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Clinical management of a fractured anterior tooth with reattachment technique: a case report with an 8-year follow up

CASE REPORT

Ufuk Işeri, Zeynep Özkurt, Ender Kazazoğlu

Department of Prosthodontics, Faculty of Dentistry, Yeditepe University, Istanbul, Turkey

Correspondence to: Dr. Zeynep Özkurt, Department of Prosthodontics, Faculty of Dentistry, Yeditepe University, Bagdat cad. No 238 Göztepe, Istanbul, Turkey
Tel.: +90 216 363 60 44/6412
Fax: +90 216 363 62 11
e-mail: zeynepozkurt@hotmail.com

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Abstract – Fracture of anterior teeth is a relatively common outcome of trauma to the teeth. If the fractured teeth fragments are recovered by the patient and brought to the dental office within reasonable time, the fragments may be reattached to the remaining tooth structure. This article presents a case of a 15-year-old male patient with fractured left maxillary lateral incisor. The fragment reattachment was performed using dual-cured composite resin cement and the treatment outcomes of an 8-year follow up were presented. The technique described in this case report for reattachment of the fractured fragments is simple, while restoring providing long-lasting esthetics and improved function with a very conservative approach.

Coronal fracture of the anterior teeth by dental trauma is a common type of injury that mainly affects children and adolescents (1, 2). The majority of dental injuries involve the maxillary incisors because of their position in the arch (3). Functional, esthetic, and phonetic impairments are the main problems of the tooth fractures (4). There are different reliable treatment alternatives to restore the fractured teeth such as veneer crowns, laminate veneers, or composite resin restorations (5). Although these conventional treatment modalities are indicated for fractured teeth, they are time-consuming, high priced, and not conservative (6).

Another excellent option for managing coronal tooth fractures is the reattachment when the fragment is available (7–9). Chosack and Eidelman (10) first described the restoration of fractured teeth using the dental fragment in 1964. Since then, several successful case reports that use a variety of techniques and materials to reattach fractured teeth have been published. Today, with the improvements in adhesive dentistry, this technique is almost the first choice to restore the fractured teeth (9, 11, 12). The fragment reattachment offers a conservative, safe, simple, and cost-effective restorative option with less chair time (13–15). Furthermore, reattachment can provide good and long-lasting esthetics, because the anatomic form, color, and surface texture are maintained (3).

This article reports a coronal tooth fracture that was successfully treated using tooth fragment reattachment. In addition, clinical and radiographic findings are demonstrated after an 8-year follow up.

Case report

A 15 year-old male patient was referred to Yeditepe University Faculty of Dentistry on September 2001, soon after sustaining a crown fracture to the maxillary left lateral incisor during sports activities. Intraoral clinical examination revealed a one-part crown fracture (Fig. 1). The fractured tooth fragment was recovered by the patient at the site of the injury and maintained in a moisturized environment (Fig. 2). There were no signs of soft tissue laceration or evidence of alveolar bone fracture. The radiographic examination revealed full root development and absence of an extensive root fracture. Pulpal exposure was observed, and the tooth was diagnosed as non-vital by electrical pulp test. Then, an endodontic treatment was performed and the patient was referred to Department of Prosthodontics (Fig. 3).

After routine dental and medical history taking and examination, the treatment options were presented to the patient including (i) postcore and crown, (ii) crown buildup restoration with a resin-based composite, and (iii) reattachment of the tooth fragment. After some deliberation about the advantages, disadvantages, prognosis, and cost of every treatment option, the patient was decided to have reattachment of the tooth fragment. This treatment option was presented after confirming that the fragment was in good condition and that it fit reasonably well on the fractured tooth (Figs 4 and 5).

The root canal filling material was removed from the pulp chamber (Fig. 6), and the entrance of the root canal was sealed with glass ionomer plug (Ketac Cem; 3M ESPE, St. Paul, MN, USA). The fractured tooth and the fragment were cleaned with polishing paste and brush.

Fig. 1. Tooth fragment.

Fig. 2. Storage condition.

Fig. 3. Frontal view of the patient after the endodontic treatment.

Fig. 4. The confirmation of the well fit of the fragment-frontal view.

Fig. 5. The confirmation of the well fit of the fragment-lingual view.

Fig. 6. The root canal filling material was removed from the pulp chamber.

Then, the enamel margins were beveled to increase the adhesive surface area. After etching the enamel layers of the fragment (Fig. 7) and tooth with 37% phosphoric acid gel (Etch-Rite; Pulpdent, Watertown, MA, USA) for 30 s, they were rinsed and dried. Syntac Adhesive System (Ivoclar Vivadent, Schaan, Liechtenstein) was applied to the dentin surfaces of the remaining tooth and the fragment according to the manufacturer's instruc-

