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## **A biologic approach to crown fracture: Fragment reattachment with Ribbond for immediate esthetics: A case report**

**Pooja Misar, Hemalatha Hiremath, Pradeep Jain, Rucha Jain and Pankaj Verma**

#### **Abstract**

Coronal fractures of the anterior teeth are a common form of dental trauma that mainly affects children and adolescents. One of the options for managing coronal tooth fractures when the tooth fragment is available and there is no or minimal violation of the biological width is the reattachment of the fragment. This article presents a novel technique for reattachment of obliquely fractured fragment of vital maxillary central incisor with pulp exposure. Pulp capping was done using mineral trioxide aggregate (MTA). Polyethylene fiber (Ribbond) and flowable composite were used to reattach the fractured fragment using an internal groove technique to provide high fracture strength to restored tooth. Ribbond fibers can be used to give additional strength to the reattached tooth fragment so that the tooth obtains fracture resistance equal to an intact tooth.

**Keywords:** Coronal fracture, mineral trioxide aggregate, Ribbond, composite, fragment reattachment

#### **1. Introduction**

Traumatic crown fractures, which are caused from dental injuries, are a serious dental public health problem<sup>[1]</sup>. A majority of the crown fractures involve the maxillary incisors<sup>[2]</sup>. The reattachment of the fractured tooth fragment has advantages including the preservation of the remaining tooth structure, reproducibility of the tooth contour and natural colors, and the most well-preserved incisal transparency<sup>[3]</sup>. Resin based restorative materials are frequently used in restoration of the fractured teeth. Because of the poor mechanical resistance of these materials, different approaches developed to strengthening resistance of composite resin<sup>[4]</sup>. This paper presents a case report wherein the fractured fragment of right maxillary central incisor was reattached using Ribbond fibers.

#### **2. Case report**

A 22 years old male patient reported to the department of Conservative Dentistry and Endodontics, Sri Aurobindo College of dentistry, Indore, with the history of fall and injury to the upper front teeth on same day. Extra-oral examination revealed no significant abnormalities, and intra-oral examination revealed neither lacerations nor evidence of alveolar bone fracture, but there was a coronal fracture seen in relation to #11 with pin point exposure of pulp. [Figure 1a]. Patient brought the fragment in milk. Based on clinical and radiographic findings, it was diagnosed as Ellis class III fracture in relation to #11. It was planned to perform pulpotomy procedure on 11 followed by reattachment of the fractured fragment with Ribbond fibers reinforcement. Local anesthesia was administered (1.0 cc of lidocaine 2% with 1: 80,000 epinephrine). Rubber dam isolation was done. The fragment was then cleaned with 2% chlorhexidine solution and stored in isotonic saline solution. The pulpotomy procedure was completed on 11 using the MTA over that moist cotton plug was placed with the temporary restoration. [Fig 1b] After 24 hours patient had been recalled for further procedure. The temporary restoration and cotton plug were removed.

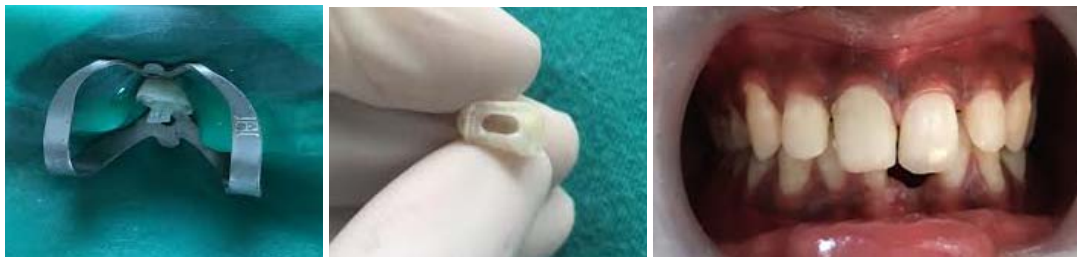
The groove was prepared on the tooth fragment. Both the intact coronal portion of the tooth and the original crown fragment were etched with 37% phosphoric acid gel for 20sec, rinsed with water for 20 sec and dried with a gentle stream of air, dentin bonding agent (Adper Single Bond Plus, 3M) Flowable composite resin (Filtek Supreme XT, 3M) was applied and cured for

40sec. Fragment was positioned to its original place with the help of a strip of Ribbond fiber (Ribbond Inc., Seattle, WA, USA). Excess resin was removed and light cured for 40 seconds. (Figure 2a 2b and 2c) Clinical and radiographical follow-up examination, after 6 months was done and

evaluated: fragment position, fragment stability, gingival swelling, and presence of abscess, sinus tract formation, sensitivity to percussion were normal and satisfactory. Vitality test was done and found normal pulp response. (Figure 3a and 3b)



**Fig 1a and 1b:** Clinical presentation of labio-palatal fracture of maxillary right central incisor and pulpotomy procedure



**Fig 2a, 2b and 2c:** Placement of Ribbond fiber into the prepared space, fractured fragment and reattachment



**Fig 3a and 3b:** Radiograph after pulpotomy and post-operative condition

### 3. Discussion

A fractured anterior tooth requires immediate clinical attention and, if untreated, can cause damage to dentition and even have a psychological impact on the patient [5]. One of the options for managing the coronal tooth fractures specially when there is no violation of biologic width is the reattachment of fragment when it is available [6]. As esthetics is of utmost importance to the patient, the dentist should therefore value the importance of adequately restoring the esthetic elements of the tooth. The restoration of root canal treated teeth, with significant loss of tooth structure, is often achieved with reinforcement [7].

Several conditions must be taken into consideration to determine the ideal option, such as the location and extent of the fracture, the pulpal condition, the degree of tooth eruption, the degree of root formation and the patient's esthetic demand. Pulpotomy procedure involves removing only part of the pulp, eliminating tissues that have inflammatory or degenerative changes and leaving intact the underlying healthy pulp. Eghbal *et al* revealed an outcome of short term clinical and histological study of MTA pulpotomy of 12 matured permanent molars with irreversible pulpitis. Clinically there

was no complaint of discomfort or tenderness in the next day. Later a dentinal bridge was evident in all cases when the teeth were extracted two months post treatment for histological study [8].

Ribbond is a fiber reinforced composite, which is made up of polyethylene fibers. It is a spectrum of 215 fibers with a very high molecular weight. These fibers have a very high coefficient of elasticity (117 Gpa), hence has an excellent resistance to stretch and distortion. They also have a very high resistance to traction (3 Gpa), as a result of their closed stitch configuration and a good adaptability. Bondable reinforcement fibers are also characterized by impact strength five times higher than that of iron. They are translucent and assume the color of the resin to which they are added [9]. The use of Ribbond fibers as root canal post and reattachment of an original crown fragment is a simple and efficient procedure for the treatment of traumatized anterior teeth that appears to offer excellent aesthetic and functional results.

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