

Case Report

Restoring and Reinforcing Fractured Tooth with Contemporary technique

Marisha Bhandari¹, Sheetal Grover²

^{1,2}Reader, Department of Conservative Dentistry & Endodontics, Seema Dental College and Hospital Rishikesh-249203 Uttarakhand, India

ABSTRACT:

Aim: Traumatized anterior teeth require quick functional and aesthetic repair. The treatment modality varies from simple reattachment to complex interdisciplinary approach. Treatment alternatives for fractures involving biologic width include crown lengthening, flap surgery, osteotomy and rapid orthodontic tooth extrusion. **Case Description:** A 35-year old patient, reported with a history of trauma, 2 days back. The clinical examination revealed vertically fractured Maxillary left Central Incisors and the fracture involved enamel, dentin, pulp and cementum. A more conservative approach was decided to restore the form, function and aesthetics of the tooth using Polyethylene fibre and Dual cure resin cement. **Conclusion:** Several aspects govern the choice of a technique or the association of materials for fragment reattachment. Reattachment proved to be a successful technique for restoring immediate aesthetics and function. However, because few long term studies have been reported in literature, the patient should be informed of possible interim nature of the treatment.

Key words: Fractured fragment reattachment, Polyethylene fibre, Dual cure resin cement

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Corresponding author: Dr. Sheetal Grover, Reader, Department of Conservative Dentistry & Endodontics, Seema Dental College and Hospital Rishikesh- 249203 Uttarakhand , INDIA

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INTRODUCTION

The incidence of complicated crown fracture ranges from 2% to 13% of all dental injuries. Maxillary Central Incisors not only dominates the physical appearance of the individuals but also is the most commonly seen fractured tooth.^[1] Fracture of tooth affect the person both physically as well as mentally and it has been seen that adolescent are more affected than adults. Thus immediate restoration of fractured tooth is must.^[2]

During the last century, clinicians utilized a variety of procedures (eg. Pin-retained resin, orthodontic bands, full coverage gold with bonded porcelain, porcelain jacket crowns, composite etc) for the restoration of the fractured crown.¹ Polyethylene fibre is recently introduced in endodontics and can be used as intra canal retainer associated to resin composite as an alternative option for reconstruction of permanent dentition which are greatly damaged by extensive carious lesion.^[3] More recent approach have concluded that the use of fibre set in composite resin resulted in an increase in strength of restoration.^[4]

This case report presents a case with complicated vertical crown fracture (according to

Andreasen) in Maxillary left Central Incisors which was immediately restored using *leno weave ultra high modulus polyethylene fibre and dual cure resin cement (U-100, Dual cure resin, Coltene-Whaledent) utilising external and internal reinforcement technique after a single visit endodontics.*

CASE REPORT

A 35-year old male patient, reported to the Department of Conservative Dentistry and Endodontics, with a history of trauma, 2 days back. The clinical examination revealed vertically fractured Maxillary left Central Incisors and the fracture involved enamel, dentin, pulp and cementum. The Maxillary anterior showed negligible overjet and the patient also had tongue thrusting habit. (Figure 1: a & b) A more conservative approach was decided to restore the form, function and aesthetics of the tooth. Due to pulpal exposure root canal treatment followed by reattachment of fractured fragment was planned. The fracture fragment was immediately kept into the saline for 48 hours, for rehydration as the fragment was dry.^[5] (Figure 1: c) Isolation was achieved by placing rubber dam. (Figure 1: d) The fracture fragment was tried for its adaptation and

perfect fit. Root canal was located and the working length was determined using apex locator (Propex II, Denstply Malliefer, Bailligues, Switzerland). Cleaning and shaping was performed with protaper files till F2 using endomotor X-smart (16:1 gear endomotor, Dentsply Malliefer, Bailligues, Switzerland) with crown down technique. The obturation was done using F2 Protaper cone and AH plus sealer (Denstply Malliefer, Bailligues, Switzerland) and post space preparation was computed utilizing Peeso-reamer (upto size 3).

The fracture fragment was again tried for its adaptation and the proximal contact area was marked. The fragment was removed and class III cavity was prepared on both the sides' i.e, mesial and distal of it. (Figure 1: e & f) Corresponding to these cavities Class III cavities were prepared on the mesial surface of Maxillary right Central Incisor and Left Lateral Incisors. On the inner surface of the fractured fragment the portion indicating the pulpal portion was deepened by 0.5 mm for achieving space for retention of RIBBOND fibre without causing any change in appearance of crown from labial view. (Figure 1: g) Two internal grooves were prepared in the dentin with the help of diamond round bur no. # 1 on the fractured around pulp space of attached crown. The location of

grooves were mesioingival and distoingival surface and the depth of the grooves was 0.5 mm. Grooves on the attached tooth surface, class III cavities and triangular space on the fractured fragment enhanced the retention of the fragment.