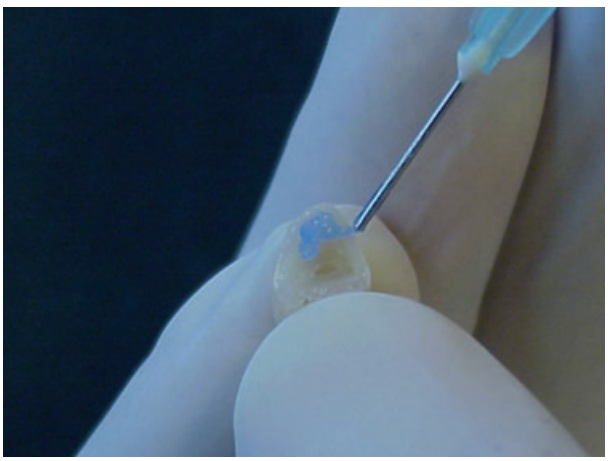

Fig. 7. The acid-etching of the fragment with 37% phosphoric acid gel.

tions (Fig. 8). Composite resin cement base and catalyst (Variolink II; Ivoclar Vivadent) were mixed and applied to both fragment and tooth surfaces (Fig. 9). The fractured segment was then accurately placed on the tooth, paying special attention to the fit between the segments. When the original position had been reestablished, excess resin was removed and the area was light-cured for 40 s on each surface, making sure that no displacement of the fragment occurred before resin polymerization was complete (Fig. 10). The occlusion was carefully checked and adjusted (Fig. 11). The margins were properly finished with diamond burs and polished with a series of polishing disks (3M ESPE) and diamond polishing paste. The radiographic examination was performed after the treatment (Fig. 12). The patient was then scheduled on recall visits at each 6 months. After 8 years, the tooth remained clinically acceptable and exhibited good esthetics, good periodontal health, and normal function. The clinical and radiographic findings presented no color change, no mobility, and no periradicular pathosis, and the tooth had a healthy periodontium with only minimal gingival recession (Fig. 13).

Discussion

The reattachment technique described in this case report is simple because it is restoring function and esthetic with a very conservative approach. With the materials available today, esthetic results can be obtained with predictable outcomes (16). Case reports and clinical experiences show that the reattachment of tooth fragments results in successful short- and medium-term outcomes (4, 17, 18). However, long-term results are unknown. In this case report, good immediate esthetics and functional outcomes of the reattachment technique over an 8-year period were presented.

Although composite resin restorations are indicated in the management of fractured anterior teeth, reattachment is an excellent option when the fragment is available (7–9). There are many factors affecting the long-term success of this technique. The adequate hydration while the fragment is outside the mouth is an important factor. Hydration maintains the vitality and original esthetic appearance of the tooth (19). In addition, it ensures adequate bond strength (20). However, fragments are not always kept hydrated after an accident until the moment of restoration (21). In this case, the fractured tooth fragment was maintained in a moisturized environment.

The most frequently used materials for reattachment of fractured segments are the adhesive systems, because they provide high bond strength between the fragment and the traumatized tooth (22). The success of the reattachment technique is directly related to the adhesive materials, which should be selected on their mechanical properties and the biocompatibility with the dental and periodontal tissues (22–24). Technical sensitivity of the adhesion procedure is another important issue for the success. Today, with the improvements in adhesive dentistry, this technique is almost the first choice to restore the fractured teeth (9, 11, 12). In this case, Syntac adhesive system and dual-cured resin cement were used, which would provide high bond strength. The root canal filling was removed from pulp chamber both to increase dentin surface and to obtain mechanical retention. The beveling of the enamel margins of tooth and fragment before reattachment may improve the retention and hide the finishing line (25). Therefore, little beveling was performed both to increase retention and to keep the precision fit between the segments in the presented case.

The reattachment technique has advantages over composite resin restorations or prosthetic restorations such as ease of application, less chair time, and lower cost (17). On the other hand, indirect restorations built in the laboratory do not simulate natural tooth esthetics completely. This technique maintains the natural tooth color, contour, translucence, and texture (13–15).

Fig. 8. Syntac Adhesive System was applied to the dentin surfaces of the remaining tooth (a, Syntac Primer; b, Syntac adhesive; c, Heliobond).

Fig. 9. Resin cement (Variolink II) applying to remaining tooth.

Fig. 10. The accurate placement of the fragment.

Fig. 11. The postoperative frontal view of the patient.

A few clinical trials and short- and medium-term follow-up studies that use a variety of techniques and materials to reattach fractured teeth have been published (4, 17–19, 26). Andreasen et al. (26) stated that the reattachment of the coronal fragment is a realistic alternative to placement of conventional resin-composite restorations. Oz et al. (4) reported that excellent stabilization of the fractured fragment, excellent natural appearance with no color change, and good periodontal health with no periradicular pathosis were maintained during a 4-year follow up. Baratieri et al. (19) pointed out that the tooth showed optimal fragment rehydration, presence of pulpal vitality, absence of sensitivity, and a good esthetic after 3 years.

Fig. 12. Radiographic image of the fractured tooth after the treatment.

Fig. 13. Intraoral view of the patient after an 8-year follow up.

After an 8-year follow up, excellent stabilization of the fragment, natural appearance with no color change, and healthy periodontal tissues with only slight gingival recession were observed in the presented case. The radiographic examination showed no periradicular or periodontal pathosis. The results are satisfactory both for the patient and for the clinician.

It can be concluded that the reattachment is a very conservative technique that restores esthetic and function. The clinician has to be careful about technical sensitivity of bonding procedures to achieve success in this technique.

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