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Case Report

Horizontal root fractures: a case report

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Abstract – This case report describes the treatment of an upper right central incisor with an intra-alveolar horizontal root fracture at the level of the middle third and an upper left central incisor with the horizontal root fracture in the cervical third. The root fractures were reduced and rigidly splinted for 4 months. The endodontic therapy was instituted in the upper left central incisor because there was no possibility of fracture repair due to the proximity of the fracture and the gingival sulcus. As soon as the diagnosis of pulp necrosis was established in the upper left lateral incisor, the endodontic treatment was performed. After 3 years and 9 months check-up appointments showed healing in the middle root third of the upper right central incisor and it responded within normal limits to pulp testing. Thus, there is no need for endodontic therapy on this tooth.

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Key words: root fractures; conservative treatment; biological treatment

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Horizontal root fractures occur in 0.5–7.1% of all traumatic injuries with the upper anterior region most commonly affected (1–5). Immediate treatment requires repositioning of the coronal fragment and splinting. This procedure is successful in around 80% of cases especially in the middle and apical third (3, 6–8). In the cervical third healing depends on the proximity of the root fracture to the gingival sulcus. A high success rate should be expected for these cases also.

When teeth fail to maintain pulp viability, it occurs almost always only in the coronal segment. Infection results in granulomatous tissue at the fracture line. Endodontic treatment is limited to the coronal portion only and again treatment is predictably successful.

The case report

On February 1, 2000, a 14-year-old patient, V.D., came to the office, reporting a bicycle accident in December 1999. Her mother was looking for an alternate solution for the upper central incisors, since another dentist had suggested extraction. The clinical examination revealed occlusal displacement of the teeth, with increased mobility in the upper left central incisor. There was no sensitivity to palpation, but both traumatized teeth were sensitive to percussion. The upper right central and lateral incisors responded normally to the vitality test with cold spray (Endo Frost, Roeko, Germany). The upper left lateral incisor did not respond.

The radiographic examination of the upper anterior region revealed a horizontal root fracture at the level of the middle third in the upper right central incisor, while the upper left central incisor had an horizontal root fracture in the cervical third (Fig. 1).

The immediate treatment consisted of the reduction of the root fragments and rigid splint with a 0.6 mm orthodontic wire and photopolymerizable composite resin (canine–canine), which remained for 3–4 months (Fig. 2).

Fifteen days after the placement of the splint, a grayish chromatic alteration was observed on the dental crown of the upper left lateral incisor, which,

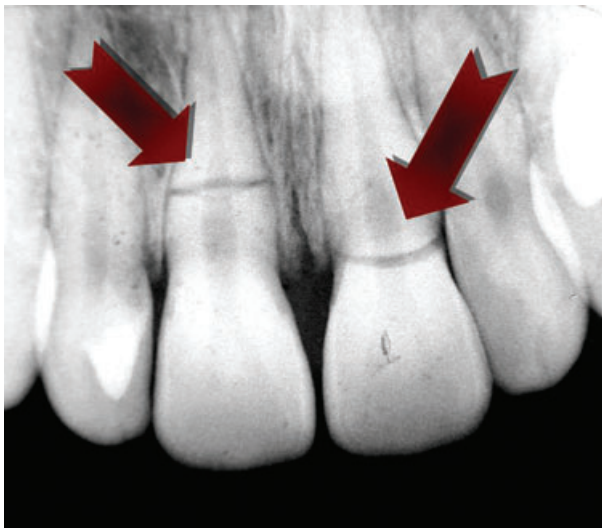

Fig. 1. Initial radiography showing a mid-root fracture on the right central incisor and a cervical root fracture on the left central incisor.

Fig. 2. Radiograph with splint in place.

together with the negative sensitivity test (on the left lateral as well), justified the necessity of endodontic treatment. The endodontic therapy was carried out in both left lateral and central incisors, in the last one due to the impossibility of root fracture repair in the cervical third. The biomechanical preparation was carried out and calcium hydroxide with polyethyleneglicol 400 was used as an intracanal dressing for 30 days. Then, the root canals were filled (Fig. 3).

After 120 days, the splint was removed and the upper right central incisor, which had a horizontal root fracture in the middle third, remained responding positively to the pulp test and presented physiological mobility. On this occasion, the patient was told to continue the follow-up for examinations every 4 months in order to intercept any failure in the early phase.

Fig. 3. Radiograph of the root-filled upper left central and lateral incisors.

The analysis of the repair process of the periradicular area of the upper left lateral incisor was carried out. All radiographies were digitalized and the area of periapical rarefaction was determined with an image analysis software (Leica Q Win 550, Leica Cambridge, Cambridge, UK). In the course of the clinical sessions, the patient was questioned about the restorative treatment of the upper left central incisor but, for financial reasons, it was not carried out. Up to now, the radiographic analysis reveals signs of healing and clinically is remains asymptomatic (Figs 4 and 5).

Fig. 4. Clinical view 3 years and 9 months after the dental trauma. The upper right central incisor responds positively to the pulp test.

Fig. 5. Radiographic evaluation - 3 years and 9 months.

Discussion

In the present case, we can observe the involvement of three teeth with different responses to the same traumatic injury. In one, there was a horizontal root fracture in the level of middle third (upper right central incisor). In another the root fracture occurred in the cervical third (upper left central incisor) and in the upper left lateral incisor, an apparent luxation injury occurred resulting in pulp necrosis. The endodontic treatment was performed in upper left lateral incisor as soon as pulp necrosis was detected through a grayish chromatic alteration in the dental crown and a negative pulp test.

We did not perform root canal therapy on the tooth with horizontal root fracture in the middle third, because the literature has demonstrated that the pulp will remain vital in most cases and a high percentage of successful healing without endodontics (3, 4, 6). However, the tooth with horizontal root fracture in the cervical third was treated endodontically because we felt that the proximity of the fracture line to the oral environment increased the possibility of contamination, compromising the tissue repair (7, 8). The reduction and rigid splint of the coronal fragment was performed because the dental crown acted as a temporary during the clinical session related to the endodontic treatment. As soon as the patient can afford the treatment we will perform orthodontic extrusion of the apical fragment and restore the tooth permanently.

Conclusions

This case report illustrates that in dental trauma cases different injuries occur in teeth in close proximity to each other. The clinician should make a careful diagnosis of each tooth and be prepared for different treatment approaches to maintain the injured teeth.

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