

Case Report

Treatment of Multiple Complicated Crown–Root Fracture of Maxiller Central Incisors: case report

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Abstract: This case report describes the surgical, endodontic, and restorative treatment for the management of two complicated crown root fractures of maxillary central incisors. A 25-year-old male patient was referred to our clinic. It was found in clinical observation that the maxillary right central incisor was fractured bucco-lingually. The fracture fragment was mobile and slightly attached to the gingival tissue and root. Clinical and intraoral periapical radiographic investigation revealed horizontal (medial third) root fracture on the left central incisor and showed that both the central incisors presented complicated crown-root fracture. The patient refused to take the treatment procedures. And then, the patient came back to after 18 days. Firstly, metallic and composite splints were properly removed from the teeth, and then the fractured fragment (#11 tooth) was separated from the gingival tissue. The root canal was obturated with gutta-percha and AH Plus root canal sealer. After, a fibre post inserted into the canal, the fibre post and the fractured tooth part was bonded with dual-cure resin cement. In the clinical examination of maxillary left central, a vertical fracture line beginning from the palatal surface to the coronal third of the root was observed, and a horizontal fractured was also seen in the radiographic examination of the root. the vertical fractured crown-root portion was separated from the remaining tooth at palatal region by using forceps. Exposed crown and root pulp were capped with MTA (Angelus, Londrina, PR, Brazil) and restored with composite resin. the splint was repeated for four weeks.

Keywords: Complicated crown–root fracture, dental injures, fibre post, MTA

INTRODUCTION

Root fractures are rare and comprise only 0.5% to 7% of all dental injuries in the permanent dentition. Horizontal root fractures have been reported in less than 3% of the all dental injuries, and most often they occur in maxillary central incisors and are frequently seen in the middle third of the root followed by apical and coronal third fractures [1, 2].

Among the types of traumatic tooth injuries, a crown-root fracture usually results from horizontal impact and represents 5% of all dental injuries, It involves enamel, dentin and cementum, and occurs below the gingival margin. It can be classified as complicated or uncomplicated, depending on whether pulp involvement is present or absent, respectively [3].

Restoration of a fractured crown is important both aesthetically and functionally [1]. The treatment plan is decided on basis of the direction of the fracture line and the bone level of the fracture. Such fractures can require a multi-disciplinary approach involving

endodontic, surgical, orthodontic, and restorative procedures [4]. These treatments involve surgical repositioning, reconstruction with restorative materials or prosthetic restoration either with or without the orthodontic extrusion, mucogingival flap and rebonding of the original fragment, and adhesive fragment reattachment associated to laminate veneer [4, 5].

Although evidence based literature shows that materials do not play an important role in fracture strength recovery, the advantage of reattachment of fractured fragments include immediate aesthetics, more reliable outline form, possibility of maintaining the occlusal function, absence of differential wear, lowered economic burden and excellent time resource management [6].

This case report describes the surgical, endodontic, and restorative treatment for the management of two complicated crown root fractures of maxillary central incisors.

CASE REPORT

A 25-year-old male patient was referred to Endodontology Clinic at Gaziosmanpaşa University for the treatment of his broken teeth 2 h after the injury. Past medical history was reviewed and there was no remarkable report. It was found in clinical observation that the maxillary right central incisor was fractured bucco-lingually. The fracture fragment was mobile and slightly attached to the gingival tissue and root. Clinical and intraoral periapical radiographic investigation revealed horizontal (medial third) root fracture on the left central incisor and showed that both the central incisors presented complicated crown-root fracture (Figure 1). There was no fracture in maxilla, mandible or any other facial bones. Information was given to the patient about the treatment techniques, prognosis of the teeth and the complications which may occur during and after the treatment. Eventually, the patient refused to take the treatment procedures.



Fig-1: Ortopantomograph after injury



Fig-2: Previous restoration and splint



Fig-3: Previous restorations

The patient came back to our clinic 18 days after having hot/cold sensitivity and mobility in the incisors. It was observed during the ordinary examination of the patient that his upper central teeth were having composite restorations and splinting, performed at some other hospital (Figure 2, 3).

Detailed clinical and radiological examination revealed that:

1. depending on lack of the dental composite restorations, the right central tooth fracture fragment was separated, and a space between the left central tooth and the composite fillings were observed.
2. due to hemorrhagic bleeding, cingulum of the left central tooth had a discoloration
3. as a result of the incorrect splinting, left central tooth leaned toward mesial, and horizontal root fracture segments were separated from each other.

There was no percussion or palpation sensitivity and the vitality test (thermal and electric pulp testing) showed positive response for both the central incisors.

