

Case Report

Management of a Subgingivally Fractured Central Incisor by Reattachment Using a Fiber Post

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ABSTRACT

Reattachment of a fractured fragment to the remaining tooth is challenging but one of the best treatment protocol in regards to aesthetics, function as well as patients acceptance. This case report presents a 20 years old male with an oblique complicated crown fracture of maxillary left central incisor tooth. The procedure used to repair the fracture regarding this case included flap surgery with endodontic treatment. The root canal was filled with a root canal sealer and gutta-percha. After root canal obturation, fragments were reattached with dual cure composite resin using a glass fibre post. After 12 months evaluation, clinical and radiographic examinations showed a stable reattachment, good aesthetics and healthy periodontium.

Introduction

Almost every dental expert is familiar with the patient having traumatized tooth in their regular practice. The most affected teeth are maxillary incisors due to their anterior position or protrusion. The common etiological factors of crown or crown root fractures in the permanent dentition are injuries caused by fall, contact sports, automobile accidents, foreign body striking the teeth. Aesthetic rehabilitation of crown fractures of the maxillary anterior teeth is one of the greatest challenges to the dental specialist.

The patients are very conscious about their appearance whereas the specialist has to consider long-term biological function of that tooth in addition to aesthetic. The conventional approach for rehabilitation of fractured anterior teeth include composite restoration, post supported prosthetic restoration and in some cases extraction and fixed prosthesis.¹

The type and location of fracture depends upon age of patient, amount of force and direction of blow² but an in vitro study concluded that most of the traumatised incisors fracture in an oblique fashion from the labial to lingual aspects with the fracture line proceeding in an apical direction.³ Oblique coronal fractures that involve pulp and extend apically into the root (subgingival) may also invade the critical area of biologic width. These fractures are particularly challenging and require elevation of a

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periodontal flap for surgical correction of biologic width and for gaining access to the fractured site for re-attachment.

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, aesthetics, finances, and prognosis.⁴⁻⁶ Reattachment of fragment may offer following advantages; 1) Better aesthetics and achievement of life like translucency; 2) Incisal edge wear at a rate similar to that of the adjacent teeth; 3) Replacement of fractured portion involving less time; 4) A positive emotional and social response from the patient⁷; 5) Relatively inexpensive procedure. Whereas, composite resins have the disadvantage of poor abrasion resistance in comparison to enamel⁸; water absorption and staining of the composite are further drawbacks.

Case report

A 20-years-old male patient reported with a fractured maxillary left central incisor where fractured coronal segment was loosely attached with the gingiva though the trauma was 15 days back. There was other history of injury site at upper lip and left side of forehead during trauma which causes delayed dental appointment for this patient. Intra-oral clinical and radiographic examination revealed a complicated crown-root fracture (involving pulp) of maxillary left central incisor. The fracture line was oblique extending in apical direction from palatal to labial surface. Upon probing, it was found that the biologic width was being violated on the labial aspect. Various available treatment options were explained to the patient, out of which he preferred reattachment of the fractured fragment.

Under local anaesthesia, the fractured fragment was removed atraumatically and stored in distilled water to be used at a later stage. The adaptation of the fragment to the underlying root was checked. The root canal was opened and there was no vital pulp tissue at the canal. Then

the root canal was prepared at 16.5mm working length up to level of 70 H file. Then calcium hydroxide was used as an intracanal medication for next 7 days followed by the root canal obturation with gutta percha as lateral compaction technique using resin based calcium hydroxide sealer (Sealer 26, Dentsply, Brazil). On the next appointment, root cervical area at labial surface was exposed by reflection of full thickness muco-periosteal flap at triangular design. The biologic width was restituted by performing minimal osteoplasty on labial aspect as well as gingival recontour as an attempt to reattach the coronal fragment of tooth.

Gutta percha was removed from the root canal up to apical third level leaving apical 5 mm using Glass fibre composite post kit (Glassix, Nordin) followed by insertion of a perfect diameter sized glass fibre post. Then the coronal fractured fragment was prepared by making internal notch where the fibre post and composite will occupy followed by surface erosion and etching with 37% orthophosphoric acid. Then the prepared coronal fragment was reattached with root fragment as well as fibre post with dual cure composite bonding (Embrace WetBond, Pulpdent, USA) and excess resin cement was finished and polished. The surgical flap was secured in place with the help of sutures which were removed after one week. Occlusion was checked and post-operative instructions were given to the patient and the patient was recalled after 7 days for evaluation. Clinical and radiographic examinations carried out after 1 month, 3 months, 6 months and 1 year confirmed the satisfactory aesthetic and functional outcome of the treatment with no associated endodontic or periodontal problem.



