# Horizontal root fracture: A case report

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## ABSTRACT

**Introduction:** Root fracture normally occurs in anterior teeth and is a condition oftentimes found in school children. It is commonly caused by horizontal trauma mistakenly subjected to extraction by unprepared and unskilled clinicians. Although trauma involves several different structures, traumatized teeth may be kept in the oral cavity. **Methods:** This study reports a case of horizontal root fracture in the middle third of tooth #13 treated by conventional endodontic treatment performed in the coronal segment. **Results:** One year after root canal filling, radiographic exams revealed complete fracture repair with bone tissue between fragments. **Conclusion:** Tooth with horizontal root fracture may be successfully kept in the oral cavity and exert its normal functions after conventional endodontic treatment is properly performed.

**Keywords:** Oral surgery. Root canal treatment. Tooth fracture.

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» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

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## Introduction

Dental trauma is relatively common. It usually causes coronal lesion, particularly in school children. On the other hand, root fracture are reasonably uncommon and account for 0.5 to 7% of lesions caused by dental trauma.[1,2,3]

Diagnosis of root fracture is based on tooth mobility, coronal fragment displacement, sensitivity to root palpation and radiographic exams. The condition is most prevalent in upper incisors with closed apex, given that completely formed roots are strongly supported by bone and periodontium.[4] Therefore, the injury affects the pulp, periodontal ligament, dentin and cementum at the same time, thereby hindering healing.[5]

Proper diagnosis and treatment planning require the case to be fully investigated, with emphasis on when, where and why the injury occurred. Once the clinician finds out when it occurred, proper treatment can be determined. Additionally, once the site of injury is identified, one can estimate the risk of contamination. Knowing how it occurred allows potential lesions to be identified.[5]

Root fracture results from labiolingual tooth displacement caused by a horizontal impact that, in turn, results from traumatic lesions caused by sports, car accidents or fights. Such an impact will also cause coronal fragment displacement, which results in pulp and periodontal ligament lesions.[5] It is worth noting that lesions occur in a directly proportional relationship, in other words, the worse the trauma caused to supporting tissues and the greater the distance between fragments, the worse the damage caused to the dental pulp and the less the possibility of repair by means of mineralized tissue deposition. Healing also depends on the stage of root development and bacterial contamination near the fracture line, both of which may lead to unfavorable prognosis.[6,7] Furthermore, the condition of the dental pulp strongly influences treatment and prognosis. Andreasen and Andreasen[5] explain that the pulp may strain or break at the level of the fracture, causing the coronal portion of the pulp to lose vascularization. Revascularization is possible through a process that has not yet been fully understood. It is believed that pulp cells comprising the apical fragment or the periodontal ligament enter into the pulp and restore vascularization. Periodontal ligament cells unite the fragments with hard tissue or interposition of connective tissue. Pulp cells comprising the apical fragment establish revascularization.

At first, in case of horizontal root fracture, treatment should promote repositioning of the fragment and provide immediate retention orthodontically performed through adjacent teeth support[8] and kept for at least 12 weeks, as recommended.[7,9,10]

Final treatment depends on several factors such as the type of trauma, prognosis of the traumatized tooth, patient's age, the conditions of the dentition, patient's expectations and financial resources.[1]

Although the rates of repair of horizontal root fractures, achieved by healing through calcified tissue, connective tissue or bone tissue,[4] are of 80%, tooth extraction is often mistakenly recommended by unprepared and unskilled clinicians.[9] For this reason, the aim of this article is to demonstrate by means of a case report that, although trauma involves several different structures, traumatized teeth may be kept in the oral cavity, thus preventing patients from undergoing prosthetic rehabilitation.

## Case report

A 23-year-old male patient arrived at the dental clinic of Paranaense University (UNIPAR) seeking endodontic treatment of teeth #11, 12 and 13. Treatment had been started by another clinician. Clinical examination revealed a provisional restoration sealing the endodontic cavity. Retention of teeth #11, 12 and 13 was also identified.According to the patient, treatment had begun a year before as a result of an accident. He admitted not going back to the clinician's office for additional procedures (removing the retainer and finishing the endodontic treatment).Radiographic exams revealed minor resorption in the root apex of tooth #11, periapical lesion of tooth #12 and horizontal fracture in the middle third of tooth #13 (Fig 1).

