Reattachment of Fractured Mandibular Incisor using Fiber-reinforced Post in a 12-year-old Patient: A 3-year Follow-up

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ABSTRACT

The incidence of coronal fractures from traumatic injuries is high in school children and causes serious functional, esthetic and psychological problems. Dentists are confronted on a regular basis with their management. Reattachment of a fractured fragment, though not a new technique, is gaining interest as a treatment option. This is due to its advantages over other techniques and advancements in adhesive dentistry. This manuscript presents a 3-year follow-up of a case of complicated permanent mandibular central incisor fracture (no cases reported in literature), that was successfully treated by fragment reattachment using a fiber-reinforced post and discusses the factors affecting the success of reattachment technique.

Keywords: Fiber-reinforced post, Reattachment, Trauma.

INTRODUCTION

Coronal fractures of the anterior teeth are a common form of dental trauma that affects children and adolescents. Majority of these dental injuries involve the anterior teeth, especially the maxillary incisors (because of its position in the arch), whereas the mandibular incisors and the maxillary lateral incisors are less frequently involved.

Reconstruction of fractured teeth has developed through the years and various methods and techniques are advocated. But, in the recent years, growing interest in minimally invasive treatment philosophy among dentists and advances in dentinal adhesives has renewed the interest in the tooth fragment reattachment as a treatment option for coronal fractures.

Reattachment of tooth fragment after trauma was described for the first time in 1964 by Chosack and Eldeman. Tennery was the first to report the reattachment of a fractured fragment using acid-etch technique. Subsequently, Starkey and Simonsen have reported similar cases. Santos and Bianchi, in 1991 coined the expression ‘biological restoration’ for the technique of bonding sterile dental fragments to teeth with large coronal destruction. Numerous cases of reattachment have been reported in literature since the early works and these include both complicated and uncomplicated tooth fractures. These works have identified the benefits of reattachment as obtaining esthetics in a single visit and also long lasting esthetics (the fragment being in right size, shape and color). In addition, the technique is simple, economical and fast. It has a positive psychological value to the patient. Sacrifice of the tooth structure is minimal and has a wear rate similar to the adjacent teeth. But, this technique is possible only when tooth fragment is retrieved and preserved after trauma and there is no or minimal violation of biological width.

Almost all these case reports discuss the reattachment of maxillary teeth and no case of reattachment of mandibular teeth has been reported. This could be due to lesser incidence of mandibular teeth fracture. This manuscript reports the successful reconstruction of a mandibular incisor with complicated fracture by reattachment of fragment and a follow-up after 3 years in a 12 years old patient.

CASE REPORT

A 12-year-old male patient reported with a crown fracture of permanent mandibular right central incisor (Ellis class III) and permanent maxillary right and left central incisors and permanent mandibular left central incisor (Ellis class II) from trauma that happened 30 minutes before reporting. There was an associated soft tissue injury in the lower lip (Fig. 1). The fragment of permanent mandibular right central incisor (Fig. 2) was recovered at...
the site by the patient and stored in water. It was transferred to saline immediately. Fragments of other teeth were not retrieved.

Clinical examination revealed a horizontal fracture line in permanent mandibular right central incisor (with pulpal involvement) that was close to the gingival margin (supragingival) with the distal end placed slightly above the mesial end.

Treatment options of endodontic therapy followed by reattachment or post-retained crown were explained to the patient. After analyzing the advantages, disadvantages, cost and prognosis, the patient chose reattachment procedure. Composite restoration was planned for the other teeth.

Local anesthesia was administered and working length was determined electronically (Foramotron D10, Parkell, New York, USA) and radiographically. Single visit root canal treatment was completed with gutta-percha (GP) (Dentsply, Switzerland) using cold lateral condensation. In the next step, GP was removed with Peeso reamer and post space was prepared. A light transmitter post (FRC Prostec Plus size 0, Ivoclar Vivadent, France) was tried in the canal (Fig. 3).

Tooth fragment was removed from saline, pulp remnants removed, cleaned with 2% chlorhexidine solution and tried on the post (Fig. 4). A groove was made to get a comfortable fit. The fragment with the post was tried on the tooth, fit and occlusion was checked (Fig. 5). The post was cut at the desired length.

Both the fractured segment and the tooth was acid etched with 37% phosphoric acid (Scotch bond, 3M ESPE, USA), bonding agent (Single bond 2, 3M ESPE, USA) was...
applied and post was cemented with light cure composite resin (Filtek™ Z350, 3M ESPE, USA). The fragment was reattached with the light-cure resin applied on its surface. Finishing and polishing were done (Fig. 6). Instructions were given to the patient. The patient was called for follow-up every 6 months. Clinical and radiographic review after 3 years were satisfactory (Figs 7 and 8).

**DISCUSSION**

Fracture of teeth is a very traumatic experience for any patient and more so if the patient is a child. Different methods of reconstruction are widely practiced and irrespective of the line of treatment, presence of large pulp, progressive eruption and gingival marginal instability pose a problem when treating children. So, when an intact fragment is available, reattachment that restores function and esthetics with a very conservative approach should be the first choice of treatment.

A number of factors are to be considered when reattachment is planned. First, the extent of dehydration plays a crucial role in fracture resistance and esthetics of the reattached fragment. The longer the fragment remains dehydrated, poorer the tooth’s strength will be. This could be due to collapse of the collagen fibers and obstruction of adequate resin monomer penetration, leading to a poor adhesion between dentin and composite material. This is overcome by fragment rehydration with saline.

Secondly, the mode of preparation influences the fracture resistance of reattached fragments. Different types of tooth preparation like beveling, chamfers, notching and over contouring of the fractured fragment are advocated prior to reattachment, but clinical trials and long-term follow-ups have reported that reattachment using modern dentin-bonding agents or adhesive luting systems achieve better functional and esthetic success.

In cases of complicated fractures, when endodontic therapy is required, the space provided by the pulp chamber can be used as an inner reinforcement, thus avoiding further preparation of the fractured tooth. The use of custom cast posts and prefabricated fiber posts have been recommended when more than 50% of the coronal tooth structure is missing. Among the two, fiber post has shown reduced root fracture and can be used with minimal tooth preparation. Reattachment of the fragment with fiber post was selected in our case considering its advantages over other technics and the age of the patient.

Other factors including the extent of fracture, alveolar bone fracture, pattern of restorability of fractured tooth, secondary traumatic injuries, the fit between the fragment and remaining tooth, occlusion, esthetics, finances and prognosis should be considered.

Finally, we cannot overlook the cooperation of the patients, especially those between 7 and 11 years of age for successful reconstruction of crown fractures.

The technique described in this case report is reasonably simple, quick and economic and very effective for young children. However, the professional has to keep in mind that, in addition to the above said factors, the
proper use of bonding protocol and materials is the key for achieving success in adhesive dentistry.

The disadvantages like unpredictable longevity and questionable esthetics in the long run are overcome by the fact that all the alternative methods as direct adhesive resin reconstruction, veneers and crowns can be performed in case of failure.

CONCLUSION

The present case demonstrates that reattachment is a viable, inexpensive and efficient technique that can restore esthetics and function almost immediately. Both maxillary and mandibular teeth can be treated by this technique. Esthetic results were satisfactory after a period of 3 years.

REFERENCES