



CASE REPORT

Reattachment of a Vertical Subgingival Crown Root Fracture – A Case Report

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ABSTRACT: Functional, esthetic and biologic restoration of a fractured tooth is often a clinical challenge. In particular, the treatment and prognosis of teeth with crown-root fracture are dictated solely by the extent of the fracture line. Among many conventional therapies, re attachment of the fractured segment by adhesives is now considered as a viable treatment option to quickly obtain both morphology and esthetics. The treatment strategy for complicated subgingival crown-root fracture includes periodontal surgical exposure, endodontic management and finally the fragment reattachment. This paper reports the management of a complicated crown-root fracture in a young adult, by reattaching the fractured fragments using adhesive technology.

Key words: *crown-root fracture, sub gingival, fragment re attachment, dental trauma*

Traumatic tooth fractures are a common reason for seeking dental care. The majority of traumatic dental injuries involve the maxillary central incisor (65.65%). Among them, crown-root fractures pose a special challenge due to the involvement of enamel, dentin and cementum on the fracture plane. A crown-root fracture is classified as complicated or uncomplicated fracture based on the pulpal involvement. The incidence of such a fracture in permanent dentition is 5%, whereas in the deciduous dentition it is only 2%^[1].

Since anterior teeth help in maintaining the form, function and esthetics, a treatment plan which would not compromise any of these values is considered to be a desirable one. Treatment of complicated crown-root fractures is often challenging. Several therapeutic procedures have been indicated depending on fracture location. They include orthodontic extrusion, forced surgical extrusion, intentional re-plantation and periodontal crown lengthening procedures. The aim of these procedures is to expose the fracture site, followed by restoring the lost tooth structure with either prefabricated or custom cast-post and core build up.

Each of these procedures is not without inherent drawbacks. Excessive forces in orthodontic extrusion can lead to pain, root damage or tilting of the abutment.

It can also result in failure of tooth movement, and subsequent impaction of the root that is being extruded^[2]. The custom or prefabricated post and core have hazards such as perforating the root during the post space preparation, inducing stresses during the placement of the post and thus increasing the risk of root fracture^[3].

The era of resin based composite have opened up a range of less invasive treatment approaches for crown-root fractures. If the fracture fragment is intact, its attachment to the viable tooth structure offers functional and esthetic treatment option^[4]. Chosack and Eidelman first described the restoration of fractured teeth using the dental fragment in 1964^[5]. The fragment re attachment offers a conservative, safe, simple and cost effective restorative option with less chair time^[6,7]. The following case report focuses on the re attachment of a subgingival crown-root fracture of a mandibular central incisor using adhesive technology.

CASE REPORT

A 27-year old male patient visited the Department of Conservative Dentistry and Endodontics, Meenakshi Ammal Dental College, Chennai, with the chief complaint of pain and mobility in relation to the lower front tooth region. Pain was present since 20 days after an injury in a road traffic accident. The medical and past dental histories were non-contributory.

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Fig 1: Labial view of the fractured central incisor



Fig 2: Pre-operative radiograph showing periapical rarefaction

On examination, the lower left central incisor showed a complicated crown-root fracture extending from the incisal edge to and beyond the cervical line subgingivally (Fig- 1). The fractured segment showed grade-3 mobility while the remaining part of the tooth structure exhibited grade-1 mobility. The tooth was tender on percussion; however the occlusion was unaffected. Electric pulp test revealed a negative response. Radiographic examination revealed periapical radiolucency in relation to the lower left central incisor (Fig- 2)

Since the pulp was necrotic and the fractured fragment was available for re attachment, a treatment plan comprising of root canal therapy and fragment re attachment was decided. The treatment approach was explained to the patient and a written consent was obtained.

Routine hematological investigation was done prior to surgery and the values were found to be within the normal range. Profound anesthesia was achieved by administering 2% Lignocaine with Adrenaline (1:200000). A full thickness muco-periosteal flap was raised on the labial aspect to expose the fracture margin (Fig-3). The fractured fragment was detached from the tooth structure by separating the gingival attachment with no.15 BP blade (Fig- 4). The fractured fragment was cleaned of debris and kept in normal saline.

Subgingival curettage near the fractured area was done to remove the encroached soft tissue. Endodontic treatment of the fractured tooth was performed using a step-back technique using ISO K files. The canals were adequately debrided using saline. 17% aqueous EDTA solution was used as a final flush. The canals were dried with sterile absorbent points and then coated with AH plus sealer and obturated with gutta-percha using cold lateral compaction technique.

Periapical curettage was done to remove granulation tissue at the root tip. No tooth structure modification was done in the fragment as well as the tooth to enable a good adaptation on re attachment. However a groove was given along the canal space in the fracture fragment to create space for the obturating material when re-apposed with the main tooth structure.

The surfaces of the fracture fragment and the main tooth structure were etched with 37 % phosphoric acid gel for 15 seconds, washed and blot dried. Later they were coated with Prime and Bond NT (Dentsply, USA) with the help of applicator tip and cured for 20 seconds. The fractured fragment was bonded to the remaining tooth structure with the help of the microfilled anterior composite (Clearfill, JAPAN) which was photo polymerized as per the manufactures instructions (Fig- 5). Adequate moisture control was achieved with the help of high volume evacuation throughout the adhesive procedure. The flap was sutured back with 3-0 black silk (Fig-6). The occlusal interferences were removed with a fine diamond burr.

