Case Report

Reattachment of Fractured Tooth Using Self Etching Adhesive and Esthetic Fiber Post

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Abstract

In the permanent dentition, crown fractures comprise 26-76% of dental injuries. Endodontically treated teeth often have extensive loss of coronal tooth structure. Failure to give a successful final restoration makes them prone for fractures with repeated trauma. Reattachment of tooth fragment should be the first choice and is a viable alternative to conventional approaches because of simplicity, natural esthetics and conservation of tooth structure.

Here is a case report where a fractured coronal tooth fragment in an endodontically treated maxillary lateral incisor is reattached with self etching adhesive resin and an esthetic fiber post.

Key words: Reattachment, Fiber post, Self etching adhesive resin, Trauma

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Introduction

In the permanent dentition fractures comprise 26-76% of dental injuries¹. The most affected teeth are maxillary incisors due to their anterior position and protrusion caused by the erupting process. The loss of structural integrity associated with access preparation lead to a higher occurrence of fractures in endodontically treated teeth compared with vital teeth especially in the absence of
restoration that enhance structural integrity\(^2\). The most common etiological factors of crown and crown root fractures in the permanent dentition are injuries caused by fall, contact sports, automobile accidents, foreign body striking the teeth\(^3\).

Reattachment of tooth fragments should be the first choice and is a viable alternative to conventional approach with minimal or without violation of biologic width because of simplicity, natural esthetics, conservation of tooth structure. Reattachment of tooth fractured at cervical level can be reinforced with the use of post as it interlocks the two fragments and minimizes the stresses on the reattached tooth fragment. With the recent improvements in the dental materials resin based restorative materials with tooth colored fiber post are of choice because of several advantages such as esthetics, bonding to tooth structure, low modulus elasticity similar to that of dentin\(^4\).

**Case Report**

A male patient aged 29 years reported to the Department of Conservative Dentistry and Endodontic, Sri Siddhartha Dental College, Tumkur, with the chief complaint of pain and mobility of an upper front tooth since three days. History revealed trauma as the patient accidentally hit himself against the wall which resulted in pain. The pain was aggravated by normal movement of the tongue and also while consuming food.

Past dental history revealed trauma 5 years ago in the same region. But patient visited Sri Siddhartha Dental College and Hospital only 6 months ago as he developed pain and pus discharge. Root canal treatment was done for two teeth in the same region.

Soft tissue examination revealed marginal inflammation of the gingiva with respect to maxillary right lateral incisor on the palatal side.
Hard tissue examination revealed discoloration of the maxillary right central incisor with fractured incisal edge. Maxillary right lateral incisor was fractured in a labio palatal direction without displacement of the fragment (Fig: 1).

Fractured fragment was mobile though the fragment was held in position by the soft tissue palatally. Maxillary right central and lateral incisors were tender on percussion. Dental caries was present with respect to maxillary left first molar and mandibular right first molar.

Intraoral periapical radiograph of maxillary right central and lateral incisors revealed radiolucent horizontal line at cervical one-third with respect to maxillary right lateral incisor. Root canal obturation was found with respect to maxillary right central and lateral incisors. Periapical radiolucency was seen with respect to maxillary right central incisor (Fig: 2).

A diagnosis of complicated crown fracture with respect to maxillary right lateral incisor and apical periodontitis with respect to maxillary right central and lateral incisors was made.

Removal of fractured fragment and reattachment using self etching adhesive and esthetic fiber post was planned. Patient was also advised oral prophylaxis and post endodontic restoration with
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respect to maxillary right central incisor.

**Procedure for reattachment of tooth fragment**

Fractured fragment with respect to maxillary right lateral incisor was removed and kept in saline. Isolation was done with cotton rolls and gingival retraction cord. Gutta percha filling was removed with peeso reamer from two-third of the canal retaining approximately 5-6mm of gutta percha apically. Post space preparation was done with reamer of size 1mm provided in the D.T. Light – Post (R.T.D, St-Egreve-France). Radiograph was taken for the confirmation of the post space preparation (Fig: 3).

![Fig: 3 - Radiograph showing post space preparation](image)

Coronal portion of the fiber post was cut to fit into the coronal fractured fragment and the fragment was aligned with the apical portion of the tooth fragment (Fig: 4) and radiograph was taken for the confirmation of the post length (Fig: 5).