Root canal, fractured surfaces of attached and fractured tooth fragment, grooves and class III cavities on fracture fragment and adjacent tooth were etched for 10 seconds with 37% Phosphoric acid. (Figure 1: h) (Figure 2: a) The etchant was rinsed off and excess moisture was blotted off. Then the 4mm wide and 6 cm long RIBBOND fibre was selected and dipped in the bonding agent (Adper Single bond, 3M ESPE, USA). The etched canal and fractured surface of the attached crown and fractured tooth was coated with the same bonding agent. The dual cure resin cement was mixed according to manufacturer's instruction and the canal was coated with it. Now the fibre was condensed tightly into the canal leaving around 2 mm of it coronally, and the fragment was approximated and light cured (Mini LED, Satelec, France) for 40 seconds.(Figure 2: b, c, d & e) Class III cavities were restored using composite restoration joining the fractured fragment with adjacent teeth. Patient was recalled after 6 months for check up (Figure 2: f)

Figure 1:

- a) Preoperative clinical photograph: Labial view (21)
- b) Preoperative clinical photograph: Palatal view (21)
- c) Fractured tooth fragment stored in saline (21)
- d) Isolation achieved using rubber dam (21)
- e) Class III cavity prepared: distal surface of the fractured tooth fragment (21)
- f) Class III cavity prepared: mesial surface of the fractured tooth fragment (21)
- g) Triangular groove: internal aspect of fractured tooth fragment (21)
- h) Etchant application: fractured tooth fragment (21)

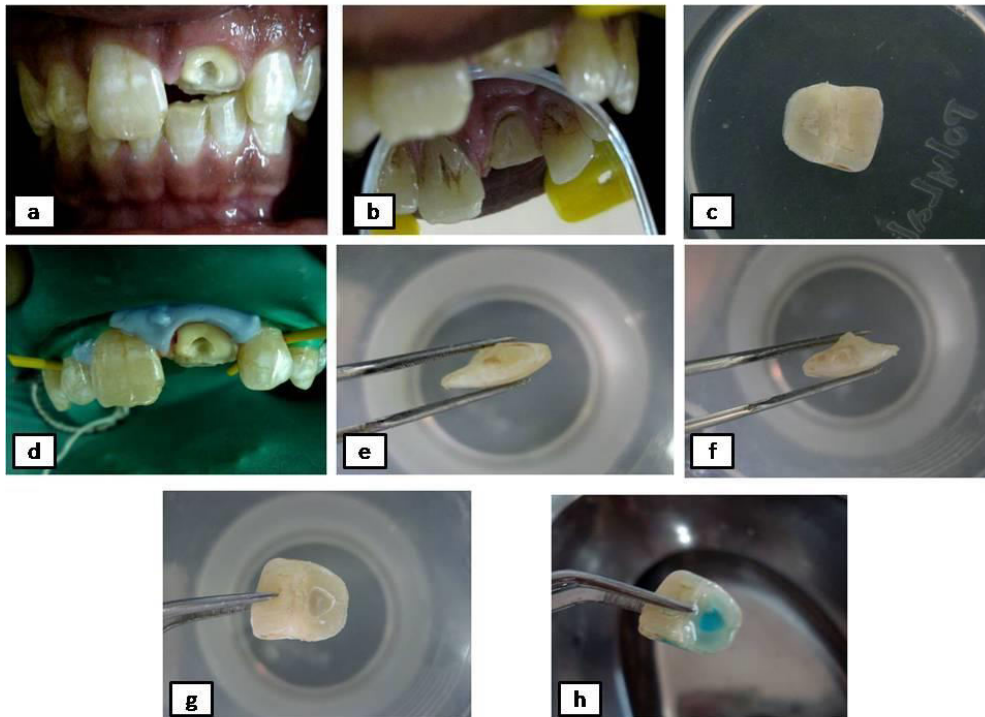
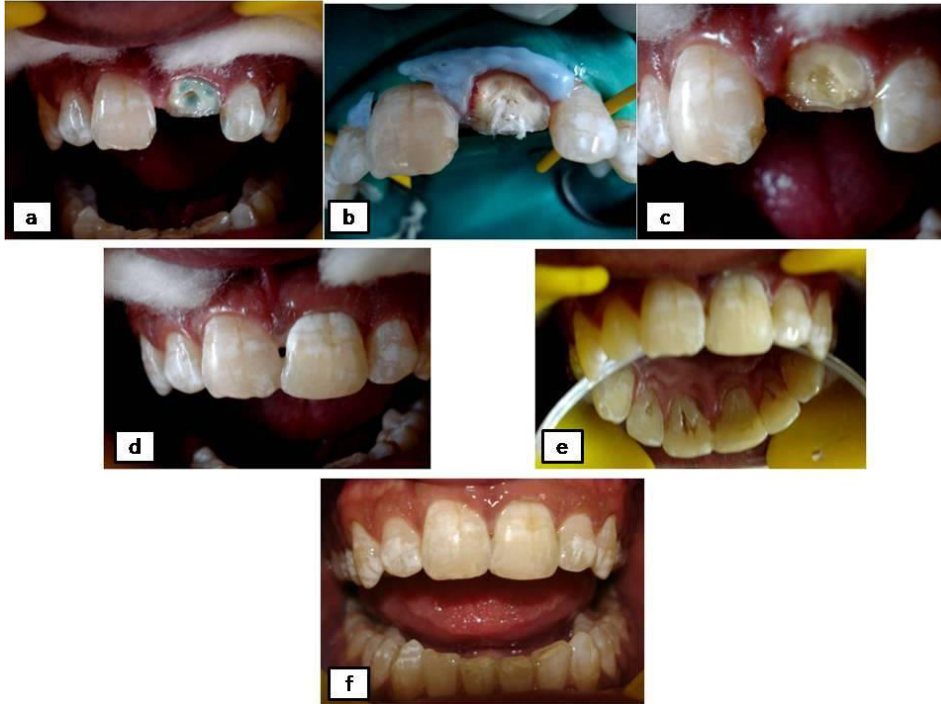


