

Case Report

The Restoration of Traumatized Anterior Teeth with Original Tooth Fragments

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Abstract: Anterior tooth fractures are a common dental injury, and treatment of these fractures is an important part of dentistry. Loss of tooth structure, tooth eruption, aesthetics, function, and patient expectations must be considered when evaluating treatment of this injury. Reattachment of an original fragment of a fractured tooth can provide the best result when considering color, shape, and transparency of the real teeth. In this case report, the restoration of incisor crown fractures with original fragments in three patients is presented.

Keywords: Trauma, Crown fractures, Reattachment

INTRODUCTION

Crown fractures are one of the most common traumatic injuries in permanent teeth. Dental trauma can occur following falls, traffic accidents, or sports activities [1]. Maxillary incisors are most often affected by the trauma due to their position in the arch [2]. Further, crown fractures are classified as complicated or uncomplicated injuries depending on pulp exposure [1]. Although tooth fractures create aesthetic problems, these injuries are easier to treat and have a better prognosis than root fragments [3].

Treatment of fractured anterior teeth is important for phonetics, function, and especially aesthetics. The purpose of the treatment is to maintain the natural appearance of the teeth, and to retain teeth in the mouth. The best technique is restoration of fractured teeth using original fragments [2, 4]. The development of adhesive dentistry in parallel with the "reattachment technique" has also increased the success of this treatment [5]. Additionally, tooth fragment reattachment results in improved aesthetics, and translucent color harmony, and the continuity of the contours of the original tooth can be protected. Finally, bonding of the original tooth fragment requires less time than a composite restoration [6].

Researchers have suggested various techniques including circumferential bevel, external chamfer, V-shaped enamel notch, internal groove, and superficial overcontour of restorative material on the fracture site for fragment reattachment [7-10]. The current case

reports provide details of the successful treatments of three cases of crown fractures with original tooth fragments.

CASE REPORT

Case 1

An nine-year-old female patient was referred to the pediatric dentistry department with complaints of traumatic injury to the right maxillary incisor following a bicycle accident. On clinical examination, no pulp exposures, luxations, or trauma to surrounding tissues or other teeth were apparent. The root formation of incisors was examined using radiography, and no fractures related to periapical tissues or the radices were identified. Responses to an electric pulp test were positive. After the procedure was explained to the parents, treatment was started. The fracture line and fragments were etched with 37% phosphoric acid gel for 20 seconds, and washed and dried with gentle stream of air. Bonding material was applied to the etched enamel and the dentin surface. The same procedure was applied to the fragmented teeth. Composite resin was applied to the tooth fragment and to the tooth surface, and the tooth fragment was repositioned directly over the fractured tooth. The region was light cured for 40 seconds, and polishing was completed using finishing discs (Fig. 1). One year later, the results of clinical and radiographic examinations of the restoration indicated that the repair was still intact, and that no pathology was present in the periapical tissue.



Fig. 1(a): Clinical appearance of Case 1 before treatment. (b): After treatment

Case 2

A ten-year-old male patient suffered a traumatic injury to his right mandibular central incisor while playing volleyball, and was admitted to the pediatric dentistry department 2 hours later. Intraoral examination revealed crown fractures without pulp, and no mobility in the right mandibular central incisors, while extraoral examination revealed no soft tissue

damage. Lastly, radiographic examination revealed that no root fractures were present. Similar to the first case, the right mandibular central incisor were restored using tooth fragments (Fig. 2). One year later, the results of clinical and radiographic examinations indicated the restoration was still intact, and that no pathology was present in the periapical tissue.



Fig. 2(a): Clinical appearance of Case 2 before restoration. (b): After treatment.

Case 3

An 11-year-old male patient was admitted to the pediatric dentistry department with complaints of traumatic injury to the right maxillary incisor following a fall at school. Clinical examination revealed a horizontal crown fracture in the middle third. Radiographic examination revealed complete root formation in the right maxillary incisors, and no

fractures in the root. After providing the necessary information to the patient and her parents, treatment was initiated. Similar to the first case, the right maxillary central incisor was restored using tooth fragment (Fig. 3). One year later, clinical and radiographic examination revealed the restoration was still intact, and that no pathology was present in the periapical tissue.



Fig. 3(a): Maxillary right central tooth fracture of Case 3 before restoration. (b): Clinical appearance after treatment.

DISCUSSION

Dental injuries generally involve maxillary incisors, due to their position in the arch, and less frequently involve mandibular, central incisors, and maxillary lateral incisors. Crown fractures are typically seen in anterior teeth, and usually affect children and adolescents [11, 12]. In fact, this fracture is one of the most common dental injuries in permanent dentition. In crown fractures, the form of treatment and post-treatment prognosis depend on the degree of fractures and the dental tissues involved [1]. Trauma that occurs in the group of upper front teeth creates aesthetic concerns and loss of function in patients. Therefore, emergency treatment is often required to address psychological and physiological losses. For this purpose, the most conservative treatment is the reattachment technique [13, 14]. The reattachment technique is a conservative, aesthetic, and cost effective restorative technique that offers an alternative to resin based composite restorations or prosthetic restorations [10, 15-17]. This technique provides a quality and long-term aesthetic solution to a tooth fracture because it harmonizes with the anatomic form, color of the tooth, and it continues to protect the surface structure. In terms of restoration, the reattachment technique also offers the advantages of positive psychological responses, ease of application, and minimal loss from the remaining tooth structure [18].

Clinic applications and long term follow-up has revealed that modern dentin bonding agents and adhesive bonding systems used in the reattachment technique increase the functional and aesthetic success [10, 19].

Cavalleri and Zerman [20] have reported long-term follow up studies of the reattachment technique, and confirmed that the reattachment technique yielded more successful results than composite resin restorations. Similarly, Kararia *et al.* [21] and Macedo *et al.* [3] reported more successful short and long-term results in coronal fragment repairs with the reattachment technique.

Eden *et al.* [22] reported that the reattachment technique that more comply the fracture segments were better in complied with together, positively affected the stability of the natural tooth surface, as well as successful biocompatibility with periodontal tissue.

Reis *et al.* [7] reported on the fracture resistance of reattachment technique, and noted that without any preparation, the application fracture resistance was only 37.1%, while in the buccal chamfer application resistance was 60.6%, in bonding with an over contour it was 97.2%, and in the placement of an internal groove it was 90.5%.

Demarco *et al.* [23] evaluated the different adhesive systems and the effects of the bevel preparation in regards to resistance against fracture. They reported that bevel applications in all groups increased the resistance against the fracture, while adhesive bonding applications yielded poor results. For this reason, we successfully restored the coronal fracture and bevel applications together with the original tooth fracture in all three of our cases.

CONCLUSION

Developments in composite filling materials and dentin bonding systems have provided the opportunity to use tooth fragments in the treatment of dental trauma. Further, the reattachment technique provided protection of the original tooth structure, as well as positive social and psychological effects on young patients. In our cases, we obtained quality, long-term aesthetic results from the reattachment of tooth fragments, as well as protection of the original anatomic forms, color, and surface tissue.

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