Horizontal root fracture in the middle third: Case report

Jefferson J. C. MARION
Juliana Yuri NAGATA
Ketrin Kimberly RAMOS
Frederico Campos MANHÃES

Introduction: Dental trauma may be considered one of the main causes of permanent teeth loss, and root fractures are relatively uncommon in these situations. Objective: The aim of this study was to report a clinical case of horizontal root fracture promoted by a dental trauma and discuss their clinical implications. Methods: The horizontal root fracture occurred at the middle third of the maxillary central incisor with separation of the fragments. The tooth was diagnosed with pulp necrosis, and the endodontic treatment was performed. Results: After a follow-up period of two years with radiographic and tomographic images root complications were not observed, neither painful symptomatology, highlighting the importance of a correct diagnosis which results in a good prognosis, preserving the esthetic and psychological integrity of the patient.

Keywords: Endodontics. Dental trauma. Root fracture.

ABSTRACT

How to cite this article: Marion JJC, Nagata JY, Ramos KK, Manhães FC. Horizontal root fracture in the middle third: Case report. Dental Press Endod. 2013 Jan-Apr;3(1):88-93.

The authors report no commercial, proprietary or financial interest in the products or companies described in this article.
Introduction

One of the main causes of anterior permanent tooth loss is dental trauma, representing 24% of dental absence due to infection and mobility in traumatized teeth. Upper central incisors are vulnerable to this type of injury, being affected in 80% of dental trauma, followed by upper lateral incisors and lower incisors.

Considering the types of trauma, root fractures are less frequent, with prevalence of 0.5% to 7% in permanent dentition and 2 to 4% in deciduous teeth. Similar to dental trauma in a general manner, these fractures occur mainly in central incisors (68%) and lateral incisors (27%), and only 5% in lower incisors. It happens in consequence of an impact force at the top of the root and frontal forces in the compression zone directed to vestibular and lingual, dividing root in coronal and apical fragments. This division may cause harmful consequences to cement, dentin, pulp and periodontal tissues.

Root stage development, displaced fragments reposition and all signals and symptoms associated, such as pain and mobility may influence repair process of root fracture. Literature describes different positions where fracture may be located — such as those restrict to cervical third, oblique fracture involving cervical and middle third, in the middle third, and in the apical third — as well as its influence in the treatment success. The treatment protocols related to cicatrization, reposition and contention reported in the literature are mainly determined empirically and without a relevant data base.

The prognosis of root fractures is favorable in 60-80% cases, however complications such as pulp necrosis, root resorption and calcification of root canal may emerge.

According to pulp lesion, and considering the possibility of bacterial invasion in the fracture line, four types of tissue repair may occur: Fusion of fragments by means of hard tissue formation, interposition of connective tissue or a “fake union” due to the presence of chronic inflammatory tissue between the fragments.

The present study has the purpose to report a clinical case of dental trauma with horizontal root fracture, pulp necrosis and endodontic treatment of fragments, as well as to discuss clinical implications.

Case report

A 16-year-old male patient attended a particular Endodontics clinic after he had suffered a dental trauma during football practice. He did not present systemic alteration. Clinically, it was observed soft tissue lacerations (lips, tongue and gingiva) as well as right central maxillary incisor commitment (tooth #11). In addition, gingival tissue at this tooth presented bleeding at the cervical region, with mobility and light extrusion. At the radiographic exam, it was observed that the right incisor presented horizontal root fracture at the medium third with separation of the fragments (Fig 1A).

The patient and his responsible were informed about the difficulties and complications of the treatment, agreeing to perform the protocol suggested by Gulinelli et al. At first, lips lacerations were sutured, and then the fragments were repositioned through the application of a vertical force in the incisal portion of the tooth, with local anesthesia. It was performed splintage of the coronal fragment with composite resin. It was prescribed amoxicillin 500 mg for 7 days, nimesulide 100 mg for three days and sodium dypiron for three days too.

After 45 days, patient returned for clinical and radiographic follow-up, being possible to note root fragments separation and absence of pulp sensibility for thermal and cold tests (Endo-Frost, Roeko®, Germany) (Fig 1B).

