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CASE REPORT

Multi-disciplinary approach for the treatment of maxillary anterior teeth with luxation injuries and complicated crown fractures: A case report

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ABSTRACT

Anterior tooth fractures are commonly seen types of dental injury. In the treatment of complicated crown fractures, two treatment options as extraction and root canal treatment could be considered due to the remaining tooth structure. Endodontic treatment is vital in order to maintain function and provides better aesthetics and reliefs the patient's pain. The aim of this case report is to present a 17-years-old female patient's treatment and five-years follow-up radiographs and photographs. Patient had the multiple traumatized (luxation and complicated crown fractures) maxillary incisor teeth with periapical lesions. After careful examination and multidisciplinary treatment, periapical lesions were healed, teeth and adjacent tissues were healthy and functional. Endodontic treatment must be considered by clinicans instead of extraction of tooth as a priority.

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INTRODUCTION

Traumatic dental injuries may occur in accidents (automobile, bicycle etc.), during sport-related activities, falls and fights.[1] The maxillary anteriors are the most frequently traumatically injured teeth due to their exposed position in the dental arch.[2] The incidence of complicated crown fractures ranges from 2% to 13% of all dental injuries and the most commonly involved tooth is the maxillary central incisor.[3] The anterior tooth loss or fracture occurring as a result of trauma, can cause aesthetic and psychological problems especially in young patients. Anterior aesthetic and functional dental rehabilitation plays an important role in the development of quality of life, one's self-confidence and to engage in an active social life of next term.

Dental trauma can cause many different types of injuries on dental and surrounding tissues. Crown fractures involving enamel, dentin, and pulp, are called as complicated crown fractures. Teeth with crown fractures and exposed pulps can be treated either by pulpotomy or root canal therapy before restoration of lost tooth structure. If vital pulp therapy is planned, it is important to perform treatment as soon as possible after the injury.[4,5] Lateral luxation is defined as a trauma, displaced the tooth lingually, buccally, mesially, or distally, which is, out of normal position.[5] Complicated injuries such as luxation combined with fractures could pose a risk factor for pulp health.[6,7]

In trauma cases, a right diagnosis, treatment planning and follow-up are crucial in order to achieve successful treatment results[8] and function and aesthetics should quickly regained. In the treatment of complicated crown fractures, two different treatment options emerge according to the remaining tooth structure; these are tooth extraction and root canal treatment.[9] Injuries have been restored with posts and crown techniques after endodontic treatment in this clinical case.

The objective of this case report is to present multi-disciplinary approach of traumatized maxillary anterior teeth treated in endodontic, restorative dentistry and prosthodontic departments.

CASE REPORT

A 17-years-old female patient referred to Ankara University Faculty of Dentistry Department of Endodontics with trauma history which caused fracture of her anterior teeth. Clinical examination revealed crown fracture of maxillary left central, lateral, and maxillary right lateral, combined with lateral luxation injury in maxillary right central incisor. Radiolucent lesions were determined in the periapical area of maxillary right central, lateral and maxillary left central incisors radiographically. It was learned from the patient that she had gone under orthodontic treatment due to her protrusive incisors for about 3 years and the treatment was ended 1 year before the injury. Severe pain, mobility, percussion and palpation sensitivity was observed clinically. Clinical situation reflect the combination of complicated crown fractures and luxation injuries on teeth.

After the treatment of soft tissues, dislocated tooth repositioned with finger pressure under local anesthesia. The damaged teeth were splinted with composite resin and pulp extirpations were made immediately (Figure 1). Calcium hydroxide dressing was applied to the root canals monthly for 4 months. And then root canal fillings were made by gutta-percha and Seal-Apex root canal sealer (Figure 2). The splint was removed after three weeks. The teeth were restored with composite resin (Filtek Z 250, 3M Espe, St. Paul, MN, USA) temporarily (due to aesthetic concerns and the patient's age) after placing the fiber

