, Dentsply Maillefer, Ballaigues, Switzerland) in a torque – controlled cordless endodontic engine (Canal Pro CL2, Coltene ENDO, Coltene Whaledent, Germany) till file F3 using the crown down technique. Copious irrigation of the root canal was intermittently done during instrumentation with 3% sodium hypochlorite (Neelkanth Health Care (P) Ltd, Jodhpur, Rajasthan, India), Normal saline (Infutech Healthcare limited, Navalakha crossing, Indore, Madhya Pradesh) using 17% EDTA as lubricant (Prime Dental Products Pvt Ltd, Thane, Maharashtra, India).

The canal was dried with absorbent point (Dia Dent Group International, Burnaby, Canada) and obturation was done by sectional method maintaining 5-mm apical seal for 21 and lateral condensation for 11. After preparing the post space with Peso Reamer (Mani, Japan), prefabricated glass fiber post (Reforpost

Glass Fiber, Angelus, Londrina, Brazil) was luted in the canal with resin cement (Calibra, Dentsply). The tooth fragment was disinfected with sodium hypochlorite solution and then rinsed properly with water. Then, entire pulp was removed from the coronal fragment and seated over the coronal portion of the fiber post. It was then etched with 37% phosphoric acid, rinsed, blot dried, and bonding agent (Prime and Bond NT, Dentsply) was applied.

Subsequently, resin cement was used to fill the hole in the tooth and the prepared grooves into the coronal fragment. The fragment was carefully seated on the remaining tooth and light cured for 40 s each from the buccal and lingual aspects of the tooth. During curing, firm and stable finger pressure was applied to the coronal fragment to closely oppose it to the tooth. After curing, excess composite was removed with a diamond finishing bur. Next day, final polishing was done.

There was no need of suturing palatal gingiva since it was a traumatically separated during fragment removal. It was followed by direct composite restoration of 11. The immediate postoperative view shows adequate esthetic results with restored functionality by the use of a very conservative and cost-effective approach. The tooth remained normal in esthetics and function.



(a) Preoperative picture, (b) Preoperative radiograph, (c) Fractured fragment, (d) Clinical picture after retrieval of fractured fracture (e) Master cone IOPA, (f) Sectional obturation radiograph and post space preparation, (h) Fiber post luted in the canal, (i) Postoperative picture

Discussion

Various treatment options for crown-root fractures include composite restoration, post-and-core supported prosthesis, the fragment removal and gingival reattachment, the fragment removal and the surgical exposure of the subgingival fracture, the fragment removal and the orthodontic extrusion, the fragment removal followed by surgical extrusion and the tooth removal.^[13] With the advent of newer generation dentin bonding agents and adhesive materials, reattachment of the fractured fragments has become a reliable treatment modality. Reattached teeth are resistant to shear stresses similar to the intact teeth^[14]

The use of natural tooth substance clearly eliminates the problems of differential wear of restorative material, unmatched shades, and difficulty of contour and texture reproduction associated with other techniques. Treatment plan can be made after evaluation of the

periodontal, endodontic, coronal, and occlusal status.^[15] Badami et al.^[16] have shown neither the bevel nor the material used could obtain the original fracture resistance of the tooth. Specimens prepared with chamfer and bonded had a fracture resistance of 40%–60%, with internal dentin groove, and over contour, it reached around 90%. The highest fracture resistance was obtained by chemically cured composite followed by light-cured resin and least by only dentin- bonding agent.^[17]

The pulp chamber was used for increasing the surface area for composite bonding and without the use of post. Amir et al., in 1986, showed that the space provided by pulp chamber may be used as an inner reinforcement, thus avoiding any excess preparation of teeth.^[18] The direction of the fracture line is an important aspect in re-restorability, and it has a direct bearing on the prognosis of teeth.^[17] The fracture line was in a favorable direction in the cases undertaken. Extensive damage of the tooth

structure and missing fragment warrants reinforcement using fiber posts followed by crown. However, in our case reports, the fractured fragment was in sound condition and exhibited good fit over the radicular portion, so reattachment using fiber post was considered to be the best treatment option. A bevel with flowable composite further improved the fracture strength.

Fiber-reinforced posts have several advantages over metal posts. Their principal advantages are that they are passive, tooth colored, more flexible than metal posts and have modulus of elasticity close to dentin. They need minimum preparation since resin cement uses the surface irregularities for an increase in surface area for adhesion.^[19] Reattachment using the fiber reinforced resin post bonded into the root canal increases the retention of the crown's fractured fragment. It increases the fracture resistance as a result of a combination of elastic and adhesive characteristics. Thus, tooth and post move and flex as a single unit, ensuring favorable stress distribution.^[20]

If the fracture line is supragingival, the procedure for reattachment will be straightforward. However, when the fracture site is subgingival or intraosseous, orthodontic extrusion with a post retained crown may be necessary. Alternatively, surgical techniques such as electrosurgery, elevation of tissue flap, 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. It has been suggested that whenever the fracture site invades the biologic width, surgery should be performed with minimum osteotomy and osteoplasty.^[21]

However, in cases with minimal biologic width invasion, the organism is able to restore the biologic width by itself provided assiduous plaque control is done. The

success rates of reattached fragments have been seen to be up to 90% based on the parameters of periodontal, pulpal, and color harmony for a follow-up period of up to 24 months.^[22]

This case reports presented a successfully esthetic management of a complex crown fracture. The treatment included agglutination of fractured parts to each other using fiber post and resin is preserve sound tooth structure and returned loss tooth structure. The agglutination method of the fractured part, using fiber-supported post system, is an effective and minimally invasive treatment option that provides regaining esthetic and functional completeness for the patient.

Conclusion

The reattachment of tooth fragments with adhesive techniques, even when the fracture is severe, can be considered a safe procedure with predictable results, provided that cases are selected judiciously. Tooth fragment reattachment using fiber-reinforced post and original tooth fragment is a simple and efficient technique for the treatment of fractured anterior teeth. It appears to offer optimum esthetic and functional outcome.

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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