

Tooth fragment reattachment: A viable treatment alternative.

A Vinaya Kumar Kulkarni *, Divya S Sharma **, Naveen Reddy Banda ***, Khushboo Barjatya****

Abstract:

Coronal fractures of the anterior teeth due to trauma are relatively common among children and adolescents. Reattachment of tooth fragment to a fractured tooth remains as the treatment of choice because of its simplicity, natural esthetics and conservation of tooth structure. This report presents a case of complicated crown fracture of permanent maxillary right central incisor in an eleven year old girl. The traumatized tooth was treated endodontically. The fractured fragment was reattached using bonding system and composite resin. Pre-bonding grooves and post-bonding double chamfer margin was created to enhance bond strength and aesthetics.

Key Words: central incisor, composite resin, crown fracture, tooth fragment reattachment, traumatic injury.

Introduction

Dental trauma is a common occurrence. Crown fractures accounts for up to 92% of all traumatic injuries to permanent teeth, commonly seen in Angles class I protrusive and class II division 1 type of malocclusions. The maxillary central incisors are most often injured in the accidents and boys are affected more than the girls.^[1]

Various factors influence the management of traumatized tooth. These include the extent and pattern of fracture, pulpal involvement, stage of root development, alveolar bone fracture, involvement of biologic width, soft tissue injuries, presence/absence of fractured tooth fragment, secondary traumatic injuries, occlusion and aesthetics.^[2-4]

Trauma to the tooth structure resulting in its fracture causes psychological stress in children due to missing tooth structure, besides the pain from the injury. Primary goal of the treatment remains aesthetic and functional rehabilitation of the fractured teeth. Composite resin restoration is usually

indicated in the treatment of fractured anterior teeth in children. However, reattachment of the fractured fragment is an excellent biological approach for restoration, when the fragment is available.^[4] The purpose of this case report is to describe fracture fragment reattachment in a maxillary central incisor with complicated crown fracture, using bonding system and composite resin.

Case report:

An eleven year old girl reported seeking treatment for her traumatized upper front tooth. Patient had trauma due to accidental fall four days ago. Trauma resulted in coronal fracture of her maxillary right central incisor. They reported with the fractured fragment of the tooth in dry condition. Her medical and family histories were non-contributory. On examination, no extraoral injuries were detected. Intraoral examination revealed permanent maxillary right central incisor was fractured (Fig 1) involving enamel, dentin and exposing the dental pulp. The pulpal exposure was more than 2 mm. in diameter and there was no associated

* Professor

** Professor & Head

*** Reader

****Senior Lecturer, Department of Pedodontics and Preventive Dentistry, Modern Dental College & Research Centre, Indore.

mobility of the fractured tooth. Intra oral periapical (IOPA) radiograph exhibited that there was only coronal fracture in an oblique direction, involving much of the distal portion of the tooth (Fig 2). Apex of the involved tooth was completely formed.

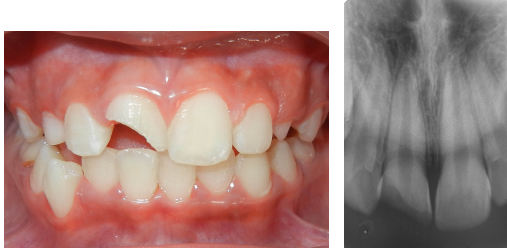


Fig.1 Intraoral view showing fractured maxillary right central incisor. Fig.2 Pre-operative IOPA radiograph

The fractured tooth fragment was preserved in distilled water until reattachment. Root canal treatment for the involved tooth was planned followed by tooth fragment reattachment. Access was gained to the root apex after administration of local anesthesia and rubber dam isolation. The working length of the root canal was determined. Shaping and cleaning of the canal was performed using endodontic K-files and H-files [MANI, INC. Utsunomiya, Tochigi, Japan]. Irrigation of the root canal at every step was done with 5.2% sodium hypochlorite and normal saline. The canal was finally flushed with normal saline and dried with absorbent paper points. The root canal was filled with a paste of calcium hydroxide powder mixed with saline [Deepashree products, Ratnagiri, India] for one week. After one week as the tooth was asymptomatic, final obturation was done using endodontic sealer [Endoflux, Ammdent, Mohali, India] with gutta-percha [Dentsply, France, SAS] by lateral condensation technique. After root canal filling the access cavity was sealed by glass ionomer cement (GIC) [KetacTM Molar Easymix, 3M ESPE AG, Seefeld, Germany].