Patient was advised to maintain oral hygiene by using 0.2% Chlorhexidine gluconate mouth wash and gentle brushing. Patient was also instructed to avoid sticky and hard food substances for 1 week. Antibiotic and analgesic were prescribed.

Initially patient was recalled after 7 days for suture



Fig 3: Surgical exposure of the fractured fragment.



Fig 4: Labial view of the intact tooth with pulp exposure. Insert shows the fractured fragment



Fig 5: Reattached fragment with resin based composite



Fig 6: Flap sutured

removal and one month thereafter for review. Follow up was done at 3 and 6 months (Fig -7 a and b). During the post-operative follow up period, no signs of ankylosis, re fracture, periodontal pockets, mobility and abscess formation were observed. Post operative radiograph after 6 months revealed resolving periapical lesion with bone regeneration. But the patient did not report for further post-operative follow up.

DISCUSSION

The most common etiological factors of crown- root fracture are falls, automobile and bicycle accidents^[8-10]. The treatment is challenging due to the complex nature of the injury that involves not only the tooth but also the supporting structures.

One of the determinant factors for the functional and aesthetic success in the management of complicated crown-root fractures is the adoption of a multidisciplinary approach involving surgery, endodontics, periodontics and prosthodontics^[11].

Numerous methods such as removal of the fragment, gingival surgery, surgical repositioning, orthodontic extrusion post and core build-up, have been used to save as well as reconstruct the tooth. However, these strategies are time consuming and elaborate and invasive. In the recent past decades, adhesive technology has revolutionized the way a mutilated tooth is reconstructed. Advent of the dentin bonding systems and the concept of moist bonding has enabled the use of adhesive systems even in stringent conditions of moisture control.

Andreasen and Andresen stated that re attachment of fracture segment serves as a transitional treatment alternative to postpone definitive treatment in pediatric and adolescent population^[12]. The affected tooth is either bonded in situ^[13] or extracted, bonded and then re-implanted in to the socket^[14]. In the present case, being a mandibular central incisor, intentional replantation procedure would have caused damage to the bony supporting structure; therefore in-situ bonding was planned.

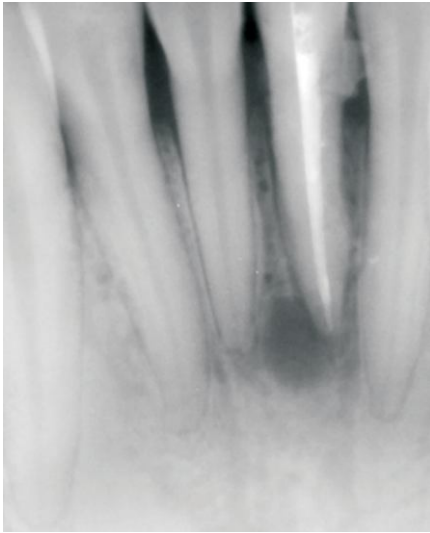


Fig 7 :a. Radiograph - review after 3months

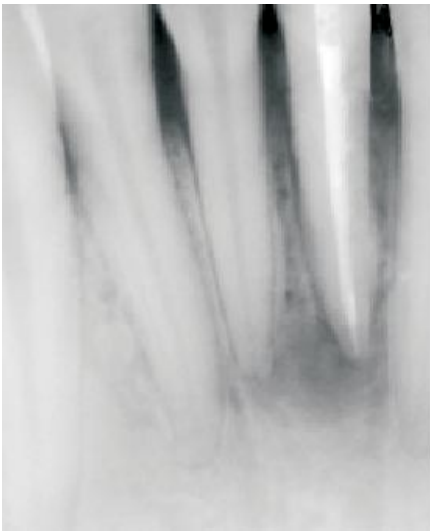


Fig 7: b. Radiograph - review after 6 months.

Though radiographs revealed peri apical changes in the root apex, it was decided to raise the flap, perform endodontic therapy, curette the periapical lesion and approximate the fractured fragment with a dentin bonding system, all in a single stage. The reasons for this decision are that a multiple visit root canal therapy would have jeopardized the already compromised structural integrity of the intact tooth and mobilized the fragment even more, thus complicating repositioning. Single phase treatment plan was done to prevent a secondary periodontal lesion in relation to the fracture line. The resin sealer (AH 26) was used in the obturation that would not interfere with the bonding of the fragments.

Although the re attachment is susceptible to the effects of cyclic fatigue, hydrolytic degradation over time and can also result in cervical root resorption, various studies have described a functional and esthetic success

exceeding 7 years.^[4] In the present case patient came for follow up at the end of third and sixth month. In this short term follow-up there were no untoward sequels. An adhesive post endodontic restoration also would have enhanced this immediate success, but the patient was not available for further follow up.

CONCLUSION

Although adhesive fragment re attachment cannot be considered a durable procedure for the management of extensive fractures, this technique offers an effective and conservative treatment option in some cases because this technique shortens the operative time and improves the reproduction of tooth color, shape and contour^[15].

As the re attachment procedure does not preclude any future treatment, whenever an intact fragment is available, re attachment of fractured fragment should be considered as a viable first treatment option, followed by definitive functional restorations. However, prognosis of the re attachment procedures needs to be assessed further in long term clinical studies.

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