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Root healing after horizontal fracture: a case report with a 13-year follow up

CASE REPORT

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Abstract – Although horizontal root fractures connote a serious trauma to the tooth, they present a favorable prognosis, as the vitality of the pulp remains. Small displacements of the fragments minimize the failure of the healing process; however, even when they occur, the reduction of the diastasis between root fragments is always necessary. A majority of cases are asymptomatic and heal spontaneously even though no therapeutic measures have been adopted. A case of root fracture that was discovered only 1 year after the trauma is presented. Thirteen years later, the tooth is well positioned in the maxillary arch and has kept its pulp vitality despite the obliteration of the root conduct. Expectant management was adopted at the moment of the first examination, and the follow-up of the patient showed it to have been the best choice.

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Horizontal root fractures normally result from a frontal impact and cause combined injuries to three dental tissues: pulp, dentine and cemento, associated with injuries of the periodontal ligament and alveolar bone (1). The damage to the periodontal ligament presents the same profile as the pulp injury, but without fiber ruptures or stretching (1). The repair of these fractures therefore foresees the regeneration of different tissues, each one with its peculiar biological behavior. The preservation of pulp vitality is an essential factor needed to reach this goal (2, 3).

Some controversy has been observed in the proposals of treatment for this condition. The reduction in the diastasis is required, but it is not necessary to obtain a precise result for this maneuver. The installation of a splinting, however, is not mandatory (4, 5). This case illustrates a horizontal root fracture that was discovered when the healing process was installed. Because of this, the therapeutics were restricted to follow-up. Root repair was observed in spite of the obliteration of the root canal.

Case report

The right central incisor of a 22-year-old female suffered an impact against a rigid object when she fell from a height 13 years ago. The patient sought dental care for this trauma 1 year later, when she noted darkness at the crown of the tooth. At the moment of the trauma, she recalled that only a gingival bleed was seen, without mobility or pain. In the first examination, 12 years ago, the alveolar mucosa was intact with normal coloration, texture and shape. Tooth 21 was sensitive to thermal stimulations. The radiographs obtained at that moment showed horizontal root fracture in the middle third of the root of tooth 21 with a small displacement of the apex. No periodontal injury was present (Fig. 1). As there was no pathological sign, a decision was made to follow up. After 5 years, the pulp chamber and the root canal were less radiolucent (Fig. 2) because of discrete calcification of the pulp that had already slightly obliterated the broken apical fragment, but the tooth tested vital to thermal tests. At the 13-year follow up, the patient had no complaints about pain. The tooth was found to be normally located in the maxillary arch, although its crown was more discolored than tooth 11's crown (Fig. 3) and the radiographs showed consolidation of the root (Fig. 4). Only with the treatment of the radiographic images, it is possible to visualize the fracture line and the root canal (Fig. 5). The tooth courses with progressive obliteration of the chamber and the root pulp, but it is still positive to sensitive tests.

Discussion

Horizontal root fractures do not represent a serious damage, and the prognosis of the tooth is favorable.

Fig. 1. First radiograph obtained only 1 year after trauma.

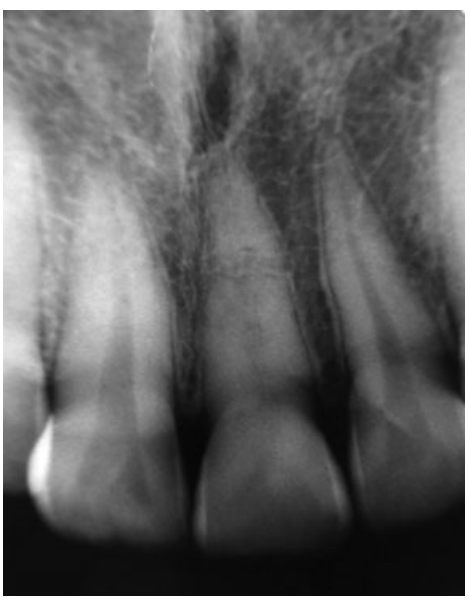

Fig. 2. Radiograph obtained 5 years after the first examination.

Often, this is discovered in a routine radiographic examination (6, 7). Some papers have verified the repair of these injuries at a rate superior to 80%, even if no treatment is instituted (4, 7, 8). In this report, the absence of symptoms motivated the patient to not seek care at the moment of the trauma; therefore, the fracture was discovered only 1 year later, when she decided to investigate the darkness at the crown that was a sign of dentine deposition narrowing the pulp chamber.

