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CASE REPORT

Restoration of tooth fractures using fiber post and fragment reattachment: Three case reports

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ABSTRACT

Mostly affected teeth from dental trauma are maxillary anterior teeth**.** The immediate agglutination of original fractured tooth part is a good alternative option in the scope of emergency treatment for remaining esthetical and functional problems. In this case presentation, the endodontic and esthetic treatment approach of crown and crown–root fractures that were occurred in various levels is shown.

Key words
Crown fracture, fiber post, reattachment, restoration, trauma

INTRODUCTION

In permanent dentition, dental trauma is a more common event in young patients and resulting in fracture of anterior teeth. These fractures subsequently lead to esthetic, functional, and phonetic problems. Management of the dental trauma requires a comprehensive and accurate diagnostic and treatment plan.[1] Choosing a treatment approach for a complicated crown fracture depends on the level and position of tooth fracture line, availability of displaced tooth fragments, type of occlusion, and prognosis.[2,3] A number of techniques have been reported for the treatment approach of fractured anterior teeth such as the use of the tooth fragment either as a temporary or permanent crown, definitive crown after an orthodontic and surgical extrusion or a crown lengthening, extraction followed by implant or fixed partial denture, composite restorations, and post core supported restorations.[4]

Reattachment of tooth fragments can be used only when the intact tooth fragment is available and this technique is a viable alternative to conventional approach with minimal or without violation of biologic width.[5,6] This technique is a simple conservative approach to provide functional rehabilitation and economically acceptable and it can offer good and long-lasting esthetics (as the original tooth anatomic form, color, and surface texture are maintained).[7]

The purpose of this case report is to discuss various possible uses of natural tooth in order to maintain esthetic integrity of dentition and describe three such cases that were successfully treated using tooth fragment reattachment.

CASE REPORT

Three patients with of fractured anterior teeth referred to the Kirikkale University, Faculty of Dentistry, Department of Endodontics, following trauma. One was a 21-year-old male patient with a fractured maxillary right central and lateral incisor, the second case was a 19-year-old male with a fractured maxillary left central incisor, and the third case was 23-year-old female patient with fractured maxillary left lateral incisor.

In the first case (henceforth referred to as Case 1), clinical and radiographic examinations showed an oblique crown-root fracture in the maxillary right lateral incisor and maxillary right central incisor due to fall on the ground [Figure 1]. The fracture line was extending in apical direction from labial to palatal surface in the level of the alveolar crest at the lingual aspect. Fracture

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portion of the lateral incisor was intact [Figure 2]. Central incisors' crown fragment was brought by the patient. In the second case (henceforth referred to as Case 2), clinical and radiographic examination revealed that it was a complicated crown–root fracture in an oblique direction from labial to lingual in occlusal direction related to maxillary left central incisor due to hitting a hard object [Figure 3]. An oblique fracture of the palatal portion extended subgingivally and fractured fragment partially attached to the crown structure [Figure 4]. In the third case (henceforth referred to as Case 3), clinical and radiographic examinations showed a complicated crown fracture (enamel–dentin fracture with pulpal involvement) in the maxillary left lateral incisor because of trauma sustained during fall [Figure 5]. The fracture was found to be extending in a labio–palatal direction [Figure 6]. The crown fragment was brought by the patient. She did not have swelling or hemorrhage in the related area. Isolation was achieved using cheek retractor, cotton rolls, and saliva ejector placed in position. Various treatment options were explained to the patients and they preferred to reattachment of tooth fragments option. After administering local anesthesia the fractured part was carefully removed and to prevent dehydration and the original fragment was kept in distilled water till the completion of root canal treatment and post preparation. Gelatin sponge (Gelatamp, Roeko, Germany) was packed on palatal surface in the subgingival area to control any bleeding from that area. All subsequent processing was the same way in all three cases. Single-visit root canal treatment was completed and the post space was prepared. Gutta percha filling was removed from two-thirds of the canal retaining approximately 5-6 mm of gutta percha apically. Post space preparation was done with a reamer of size 1 mm provided in the D.T. Light-Post (R.T.D, St-Egreve, France). Coronal portion of the fiber post was cut to fit into the coronal fractured fragment and the fragment was aligned with the apical portion of the tooth fragment and radiograph was taken for the confirmation of the post length. Both fractured crown and root fragments were etched with K Etchant gel for 10 s. ED Primer was applied on the surface of the tooth structure (enamel and dentin) with a disposable brush and left in place for 30 s. Panavia F 2.0 (Kuraray,

