MANAGEMENT OF HORIZONTAL ROOT FRACTURE REPORT OF TWO CASES
Adriana de Jesus Soares, Juliana Y Nagata, Thiago Farias Rocha Lima, Alexandre Augusto Zaia, Francisco José de Souza-Filho

ABSTRACT

Root fractures diagnosis depends on careful clinical and radiographic examination. The prognosis is directly related to coronal fragment displacement, stage of root and pulp development, and type of splinting and fracture localization. This paper reports management of two different cases of root fractures, i.e., root fracture in upper left central incisor with an immature root development managed without any endodontic intervention and root fractures in the mandibular lateral incisors with associated pulp necrosis managed by the use of an intracanal medicament composed of calcium hydroxide, 2% chlorhexidine gel and zinc oxide.

Keywords: Root fracture; Repair; Immature teeth; Intracanal medicament

Introduction

Root fractures comprised of about 0.5-7% of dental traumatic injuries, and considering its low prevalence, many professionals may overlook them in dental practice. Despite the low prevalence and difficulties of diagnosis, appropriated emergency conduct represents a decisive factor for the repair of the fractured line. The diagnosis of root fractures is complicated and depends on detailed clinical and radiographic examinations. In addition, studies revealed that pulp necrosis may occur in only 25% of the root fracture cases, therefore, many times patient should only be kept under observation. The prognosis of these root fractures is conditioned to the degree of coronary fragment displacement, the type of contention and the fracture position. Repair process depends of pulp involvement and the presence of contamination in the affected area.

Clinical studies have demonstrated three types of fracture healing: interposition of calcified tissue, interposition of connective tissue and interposition of granulation tissue. In the latter, endodontic treatment should be performed to promote decontamination of the area to allow fracture repair. Before obturation of the canal, it is recommended that an intracanal medicament, which stimulates the formation of a mineralized tissue barrier, should be employed. Recently in literature the use of an intracanal dressing composed of calcium hydroxide, 2% chlorhexidine gel and zinc oxide for the treatment of traumatic teeth has been proposed. This medicament acts as a chemical and physical barrier and, do not dissolve during its permanence in the canal and have been considered as an obturation paste. This paper reports management of two cases of root fractures with different repair patterns, i.e., root fracture in upper left central incisor and immature root development without endodontic intervention and root fractures in the mandibular lateral incisors associated to pulp necrosis with an intracanal medicament composed of calcium hydroxide, 2% chlorhexidine gel and zinc oxide.

Case Report 1

An 8-year-old boy was referred to Dental Trauma Service of Piracicaba Dental School – State University of Campinas/Brazil followed by a bicycle fall, which was happened four days before. Clinical examination revealed extrusion of upper right and left central incisor with mobility. Radiographic examination revealed horizontal root fracture at the middle third of the maxillary right incisor with immature root without any alveolar bone fracture and periapical radiolucency (Figure 1). The tooth responds normally to sensitivity cold test and was positive to pain on percussion and palpation.

On the first visit reposition of the traumatized teeth under local anesthesia was achieved (Figure 2). The tooth was evaluated after 4th week and there was absence of periapical symptomatology and reduced mobility. Sensitivity tests continued to response positively, so endodontic intervention was not recommended. In all follow-up visits i.e., 3rd, 6th, 9th, 12th, 18th and 24th months, it was observed that right incisor healed itself through connective tissue interposition, associated to final root development (Figure 3).

Case Report 2

A 32-year-old female patient had car accident and received emergency treatment at a private hospital and was diagnosed for bone fracture at the anterior mandibular region, and avulsion of mandibular right and left central incisors. Bone fracture was treated by the placement of Erich Arch Bar, with immobilization of 30 days. The avulsed teeth were stored in physiologic solution and replanted following one hour of extra-alveolar period (Figure 3). After completion of 30 days, fixation was removed, and a flexible contention was fashioned with brackets and twist-flex wire and the patient was referred to Dental Trauma Service of Piracicaba Dental School – State University of Campinas, Brazil for the treatment of the traumatized teeth. Clinical examinations of mandibular incisor and canines did not show positive response to cold tests, meantime periapical tests to percussion and palpation demonstrated positive sensitivity.

Radiographic examination revealed radiolucent area in the periapical region of the inferior incisors and horizontal root fracture at the apical portion of the mandibular lateral right and left incisors (Figure 4). Flexible contention was removed and all mandibular incisors and canine were submitted to
endodontic treatment. This treatment consisted of coronary access with diamond bur under constant irrigation, followed by isolation with rubber dam. The biomechanical preparation was performed with crown-down technique using Gates-glider burs number 5, 4, 3 and 2 in the cervical and middle thirds and rotary instrumentation in the apical third. Work length was established with the use of apex locator. All instrumentations were performed under the presence of 2% chlorhexidine gel as chemical auxiliary substance and sterile saline as irrigant.