After completing the endodontic procedure, fracture fragment reattachment procedure was carried out. The proper position and the fit of the fragment was

checked on the fractured tooth. Internal grooves were prepared on both fragment (Fig 3) and the fractured tooth to enhance the bond strength. The tooth fragment and the remaining tooth structures were etched with 37% phosphoric acid gel, 20 sec. for enamel and 10 sec. for dentin. The etched surfaces were rinsed with water for 10 seconds. After removal of the excess water, dentin bonding agent [AdperTM Single bond 2, adhesive; 3M ESPE AG, Seefeld, Germany] was applied to both bonding surfaces, in accordance with the manufacturer's instructions. A small layer of A2 shade composite resin material [Filtek Z250; 3M ESPE AG, Seefeld, Germany] was then applied to the fractured area of the tooth to which the fragment was reattached. The fragment was properly positioned on the fractured tooth surface, excess resin was removed and the area was light cured for 40 seconds, while the fragment was held in place under pressure. After bonding the fragment on the fractured tooth, a double chamfer margin was created 1mm coronally and apically to the fracture line using a round diamond bur. After acid etching, single bond adhesive was applied to the chamfer area, followed by composite resin [Filtek Z250, shade A2] was applied and light cured, according to the manufacturer's instructions. Final finishing and polishing of the composite resin was done using finishing burs and composite finishing kit [SHOFU, SHANK CA, PN 0306, Shofu Dental Corporation, USA] (Fig 4 & 5). The tooth was serving both aesthetics and function. Patient is under follow-up, planned at bimonthly intervals.



Fig.3 Showing the extent of fracture line.



Fig.4 Post-operative IOPA radiograph. fig.5 Intraoral view after fracture fragment reattachment.

Discussion:

Tooth fragment reattachment offers the advantage of being simple procedure, less time consuming, conservative technique, wear of the incisal edge at the same rate as the adjacent teeth, provides natural aesthetics in the form of colour, morphology and translucency match, acceptable by the patients with psychological benefits.^[4,5]

The purpose of additional preparations on the fractured tooth and the fragment, before and after bonding is to improve the bond strength and aesthetics. Reis *et.al.*^[6] demonstrated that composite over contouring to the fracture line by placement of a bevel, as well as creation of an internal groove on both fragment and on the fractured tooth, provided strength close to that of sound teeth. In contrast bonding without additional preparations provided the restored teeth with only 50% of the strength in comparison to intact teeth. In the presented case, internal grooves were prepared both on the fragment and the fractured tooth before bonding to improve the strength. This preparation utilized a greater volume of resin and created an internal bar, which opposes the forces applied on the buccal surface. External double chamfer margin was created after the bonding procedure to mask the fracture line, which improved the aesthetics and also the bond strength.

Dehydrated dentin on the fragment offers diminished bond strength. Hence, maintenance of adequate hydration of the fracture fragment when it is outside the

mouth is another important factor. At least 30 minutes of rehydration is required before the reattachment procedure to moisturize the collapsed collagen fibers and enhance the bond strength.^[7] Hydration of the fracture fragment also maintains original aesthetic appearance of the tooth.^[7] In the present case the fractured fragment was preserved in distilled water until completion of the endodontic treatment and start of the reattachment procedure, it improved the aesthetics with proper colour matching to the natural tooth structure. Furthermore, with the advent of newer adhesive materials available today, aesthetic results can be achieved with predictable outcomes.

Conclusion:

Successful case of fracture fragment reattachment using composite resin in a permanent maxillary right central incisor has been presented. This case demonstrates that reattachment of tooth fragments can successfully benefit the aesthetic needs and normal functioning of the tooth. However, the prognosis is dependent on patient cooperation and maintenance of good oral hygiene. Long term follow-up is required for cases with complicated crown fractures.

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Corresponding Author:

Dr. Vinaya Kumar Kulkarni

Professor, Department of Pedodontics
Preventive Dentistry, Modern Dental
College and Research Centre, Gandhi
Nagar, Airport Road, Indore – 453112.
Madhya Pradesh. (India)

E-mail: vinayakumar53@gmail.com,
vinayakumar53@rediffmail.com