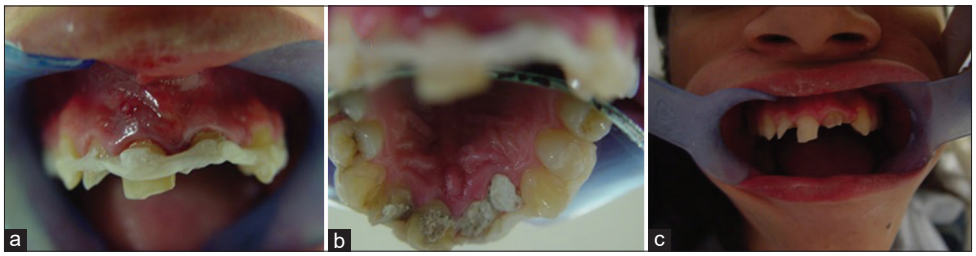

Figure 1. Intraoral view after splint application (a), Intraoral view from palatinal after splint application (b), after removing splint (c)

Figure 2. Radiographs taken from right (a) and left incisors (b) after endodontic treatment

posts (Glassix, Harald Nordin SA, Chailly-Montreux, Switzerland) (Figure 3). The patient was called for routine controls for about 1 year after the endodontic treatment (then was called in 1-year intervals) and no problem was observed (Figure 4). Maxillary anterior teeth have been permanently restored with zirconia-based all-ceramic restorations (Figure 5).

After endodontic treatment, periapical lesions were healed, the patient's gums were healthy, and there were no symptoms of sensitivity to percussion, palpation tenderness, fistula or swelling. Five years records and clinical examination showed that the teeth were healthy, moreover, no signs of root resorption and periapical lesions was observed (Figures 4,5).

DISCUSSION

Traumatic dental injuries (TDIs) of permanent teeth occur frequently

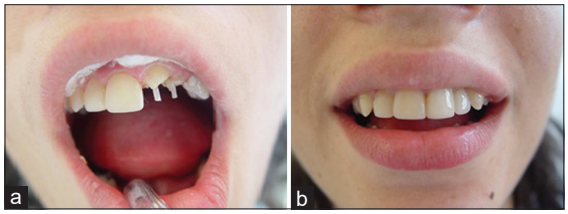

Figure 3. Fiber post application (a) and composite restorations (b) after root canal treatment

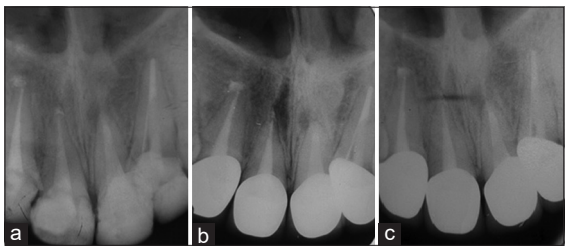

Figure 4. Radiographs of 1 year follow up (a), 3 years follow up (b) and 5 years follow up (c)

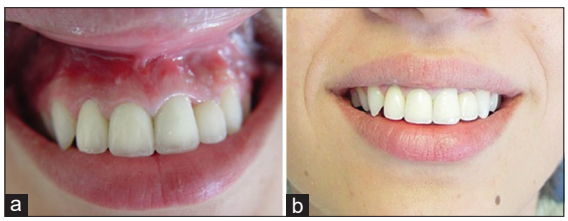

Figure 5. Zirconium oxide based ceramic restorations after 1 year (a) and 5 years of treatment (b)

in children and young adults. Crown fractures and luxations are the most commonly occurring ones among all dental injuries. The susceptibility of teeth to trauma is closely related to position of the teeth in the mouth. The maxillary incisors were found to have a much higher prevalence and incidence of trauma than