Then canals were dried with absorbent points and filled with an obturation paste, with calcium hydroxide, 2% chlorhexidine gel and zinc oxide. This paste was manipulated in a firm consistency, in the proportion of 2:1:2 and was inserted through increments with vertical condenser medium and fine medium throughout the canal extension. The canal was sealed coronally with composite resin. Patient was followed-up through 24 months without any periapical sintomatology. On radiographic examination repair of the fracture line with bone tissue deposition without any dissolution of obturation paste was observed. Meantime, it was not observed bone development in the space between mandibular central incisor due to bone fracture and avulsion of the referred teeth (Figure 5).

Discussion
Studies have demonstrated that pulp tissue prognosis in root fractures are favorable with probability of necrosis in only 20% of the cases. These favorable results are directly influenced by appropriate emergency attendance and period of time till first dentistry visit. The present reports demonstrated situations of initial attendance few days after traumatic episode in the first case and late attendance in the second. This difference in the time of seeking dentistry attendance happened possibly considering the second case represented worst severity requiring hospitalization. Considering this difference of time, studies have shown that longer periods of time for the initial treatment may negatively influence repair prognosis of pulp and periapical tissues.

Literature also reports that many factors may influence the type of healing after root fracture. Time elapsed after dental trauma till seeking for treatment, root development stage and any signal or symptoms associated such as mobility and pain are some of these factors. Related to this repair, both cases demonstrated different forms of healing, possibly due to the time for the first treatment, root development stage and coronal fragment displacement. In the first case, tooth presented immature root and patient seek for attendance few days after trauma, and this fact may favor anatomically root end development without endodontic intervention, with possibility of repair and revascularization of pulp tissue. This type of healing was also observed in previous studies, in which tooth responded positively to pulp tests and completed root development.

In the second case, it was not possible to replace the fractured fragment, happening displacement of the apical root fragment. This fact may be contributed to the rupture of the nervous vascular bundle and pulp tissue necrosis. Previous case reports also demonstrated necessity of endodontic intervention in teeth that could not be replaced, that were contaminated and that delayed to seek attendance. Meantime, considering the low possibility of pulp necrosis in root fractured cases, there are many cases in the literature of closed apexes that presented repair by deposition of mineralized tissue and pulp vitality.

For the second case treatment employed was obturation paste composed of calcium hydroxide, chlorhexidine and zinc oxide. This paste demonstrated satisfactory results with decrease in clinical symptomatology, stabilization and prevention of root resorption and repair of periapical lesion. In addition, this association revealed advantages of not need periodic changes and acts as an Obturation. In this second case, the use of this paste seems to contribute to satisfactory healing in the periapical region with deposition of bone tissue, periapical lesion repair and remission of symptomatology.

Conclusions
It is believed that in root fractures, an appropriated conduct and time to seek initial attendance may influence directly pulp prognosis and repair of fracture line. Besides it, the use of an obturation paste composed of calcium hydroxide, chlorhexidine and zinc oxide may be an alternative for intracanal medicament for necrotic teeth after root fracture.
Management of horizontal root fracture report of two cases

Authors Affiliations
1. Adriana de Jesus Soares, Participant Professor, Department of Restorative Dentistry, State University of Campinas, UNICAMP, Piracicaba, SP, Brazil. 2. Juliana Yuri Nagata, Postgraduate Student, Department of Restorative Dentistry, State University of Campinas, UNICAMP, Piracicaba, SP, Brazil. 3. Thiago Farias Rocha Lima, Postgraduate Student, Department of Restorative Dentistry, State University of Campinas, UNICAMP, Piracicaba, SP, Brazil. 4. Alexandre Augusto Zaia, Associate Professor, Department of Restorative Dentistry, State University of Campinas, UNICAMP, Piracicaba, SP, Brazil. 5. Francisco José de Souza-Filho Titular, Professor, Department of Restorative Dentistry, State University of Campinas, UNICAMP, Piracicaba, SP, Brazil.

References
How to cite this article

Address for Correspondence
Dr. Adriana de Jesus Soares,
Professor,
Department of Endodontics,
Faculdade de Odontologia de Piracicaba,
UNICAMP, Avenida Limeira, 901,
Piracicaba, SP, Brazil.
Email: ajsoares.endo@uol.com.br

Source of Support: Nil
Conflict of Interest: None Declared