Management of a Fractured Tooth By Fragment Reattachment- A Case Report
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Abstract
Coronal fractures of permanent dentition are the most frequent type of dental injury. If the original tooth fragment is retained following fracture, the natural tooth structures can be reattached using adhesive protocols. The development and use of fiber-reinforced composite root canal posts make possible the reattachment of the crown esthetically. This case report presents a clinical technique of reattachment of coronal fragment of maxillary lateral incisor after trauma using direct fiber-reinforced post systems.

Key words: Coronal fracture, Dental trauma, Fragment reattachment, Resin composite.

INTRODUCTION
A trauma with accompanying fracture of anterior teeth is an agonizing experience for a young individual which requires immediate attention, not only because of the physical disfigurement but also because of the psychological impact on the patient. A number of techniques have been developed to restore the fractured crown. Early techniques include jacket crown, orthodontic bands, pin retained resin, porcelain bonded crown and composite resin.  

Tennery was the first to report the reattachment of a fractured fragment using acid-etch technique.  

Subsequently, Starkey and Simonsen have reported similar cases.  

The introduction of composite in combination with the use of acid-etch technique to bond composite to enamel, made restoration possible for the fractured incisor, with little or no additional tooth preparation. However, composite resins have the disadvantage of poor abrasion resistance in comparison to enamel; water absorption and staining of the composite are further drawbacks. Reattachment of fragment may offer following advantages: 1. Better aesthetics and achievement of lifelike 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 patient. 5. Relatively inexpensive procedure.

Resin based restorative materials are frequently used in restoration of the fractured teeth. Because of the poor mechanical resistance of these materials, different approaches have been developed to strengthen resistance of composite resin, such as fiber posts. Tooth-colored fiber posts were introduced in the 1990’s and has several advantages, such as esthetics, bond to tooth structure, have a modulus of elasticity similar to that of dentin, but still require dentin preparation to fit into the canal.

The purpose of this article is to discuss the considerations for dental fragment reattachment
technique and to present a clinical case report of fracture involving enamel and dentin.

CASE REPORT

An 18-year-old boy reported to College of Dental Science & Hospital, Rau, Indore following fracture of the crown in the left maxillary lateral incisor (Fig. 1). The trauma had occurred due to a fall about 2 hours ago. The patient’s medical history was unremarkable. No mobility of the injured tooth was recorded and there was no apparent trauma to the soft tissues in the extra oral and intra oral examination. Clinical and radiographic examination revealed that there was a horizontal fracture in the middle third region of the left maxillary incisor involving enamel and dentin with exposure of the pulp and the fractured fragment was loosely attached to the tooth.

A periapical radiograph showed that the root formation was complete with no extrusion. The patient expressed the desire to maintain the tooth and restore it due to the lower cost compared to an indirect restoration. A detailed explanation about the treatment plan was given to the patient, which included endodontic treatment, then reattachment of the tooth crown using a fiber post. The treatment plan was accepted by the patient.

Local anesthetic was administered and the segment was removed (with minimal force and recovered and stored in normal saline to prevent discoloration and dehydration (Fig 2,3&4). Following a detailed examination, the adaptation of the fragment was checked.

The working length was determined with radiography. Gates Glidden drills were used for enlargement of coronal segment of the root canal. The root canal was enlarged to ISO size 60 at working length. 2.5% Sodium hypochlorite was used during the preparation. The root canal was dried with paper points and obturated using lateral condensation technique with gutta percha and resin sealer. The root canal orifice was sealed with a temporary restoration(Fig 5).
The day after completion of the endodontic treatment, the root canal was prepared for the post placement by removing the gutta percha from the coronal two third of the canal with paeso reamers. The fibre post (FIBRAPOST, PD) was tried in the canal and adjusted to the desired length (Fig 6).

Space was also prepared in the pulp chamber of the fractured crown fragments for receiving the coronal portion of the post and also the core. The alignment of the coronal fragment was verified with the post in situ. The root canal was then etched with 37% ortho phosphoric acid, rinsed, blot dried with paper points, and bonding agent (PRIME & BOND NT Dentsply) was applied. The post was then luted in the canal using dual cured resin luting cement (RelyX 3M). The inner portion of the coronal fragment was similarly etched and bonded to the tooth using flowable composite resin (EsthetXFlow, Dentsply) after proper shade matching. The fracture line labially was then masked using composite resin (EsthetX, Dentsply). The tooth was polished with polishing disc(Fig 7).

Occlusion was checked and post operative instructions to the patient were given to deter from loading the anterior teeth. Clinical and radiographic examinations were carried out after 1 month, 3 months, 6 months and 1 year and the tooth responded favorably.

**DISCUSSION**

The fracture of a tooth may be a most traumatic incident for a young patient, but it has been found that there is a positive emotional and social response from the patient to the preservation of natural tooth structure. Coronal fractures must be approached in a methodical & clinically indicated manner to achieve a successful final restoration. The dentist plays an important role in the management of injured cases and so he has to take into consideration every possibility of saving a tooth that has received trauma. The remarkable advancement of 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 the intact tooth fragment is available.

Hayashi et al indicated that, the best restorative methods needed to be identified for teeth with extensive loss of structure, and reinforcing pulpless teeth. When a tooth has more than 50% of its coronal structure missing, the use of a post-and-core foundation is recommended prior to restoration. In recent literature reviews, it has become clear that posts do not strengthen endodontically treated teeth, and their use is justified only for retention of the coronal restoration.

The most common complication in post and core system is debonding. Root fracture is another reason for failure of the post-and core system.
Restoration with cast metal posts can cause wedging forces coronally that may result in irreversible failure because of fracture of an already weakened root. Fiber-reinforced composite resin post has demonstrated negligible root fracture.

Studies have indicated that dentin-bonded resin post-core restorations provide significantly less resistance to failure than cemented custom cast posts and cores. 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.

The use of natural tooth substance clearly eliminated problems of differential wear of restorative material, unmatched shades and difficulty of contour and texture reproduction associated with other restorative techniques.

CONCLUSION
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.

Fiber reinforced resins allow not only creation of esthetic restorations but also facilitates the preservation and reinforcement of tooth structure. However, before recommending a similar treatment on a regular basis, a longer follow-up period is required.

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REFERENCES
11. Hayashi M, Takahashi Y, Imazato S, Ebisu S. Fracture resistance of pulpless teeth restored with


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