Firstly, metallic and composite splints were properly removed from the teeth, and then the fractured fragment (#11 tooth) was separated from the gingival tissue after administration of local anaesthesia. The fractured tooth part was preserved in distilled water until the reattachment process. The root canal was obturated with gutta-percha (Diadent, Chongju, Korea) and AH Plus root canal sealer (Maillefer, Dentsply, Konstanz, Germany) using lateral condensation technique in single visit endodontics. Following the completion of endodontic therapy, in order to place fibre post (Glassix, Harald Nordin sa, Chailly-Montreux, Switzerland) in the root canal, which was prepared by removing the gutta percha from the coronal two-thirds of the canal with peeso reamers.

The fibre post was inserted into the canal and the adaptation was checked with post space. The root canal was etched with 37% ortho-phosphoric acid

(Total Etch; Ivoclar Vivadent, Bendererstrasse, Liechtenstein), rinsed, and blot dried with paper points. The post was then luted in the canal using dual cured resin luting cement (Ivoclar Vivadent) and 40 seconds after the application of the light, overflowing cement from the root canal was removed using diamond burs. The fractured tooth part, which was immersed in distilled water, was taken and the access cavity was opened so as to ensure an exact fit between the fractured tooth and fibre post. The coronal fibre post surface and the fractured fragment were acid etched, washed and dried simultaneously. The access cavity of fractured fragment and the fibre post surface were coated with dual-cure resin cement. The fragment was repositioned and cured for 40 seconds.

The clinical examination revealed complicated crown root fractures of maxillary left central. A vertical fracture line beginning from the palatal surface to the coronal third of the root was observed, and a horizontal fracture was also seen in the radiographic examination of the root. After administering local anaesthesia, a palatal flap was lifted, and the vertical fractured crown-root portion was separated from the remaining tooth at palatal region by using forceps. Exposed crown and root pulp were capped with MTA (Angelus, Londrina, PR, Brazil) and restored with composite resin. The flaps were sutured with silk sutures; and then, the splint was repeated from the palatal region for four weeks (Figure 3). Clinical and radiographic examinations were carried out twice at 6 and 12 months interval, the teeth responded favourably (Figure 5 & 6). The patient was satisfied, both aesthetically and functionally, with the outcome of the treatment.



Fig-4: After treatment



Fig-5: After 6 months



Fig-6: After 12 months

DISCUSSION

Traumatized anterior teeth must be treated as soon as possible due to aesthetic and functional reasons. Many factors, such as extent and pattern of fracture, restorability of the fractured tooth (associated root fracture), soft tissue injuries, availability of fractured fragment and its condition for use, occlusion, aesthetics, prognosis and cost of the treatment may affect the treatment planning of crown root fractures [7, 8].

The patient's request and demand may limit treatment options in some cases. The patient should be informed in detail about advantages and disadvantages of each treatment options and so the clinician should choose the most appropriate and conservative treatment option considering patient's expectations in complicated dental injuries [9, 10].

Direct trauma to the anterior teeth often cause crown- root fractures. The condition, in direct trauma, when the apical part of the fracture line reaches to the lingual gingiva, is called chisel tip fracture [10].

In such cases, if the broken fragment is intact and available, the reattachment of a fractured crown fragment is the most conservative and desirable

treatment of choice for anterior teeth. In the absence of broken fragment, the available treatment option is composite resin restorations [11-13]. The reattachment technique has advantages over composite resin restorations, viz. procedural simplification, less clinical chair-time, better aesthetics, and similar function and wear rate [14].

In complicated crown-root fractures, if there is a small exposure and also it is within 24 h of the injury, pulp capping is applied using Ca(OH)₂ or MTA to protect vitality of the pulp [15]. We also applied MTA to protect exposed crown and root pulp in this case.

The present case is of chisel-type fracture. The fractured fragment was available and reattachment of the fragment with fibre post was performed by using dual-cure luting composite. Since, the fibre post could be bonded to the root canal walls and to the coronal fragment, it was a favourable treatment choice. Elastic modulus of the fibre post is similar to that of the dentin, which may enhance the resistance of the remaining tooth and reduces the risk of tooth fractures, and also fibre posts provide a higher aesthetic outcome for the anterior teeth [16-18].

Transverse root fractures are complicated tooth fractures that involve dentin, cementum, pulp, and periodontal ligament. Patient's age, stage of root growth, mobility of the coronal fragment, and diastasis of the fragments affect the prognosis of the tooth healing. In the treatment of a horizontal fractured tooth, the coronal fragment should be repositioned and be immobilised, and then the tooth should be checked periodically for pulpal vitality [19].

In the present case, horizontal fracture was observed in the middle-third at radiographic views of the left incisor. Falomo reported that horizontal fractures heal spontaneously [20]. In accordance with the literature, we did not perform root canal treatment for this tooth but pursued the healing. According to Andreasen *et al.* and Cvek *et al.*, root fractures have good prognosis [21, 22]. The proportion of healing is 78% [21]. After six months, hard tissue healing was seen in the radiograph.

CONCLUSION

In this case report, two complicated crown root fractured central teeth were treated. The successful treatments were made by using MTA repair material and fibre post restoration materials. In addition, without applying endodontic treatment to the teeth with horizontal fractures, the healing was monitored.

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