Root consolidation depends on the pulp and periodontal integrity (2). Odontoblasts and cementoblasts are the cells responsible for the deposition of hard tissue

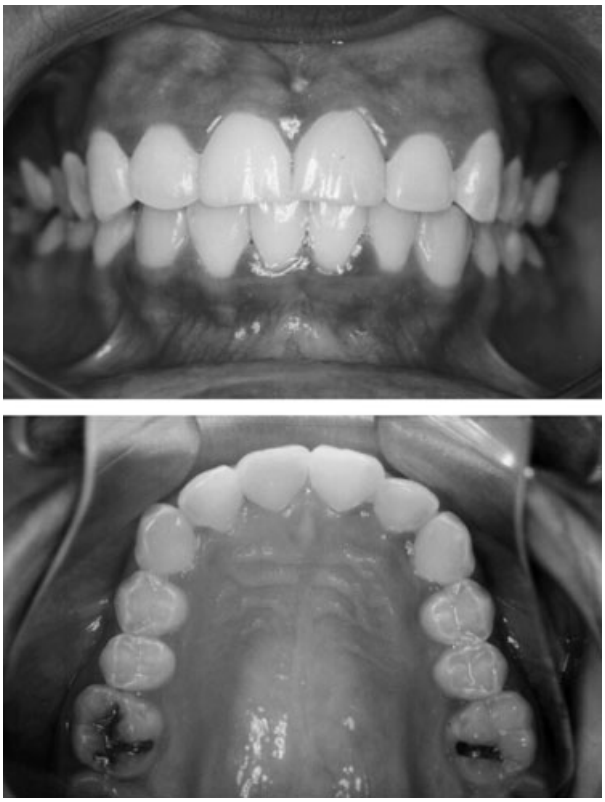

Fig. 3. Tooth 21 well positioned in the maxillary arch and slightly darker than tooth 11.

Fig. 4. Radiograph obtained 13 years after trauma.

matrix between the fragments (3). However, other tissues can be deposited in this interface (2, 6, 9, 10) as fibrosis with bone formation, fibrosis alone or granulation. Granulation tissue results from a severe injury to

Fig. 5. Image treatment with a negative filter, which produces an inverted image, showing the region of the fracture (1).

pulp with odontoblastic activity failure (3). The ideal condition for consolidation is fracture sealing to the oral environment, because the contact with oral secretions generates contamination and subsequent healing failure (3, 9).

The separation of the fragments is an important variable to fracture healing (6). If the displacement of the coronal fragment is not severe, a minimum damage to the pulp and periodontum will take place. In the presence of diastasis, the repositioning of the fragments increases the frequency of healing, particularly in mature teeth. In teeth with incomplete root formation, tissue regeneration will occur, even if diastasis in the fracture is persistent. The capacity of pulp revascularization and the potential of the cells in the dental sac constitute excellent conditions for root elongation.

Immobilization, however, is arguable for these fractures. For some authors, rigid splinting must be maintained for 2–3 months, to provide matrix deposition in accordance with principles for root healing (4, 5). However, some studies have found that the matrix deposition occurs to a greater extent in teeth, which are not submitted to immobilization, as root consolidation takes place more efficiently under functional stress (1, 5). A factor that contributed to root consolidation in this report was the absence of diastasis between fragments. This also contributed to fracture sealing against mouth microorganisms. It is not safe to state that no splinting favored the repair, but this case adds to the statistics of non-splinted teeth that evolve and heal.

It is well known that 75% of teeth with root fractures show sclerosis of the canal (7). The reparative dentine is deposited on the walls of the canal and is concentrated in the fracture line. In this region, there are more fibroblasts than in the apical portion where the pulp remains more vascularized (3). Full root obliteration is the inverse reason for the vascular and nervous regeneration of dental pulp. The treatment of the images of this case confirms this biological activity. The fracture line was more radiopaque than the apical region where there was a discrete attenuation of the image in the root canal. The obliteration of the canal can represent a complication in the future, but in light of the history and the current clinical features, it can be concluded that the approach used was competent for the maintenance of the tooth in its arch, 13 years after the trauma.

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