![Fig: 4 - Post was tried in the canal](image)

![Fig: 5 - Radiograph showing post length](image)

Self etching adhesive (Multilink System Pack, Ivoclar Vivadent, Liechtenstein) provided as primer A and B mixed in 1:1 ratio was applied to the root dentin in the post space with the application tips for 15 seconds. Thin coat of adhesive was applied to the fiber post. Self cure resin cement provided as base and
catalyst was mixed in equal ratio on the paper pad and was applied to the canal and post. Fiber reinforced post was cemented into the canal. Old gutta percha filling was removed from pulp chamber of the fractured fragment and cemented to the coronal portion of the fiber post by using self cure resin cement (Multilink System Pack, Ivoclar Vivadent, Liechtenstein)(Fig: 6 and 7).

The palatal access cavity was filled with a composite resin. Buccal chamfer preparation was done on the labial surface along the fracture line with the round bur and restored with the composite resin (3M ESPE, Filtek Z350, USA) to mask the fractured ne which also helps in reinforcing the fragment. Finishing and polishing was done using the composite finishing kit (EVE, Gremany). Patient was advised analgesics. Tooth was kept under observation. Patient was recalled after six months (Fig: 8) and one year (Fig: 9) for evaluation. Periodontal status and reattachment were found to be satisfactory.

Fig: 6 – Post operative photograph showing reattached fractured fragment.

Fig: 7 – Radiograph showing reattachment of fractured fragment with post.

Fig: 8 – Evaluation after 6 months

Fig: 9 – Evaluation after 1 year
Discussion

Endodontically treated teeth often have extensive loss of coronal tooth structure. Failure to give successful final restoration makes them prone to fracture with repeated trauma. In the present case report the maxillary right lateral incisor is fractured due to repeated trauma after endodontic treatment. Loss of structural integrity due to access cavity preparation and lack of reinforcing restoration may be the reasons for the fracture. Factors influencing the treatment modalities of coronal fractures include:

1. Site of fracture.
2. Size of fractured remnant.
3. Periodontal status.
4. Pulpal involvement.
5. Maturity of root formation.
6. Biological width invasion.
7. Occlusion.

Depending on these factors various treatment options are –

1. Reattachment of fractured fragment.
2. Composite restoration.
3. Orthodontic extrusion.
4. Surgical extrusion.

Followed by Post and Core supported restorations.

With the fracture line extending below the alveolar crestal bone orthodontic extrusion or surgical extrusion is recommended before the restoration. But with the fracture lying above the alveolar bone crest reattachment of the fractured fragment is a more viable option.

In the present case report the fracture line was oblique running labio palatally extending below the gingival contour palatally but above 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 inlays or cast restoration that sacrificed healthy tooth structure and were a challenge for the clinicians to match the color with
the adjacent teeth\textsuperscript{7}. 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 esthetically.

Most concerns about reattachment technique have been directed towards the fracture strength of the restored tooth. There are several reattachment reinforcement techniques adapted to strengthen the tooth structure like\textsuperscript{8} -

1. Circumferential bevel
2. External chamfer
3. ‘V’ shaped bevel
4. Placement of internal grooves.
5. Superficial over contour of restorative material over the fracture line and pulp chamber, in case of complicated fracture.

In the present case quartz fiber post is used along with self cured resin cement to reattach the coronal fragment which gives a monobloc effect. Though the fractured fragment could be well aligned with the apical fragment the fracture line was visible after reattachment. To mask the fracture line labially and to reinforce the fragments buccal chamfer preparation is done and restored with composite resin. Reis and Colleagues have shown that a simple reattachment with no further preparation of the fragment or tooth was able to restore only 37.1\% of the intact tooth’s fracture resistance whereas Buccal Chamfer recovered 60.6\% of the intact tooth’s fracture resistance \textsuperscript{8}. Early retrospective studies indicate that the clinical performance of fiber post is promising and the failure rate recorded is 3.2\% over a period of up to 4 years\textsuperscript{9}.

Several advantages of fiber post for reattachment of fractured fragment are \textsuperscript{10} -

1. Conservation of tooth structure.
2. Simple procedure.
3. Less chair time.
4. Esthetics.
5. Bonding to the tooth structure.
6. Low modulus of elasticity equal to that of dentin resulting in more favorable failure mode.
7. Functional rehabilitation.
9. Cost effective.

**Conclusion**

A suitable reinforcing restoration for endodontically treated teeth is of utmost importance for the success of the treatment and to avoid tooth fracture with repeated trauma. Reattachment of original tooth fragment, with the improved adhesive protocol and reinforcement technique is a simple conservative approach to provide immediate natural esthetics and functional rehabilitation. But long term follow-up is needed to prove the predictable success.

**References**


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