After removing the retainer, the clinician identified absence of tooth mobility and sensitivity at percussion. For this reason, he opted for endodontic treatment of teeth #11, 12 and 13.

Due to horizontal fracture in the middle third, tooth #13 was endodontically treated in its coronal portion, only. Odontometry (Fig 2) and biomechanical preparation were carried out. The latter was manually performed with the aid of a Kerr #70 file at the fracture

line and 1% sodium hypochlorite irrigation solution. The root canal was dried with paper cones and filled with calcium hydroxide paste associated with propylene glycol + iodoform used as vehicle so as to provide radiopacity to the mixture and ensure that the root canal was completely filled. Radiographic exams were taken to confirm the results.

After 76 days, root canal filling was performed by means of the lateral condensation technique with Sealer 26 (Fig 3). One year after root canal filling, radiographic exams revealed complete fracture repair with bone tissue between fragments (Fig 4).

## Discussion

Root fractures may be successfully treated when appropriate procedures are carried out. Should there be no contamination, treatment consists of reducing the fracture and stabilizing it with adjacent teeth as

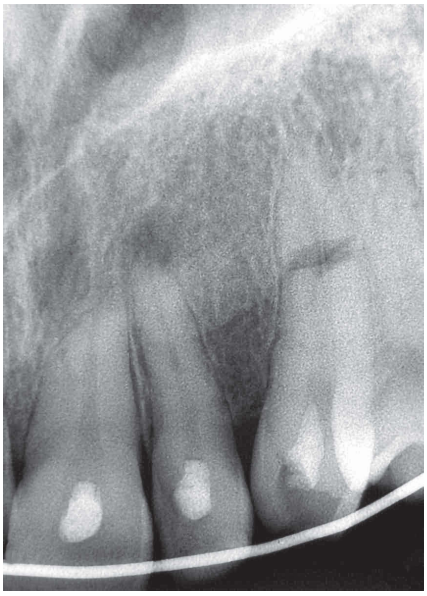

**Figure 1.** Initial radiographic exam of teeth #11,12 and 13.

**Figure 2.** Odontometry of the coronal portion of tooth #13.

**Figure 3.** Radiographic image of tooth #13 taken immediately after root canal filling.

**Figure 4.** Control radiographic exam taken 12 months after treatment conclusion.

support. These procedures eliminate the need for other types of treatment.[11]

Similarly to traumas in general, root fractures often affects upper incisors (70%) and males in their twenties.[12]

The consequences of fracture lesions are of multifactorial etiology. For this reason, knowing the possibilities of healing is essential. Four types of tissue repair may occur:

» Fusion of fragments by means of hard tissue formation;
» Interposition of connective tissue and bone tissue between fragments;
» Healing through the formation of connective tissue;
» "Fake union" due to the presence of chronic inflammatory tissue between fragments.[3]

Clinical or radiographic evidence revealing the development of pulp necrosis are occasionally found in 20 to 40% of root fracture cases[2] in which chemomechanical preparation significantly reduces the amount of bacteria. However, microorganisms are inevitably present in inaccessible areas.[10]

According to Irala et al,[10] these cases require intervention in both root portions, coronal and apical, so as to avoid necrotic debris, especially in the second canal fragment that certainly hinders case prognosis.

The use of antimicrobial intracanal dressing, such as calcium hydroxide, has been suggested with a view to reversing intraosseous necrosis at the fracture line. According to Diangelis and Bakland,[9] this type of medication prevents infection, decisively contributes to total reduction of microbes and favors apexification, thereby allowing the root canal to be properly filled and, as a consequence, ensuring treatment success.[10] It is worth noting that keeping the intracanal dressing with calcium hydroxide paste for 76 days corresponded to the period necessary for carrying out the endodontic treatment of the other traumatized teeth.

In the case reported herein, endodontic treatment was exclusively carried out in the coronal portion, given that the apical portion usually remains with vital pulp tissue of which removal is not necessary. Furthermore, access to the apical segment is hindered by coronal fragment displacement in relation to the apical fragment.

## Conclusion

Based on the results of this study it is reasonable to conclude that tooth with horizontal root fracture may be successfully kept in the oral cavity and exert its normal functions after conventional endodontic treatment is properly performed.

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