Figure 2:

- a) Etchant application (21)
- b) Intracanal Placement of RIBBOND and preparation of two dentine grooves (21)
- c) Condensed and Cured RIBBOND fibre (21)
- d) Facial view of reattached fractured fragment (21)
- e) Palatal view of the re-attached fracture fragment (21)
- f) Clinical photograph at 6 months recall (21)



DISCUSSION

Preservation of the natural dentition and restoration of the oral cavity to a normal functional state is a primary goal in dentistry (Linkow, 1970).^[6] Although composite resin restoration is indicated in the management of fractured anterior teeth, reattachment is an excellent option when the fragment is available.^[7] In addition it has been found that there is a positive emotional and social response from the patient to the preservation of natural tooth structure. Tooth fragment reattachment procedure offers an ultraconservative, safe, fast and aesthetically pleasing result when the fractured fragment is available. Reattachment of the dental fragment as a restorative procedure has become possible with the improvement of adhesive techniques and restorative materials. Fibre reinforced resins allow not only creation of esthetic restorations but also facilitate the preservation and reinforcement of tooth structure.^[8]

Researchers have pointed out that when reattaching without making any extra preparation for the broken incisal part and for the remaining tooth in the mouth, lower values than intact tooth fracture strength were obtained. Clinical reports have indicated the application of additional preparations, on both the fractured tooth and the fragment, before and after bonding, with the aim of improving bond strength. Such preparation methods include internal enamel groove,

internal dentinal groove, over contour technique and external enamel groove in the shape of a V on the tooth when reattaching the broken incisal part.^[7] Similarly the class III cavities, the internal grooves and coronal portion of root canal were used here to reinforce the bonding between fractured segments.

Polyethylene fibres improve the impact strength, modulus of elasticity and flexural strength of composite materials. When compared to other fibres, these are almost invisible in resinous matrix. Due to these reasons, they are the most appropriate and the best esthetic strengtheners of composite materials.^[8]

In the present case the Leno Weave Ultra High Modulus Polyethylene Fibre (RIBBOND) was used with dual cure resin cement to provide better adaptability and strength to the reattachment of the tooth structure. They are one of the most durable reinforcing fibres available. They are made of aligned polymer chains and have lower flexural modulus that provide them good impact resistance and have a modifying effect on how the interfacial stresses are developed along the etched enamel/resin boundary. Their transparent appearance makes them well suited for dental applications with high esthetic demands.⁹

CONCLUSION

The esthetic appearance of teeth is a mixture of shape of each individual tooth, the position of the teeth within the dental arch, and the inter-relationships of the teeth to the opposing dental arch. Reattachment of fractured tooth by using reinforcement material can provide fast, safe, aesthetically pleasing and functional biological restoration.

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