Pre-operative (lateral view)

Pre-operative (palatal view)

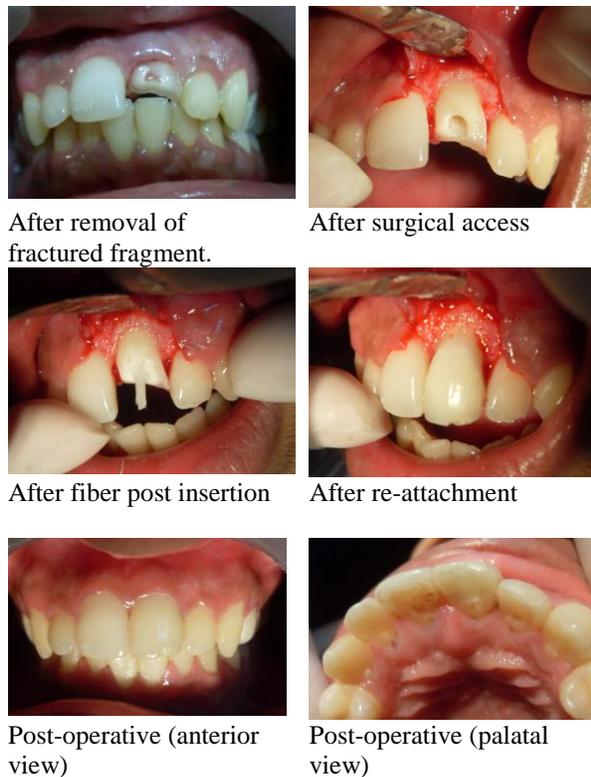


Figure 1: Re-attachment Procedure

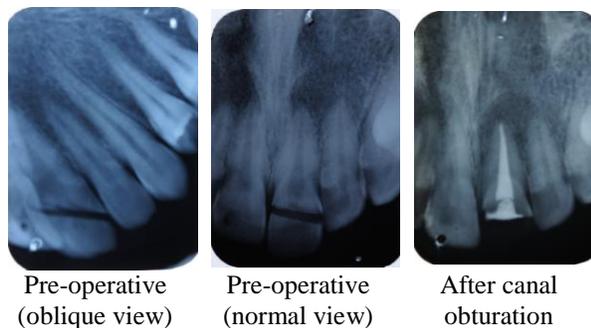


Figure 2: Pre-operative Per-operative Radiograph

Discussion

In this case, the fracture line was oblique running palato labially extending below the gingival contour labially below the bone crest. The fractured fragment was intact and held in position without displacement though the fragment was mobile. In the pre-adhesive era fractured teeth needed to be restored either with a pin retained restoration that sacrificed healthy tooth structure and were a challenge for the clinicians to match the color with the adjacent

teeth.⁹ A progressive improvement in the field of adhesive dentistry allows clinicians to reattach a broken tooth fragment to the remaining tooth structure mechanically, chemically and aesthetically.

Factors influencing the extent and feasibility of crown fracture repair include the site of fracture, size of fractured remnants, periodontal status, pulpal involvement, maturity of root formation, biological width invasion, occlusion, time and resources of the patient.¹⁰ A good fragment retention, acceptable aesthetics, and pulp vitality indicated that re-attachment of coronal fragment is a realistic alternative to placement of conventional resin composite restoration.⁶ The re-attachment strategies have been advocated for re-attaching a tooth fragment are ^{11,12} - 1) Placement of a circumferential bevel; 2) Placement of an external chamfer at the fracture line after bonding; 3) Use of a V-shaped enamel notch; 4) Placement of an internal groove; 5) Leaving a superficial over contour of restorative.

A post and core is needed to improve retention, to distribute stress and to improve resistance to root fracture. The post interlocks the two fragments and minimizes the stresses on the remaining tooth structure that is replaced.¹³ Fiber-reinforced composite resin post has demonstrated negligible root fracture. In addition, the fiber-reinforced posts can be used with minimal preparation because it uses the undercuts and surface irregularities to increase the surface area for bonding. Thus, it reduces the possibility of tooth fracture during function or traumatic injury.¹⁴ Use of a fibre post luted with resin cements increases the retention of the segment and provides a monoblock effect.¹⁵ Andreasen FM et al concluded that the good fragment retention, acceptable aesthetics, and pulp vitality indicated that re-attachment of coronal fragment is a realistic alternative to placement of conventional resin composite restoration.¹⁶ The use of natural tooth substance clearly eliminates problems of differential wear of restorative material, unmatched shades and difficulty of contour and texture reproduction associated with other restorative techniques. The re-attachment of a tooth fragment is a viable technique that restores function and aesthetics with a very conservative approach, but for each

trauma case should be attempted to restore on an individual basis.

Conclusion

A tooth fragment reattachment can be successfully used to restore fractured teeth with adequate strength, but long term follow up is necessary in order to predict the durability of the tooth-adhesive-fragment complex.

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