Reattachment of complicated tooth fracture: An alternative approach

NUJELLA B. P. SURYA KUMARI, SUJANA V.¹, C. H. RAM SUNIL¹, P. SATYANARAYANA REDDY²

Abstract

Trauma to the anterior teeth is relatively a common occurrence. There are several treatment modalities for such condition, one of which is reattachment of fractured fragment itself. Reattachment of fractured fragment provides immediate treatment with better esthetics, restoration of function, and is a faster and less complicated procedure. 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. Patient cooperation and understanding of the limitations of the treatment is of utmost importance for good prognosis. The present case report describes management of a complicated fracture of maxillary right central incisor treated endodontically, followed by reattachment of the same fragment. Reattachment of fractured tooth fragments offers a viable restorative alternative, immediately restores tooth function for the clinician because it restores tooth function and esthetics with the use of a very conservative and cost-effective approach.

Keywords: Complicated crown fracture, endodontic treatment, reattachment, resin composite, trauma

Introduction

Trauma to the anterior teeth is relatively a common occurrence. It has been reported that prevalence of trauma involving upper central incisors is 37%.¹ Trauma to the anterior teeth resulting in fracture fragment requires immediate attention not only because of the damage caused to the dentition but also due to the psychological impact it has on the patient.¹ The treatment involves simple to complex restorative intervention depending on the severity of the fracture and its extent.² ³

Tennery was the first to report the reattachment of a fractured fragment using acid-etch technique.⁴ Subsequently, Starkey and Simonsen have reported similar cases.⁵ ⁶

Reattachment of original tooth fragment helps in the maintenance of tooth color, wear resistance, morphology, and translucency in the restoration. It also has a positive emotional and social response from the patient for preservation of natural tooth structure.⁷

Reattachment of fractured fragment has become possible due to the developments and improvement in adhesive techniques and restorative materials.⁸ The present case report describes management of a fractured maxillary right central incisor treated endodontically, followed by reattachment of the same fragment.

Case Report

A 33-year-old female patient was referred to the Department of Conservative Dentistry and Endodontics, GOVT Dental College and Hospital, Hyderabad, with a chief complaint of broken upper front tooth. A thorough history from the patient revealed a blow to the upper jaw resulting in fractured maxillary right lateral incisor (11) 2 days ago [Figure 1].

Intraoral examination was done which revealed that the maxillary right lateral incisor was fractured in a labiopalatal direction without displacement of the fragment. Fractured fragment was mobile as the fracture was incomplete and the fragment was held in position by the soft tissue palatally. An intraoral periapical (IOPA) radiograph revealed no associated root fracture. The alveolar bone and the periapical tissues appeared normal. A diagnosis of complicated crown fracture (involving the pulp chamber) – Ellis Class III with respect to maxillary right lateral incisor was made. As the fracture was a complicated one, a decision of single-visit endodontic treatment was taken. Since the fractured fragments were intact, with slight attachment palatally, reattachment of the same fragment was planned.

After administration of local anesthesia, access was gained labially through the fractured region. The coronal pulp tissue was removed and the chamber irrigated with 5.25% sodium hypochlorite (NaOCl) and normal saline. Initial negotiation of the root canal was performed with a no. 10 k-file and an initial working length radiograph was taken. The root
canal was cleaned with 17% ethylenediaminetetraacetic acid (EDTA) and 5.25% sodium hypochlorite and shaped with hand protaper files. The root canal was dried with absorbent paper points obturated with 2% gutta percha points and zinc oxide eugenol sealer. Post-obturation IOPA radiograph was taken and root canal filling was found to be satisfactory [Figure 2].

**Procedure for reattachment**

The fractured tooth surface and the fragment were subjected to acid etching with 37% orthophosphoric acid (3M ESPE) for 15 seconds, then rinsed thoroughly with water and air dried. Next, an adhesive (Adper Single Bond, 3M ESPE) was applied on to the etched surfaces and the resin cement (Panavia F) was manipulated according to the manufacturer’s directions and applied to the repositioned fragment and tooth surface. The adaptation of the fragment to tooth surface was confirmed before light curing and visible light curing was done for 20 seconds each on labial and palatal side. A 1-mm-deep chamfer was prepared along the fracture line on the buccal surface with round bur (ref#1016, KG Sorensen, Sao Paulo, Brazil). After surface etching and bonding, a layer of microhybrid composite (Filtek Z250™ 3M ESPE) was applied to the chamfer surface and subjected to visible light curing for 40 seconds per increment. The restored surface was finished and polished (Sof-Lex™ disks 3M ESPE). Final evaluation for occlusion and esthetics was done [Figure 3]. Postoperative instruction regarding preventing loading of the anterior teeth was given to the patient and was scheduled for recall visits 1 month later. Postoperative period was uneventful.

**Discussion**

Trauma to anterior teeth is a relatively common occurrence, but it has been found that there is a positive emotional and social response from the patient to the preservation of natural tooth structure.[7]

Reattachment of fragments involving enamel and dentin has been found to be satisfactory after 1 year.[7] Incisal fractures of anterior teeth have been successfully treated by reattachment.[9] Complicated fractures involving pulp have been treated by reattachment with post and core.[10]

The following reattachment strategies have been advocated for reattaching a tooth fragment[11]:
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. Superficial over contour of restorative material over the fracture line and pulp chamber, in case of complicated fracture

In the present case, the enamel chamfer technique was used, as it provided a better strength recovery than simple reattachment. Reis et al. have reported 60% recovery of fracture strength with chamfer technique with minimal loss of natural fit of the fragment compared to other methods which increased the strength recovery at the cost of exposing more resin surface to oral environment.[11]

Reattachment of fragment may offer the following advantages:
1. Most rapid and conservative management
2. Better esthetics as shade match and translucency will be perfect.
3. Incisal edge will wear at a rate similar to that of the adjacent teeth.
4. A positive emotional and social response from the patient.
There are also perceived disadvantages:
1. Color changes of the bonded fragment
2. Less esthetic result if the tooth fragment is dehydrated
3. Unknown longevity
4. Need of continuous monitoring

The remarkable advancement in adhesive systems and resin composites has made reattachment of tooth fragments a procedure that is no longer a provisional restoration but rather a restorative treatment offering a favorable prognosis. However, this technique can be used only when intact tooth fragment is available and close repositioning between fragments is possible.\(^{[12]}\) Reattachment of the fractured fragment after endodontic treatment was possible in the present case as the fragment was intact.

**Conclusion**

Immediate esthetic management of traumatic injury demands proper planning which should be based on sound knowledge of the techniques available and their indications, along with risk benefit ratio.

Tooth fragment reattachment procedure offers an ultraconservative, safe, fast, and esthetically 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.

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