In face of pulp necrosis, it was decided for endodontic treatment. During odontometry, it was possible to observe an access to apical fragment and working length was established at 25 mm including radiographic apex (Fig 1C). Chemomechanical prepare was performed in the whole extension of root canal fragments under the presence of 2.5% sodium hypochlorite (NaOCl).

After instrumentation, root canal was dried with sterile paper points (Konne®, Belo Horizonte, Brazil) and dressed with calcium hydroxide paste (Biodinâmica®, Ibiporã, Brazil) associated to propylene glycol vehicle for a period of 30 days. After this period, intracanal medicament was removed with a manual file (Dentsply Maillefer, Ballaigues, Switzerland) and irrigant solution (2.5% NaOCl). In the sequence, root canal was irrigated with EDTA 17% (Biodinâmica®, Ibiporã, Brazil) for 3 minutes with mechanical agitation. EDTA
was removed by irrigating 2.5% NaOCl, with another insertion of paper points for drying the canal. Then, it was performed the main gutta-percha cone try out (Fig 1D), definitive obturation of root canal using gutta-percha cones and obturation cement with calcium hydroxide in its composition (Sealapex®- SybronEndo (SDS)/Glendora, USA). The obturation technique was the lateral condensation followed by vertical condensation. It was radiographically observed sealer overflow at the horizontal fracture region (Fig 1E).

Clinical and radiographic follow-up was performed after 30 days (Fig 2A), after 2 months (Fig 2B), 4 months (Fig 2C), 6 months (Fig 2D) and 1 year (Fig 2E). None of the follow-ups demonstrated pathological alteration such as: root resorption, radiolucency regions as well as painful symptomatology.

Two-year follow-up was performed with radiograph (Fig 3A) and tomograph (Figs 3B, C, D, E), being possible to note that the affected tooth presented characteristics compatible with the normality.
Discussion

Dental trauma may be considered a multifactorial problem considering diagnosis, long-term treatment and follow-up. These injuries may occur due to car accidents, sportive lesions, violence and malocclusion. The present case report described a right central incisor trauma due to sportive activity, which is in accordance with other studies that show 80% of prevalence of dental trauma in upper central incisors.

Root fractures in children and young people, and root fractures with minimum separation of the fragments should not preventively receive endodontic treatment since its prognosis is favorable. In addition, patient age at the moment of the injury may be considered one of the main factors to pulp repair after root fracture. In the present case report, after 45 days, it was observed pulp necrosis despite of being a young patient. This situation also may had occurred due to the rupture of neuro-vascular bundle of the dental pulp, or even because of bacterial invasion through apical foramen promoting bacterial infection and subsequent pulp ischemia in a manner that revascularization could not happen.

Endodontic treatment of the tooth was performed considering that literature reports repair of root fractures after endodontic treatment. In addition, studies describe four types of endodontic treatment for these situations: 1) chemomechanical preparation only in the coronal fragment and endodontic obturation of it; 2) chemomechanical preparation of both fragments with endodontic obturation of them; 3) chemomechanical preparation only of the coronal fragment with endodontic obturation of it and surgical removal of apical fragment; 4) chemomechanical preparation of coronal and apical fragments, filling the canal with calcium hydroxide dressing and posterior
Horizontal root fracture in the middle third: Case report

Figure 3. A) Periapical radiograph of 2-years follow-up; B) Sagittal tomographic slice indicating the axial tomographic slices with fracture in the middle third; C) Axial tomographic slice indicating the sagittal tomographic slices with fracture in the middle third; D) Sagittal tomographic slice indicating coronal tomographic slices with fracture in the middle third. E) Maxilla tomographic slice in tridimensional reconstruction.
Another factor that should be considered is the importance of long-term follow-up, because there is the possibility of occurrence of pathological alterations several years after the lesion.24

Conclusions
It is important to remember that treatment success depends on the patient-professional relation, considering the realization of therapeutic attitudes immediately after the occurrence of complications. Pulp necrosis and absence of repair at the root fracture line through hard tissue deposition may occur in permanent teeth. A permanent tooth with root fracture that was endodontically treated may present a good prognosis, preserving esthetic and psychological integrity of the patient. Clinical and radiographic follow-up is essential for treatment success of a tooth with horizontal root fracture.

References

© 2013 Dental Press Endodontics