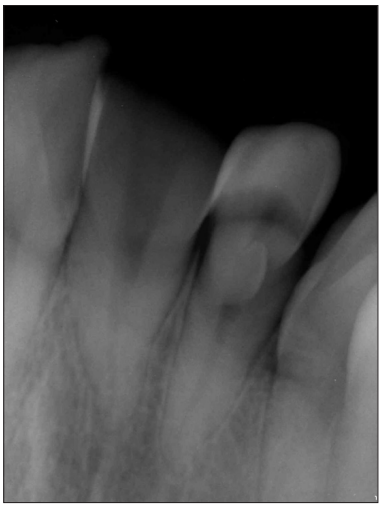

Figure 1: Preoperative radiograph

Figure 2: Fractured maxillary right central and lateral incisor (preoperative image)

Figure 3: Case 2 - preoperative radiograph

Figure 4: Case 2 - fractured maxillary left central incisor (preoperative image)

Okayama, Japan) paste was mixed and applied around the post and the retention box of the fragment and the fragment was reattached to the tooth. Excess paste along the margins was removed using blade and light cured with curing light for 20 s. Flowable composite (Filtek Flow, 3M-ESPE-USA) was placed inside the palatal opened area around the post head and cured. The fracture line was examined and polished with polishing disks (Sof-Lex; 3M/ESPE, St. Paul, MN, USA). Occlusion was checked and postoperative instruction to the patient was given to avoid loading of anterior teeth. The repaired areas were barely visible and the esthetic result was excellent in all cases [Figures 7-9]. The patients were examined 6, 12, 24, and 36 months after treatment. After 3 years, the treated teeth have satisfying excellent esthetics and function [Figures 10–12]. There was no mobility of any of the fragments, and the periodontal status of the teeth were satisfactory (no periodontal pockets with normally contoured palatal gingiva). Radiographic examination reveals satisfactory healing and no discoloration was evident on clinical examination.

DISCUSSION

Protection of mechanical and functional integrity is one of the most important factors in the restoration of traumatized anterior teeth. There are many different treatment modalities for restoration of traumatized teeth such as composite resin restorations with and without pins and prosthetic repair.[8] Whenever the fractured fragment is available intact, the reattachment of the fragment has to be the most desired treatment. Using a natural teeth structure within a single appointment provides functional, esthetic, and very cost effective treatment alternative to the patient.

With advances in adhesive dentistry, the process of fragment reattachment has become simplified and more reliable.[9] This technique has several advantages such as maintenance of original enamel translucency, similar wear rates as compared to the adjacent teeth, and minimal chair time needed. Recently, different types of post materials have been introduced into the dental practice such as carbon fiber, quartz, and glass fiber.[10]

Figure 5: Case 3 - preoperative radiograph

Figure 6: Case 3 - fractured maxillary left lateral incisor (preoperative image)

Figure 7: Case 1 - postoperative view

Figure 8: Case 2 - postoperative view

Figure 9: Case 3 - postoperative view

Figure 10: Case 1 - follow-up radiograph

Figure 11: Case 2 - follow-up radiograph

Figure 12: Case 3 - follow-up radiograph

With the recent improvements in the dental materials resin-based restorative materials with tooth-colored fiber post are of choice because of several advantages such as a suitable elastic modulus, esthetics, good bonding between post and cement, lower chair time, and minimal tissue removal.[11,12] The use of a fiber post with fractured teeth, as it interlocks the two fragments, minimizes the stress on the reattached tooth fragment.[11,12]

In this case, a dual curing resin Panavia F2.0 was used. The advantages of this system are bond strength, esthetics, and complete curing. A number of case reports explain the successful reattachment of traumatized tooth fracture cases.[13-15] This paper signifies that different tooth fragment types successfully treated by using a fiber-supported post system with dual curing resin.

Rubber dam was not possible in these cases, but adequate isolation was achieved using cotton rolls and cheek retractor. The medium of dental fragment conservation is important to maintain fragment hydration. We preferred distilled water to prevent dehydration of the original fragment till the completion of root canal treatment and post preparation. Follow-up visits are critically important for all traumatic injuries. The patient should be followed for 3, 6, 12 months and yearly for 5 years.[16] Esthetics, tooth mobility, and periodontal status should be confirmed both clinically and radiographically at these follow-up visits.

These case reports presented a successfully esthetic management of a complex crown fracture and an oblique crown–root fracture. At the crown–root fracture treatment, the method that includes agglutination of fractured parts to each other using fiber post and resin is preserve sound tooth structure and returned loss tooth structure. The agglutination method of the fractured part, using fiber-supported post system, is an effective and conservative treatment option that provides regaining esthetic and functional completeness for the patient.

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