the mandibular incisors, and the maxillary central incisors had a higher prevalence and incidence of trauma than did the maxillary lateral incisors. Especially, if maxillary incisors are associated with a Class II division 1 malocclusion, risk factors increases due to trauma.[10,11] The patient in the present case had been treated orthodontically because of her Class II division 1 malocclusion approximately 5 years before the trauma. However, the patient still has an excessive overjet. When the patient referred to the clinic just after the accident, not only fractures but also periapical lesions were observed in the periapical area of maxillary incisors radiographically. These lesions may have occurred as a result of orthodontic forces during maxillary incisor retraction which were applied in order to correct class II relationship and excessive overjet. Neurogenic inflammation by inducing orthodontic forces associated with the release of neuropeptides can lead to changes in the pulp. This iatrogenic injury may vary from simple pulp necrosis to the internal resorption.[12] We considered that the periapical lesions were related to orthodontic forces five years prior therapy, because there was no history of trauma to teeth, filling or deep decay.

Orofacial trauma may lead to different results starting from simple enamel fracture to more complex injury and require long-term follow-up. One of the most challenging problem in dentistry is to decide which treatment option is the best for the restoration of one or more of the maxillary incisors that have been fractured as a result of traumatic injuries. Different treatment approaches have been indicated for traumatized teeth, depending on the location of the fracture, remaining tooth structure, health of adjacent tissue, type of injuries, patient's cooperation and aesthetic expectations, socioeconomic status.[9] Primarily, in the present case we decided endodontic therapy and follow up because of female patient's age, type of trauma and periapical lesions.

Calcium hydroxide has wide application area in endodontic practice as dressing material because of its biological properties and antimicrobial effects. Calcium hydroxide shows these features by inducing bone formation and by inactivating lipopolysaccharide. Calcium hydroxide may be the best choice for different clinical situations. A high degree of success has been reported in several studies by using calcium hydroxide in the treatment of periapical lesions.[13-15] In the present case besides trauma injuries, there were periapical lesions in the teeth, so calcium hydroxide dressing was applied for a period of 4 months and the results were successful in non-surgical treatment of lesions.

Maitin et al. primarily performed root canal treatment and extrused the tooth orthodontically for 12 weeks, then tooth was restored with metal cast core and porcelain fused crown.[16]

Biagi et al. performed root canal treatment, build up the tooth by glass fiber and composite resin and restorated tooth with alimuna ceramic crown that in their case of crown fracture. [17]

Altun et al. have applied primarily intracanal medicament for 4 months in the treatment of crown fracture, authors applied endodontic treatment and restorated the tooth with glass fiber post and composite resin same as in the present study.[18] In the present study, in order to provide a better aesthetic teeth were restorated with zirconia-based all-ceramic restorations finally after periapical healing.

Asgary and Fazlyab treated to complicated crown fracture with minimal pulpotomy about 1 mm and restored with

composite resin. In the present study, teeth were nonvital and exposed areas were very large, therefore root canal treatment was preferred.[19]

Fragment reattachment has been applied in many cases in the literature as another treatment option[20-23] but in the present case, the patient had a serious accident and fructured components could not be reached.

The purpose of the endodontic and restorative treatment is to gain dental function, form and aesthetics again. Anterior teeth aesthetics may significantly affect the patient's psychology. Traditionally cast posts have been used for a long time to restorate complicated crown fracture. Depending on developments in adhesive dentistry resin-based fiber-reinforced posts have been used in the restoration of maxillary anterior teeth.[9] Fiber resin posts shows similar hardness to dentin and exhibits greater durability than the metal posts. Having elastic modulus similar to dentin, strengthens the remaining tooth structure and increases resistance to tooth fracture.[24-26] Because of this advantages, fiber post was used in this case to restorate the fractured teeth with composite resins.

The present case demonstrated that the teeth can be kept in the mouth in a healthy way even in severe dental trauma as a result of careful and multidisciplinary study.

CONCLUSION

Physicians must approach rather conservative for physically and psychologically worn patient. In such cases, during assessing treatment options, the occurring loss of dental hard tissues, tooth eruption, aesthetics, function and the patient's expectations should be considered carefully. In such cases experienced researchers and clinicians from related departments should be included in the steps of treatment. Endodontic treatment is vital for the protection of tooth in the mouth as functional, to bringing back the aesthetics of the patient and to relief the patient's pain.

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