Conservative Approach and Management of Cervical Root Fracture, Case Report

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Abstract

Root fracture is a rare dental trauma characterized by separation of the cementum, dentin, and pulp tissues and endangering the tooth survival as well. The impact, depending on its severity and direction, could break through a horizontal, vertical, or oblique plane within the dental root. However, the apical and coronal fragments can be reunited through the deposition of connective tissue, calcified bridge, or a combination between them, whereas failure is considered a result of invading the fracture site by granulation infected tissue. Research showed that the more the horizontal breakage site is locating cervically the less the healing chance will be obtained. Furthermore, sacrificing the coronal fragment could be the inevitable result in case the fracture line is over the alveolar crest. This case report presented a conservative management of cervical root fracture in the upper left central incisor located at the same level of alveolar crest in 18-year-old male.

Keywords: Root fracture, dental trauma, alveolar crest, central incisor

Introduction

Root fracture is a radiographic finding of dental trauma by which the cementum, dentin and pulp tissues will be separated through an oblique, vertical, or horizontal plane at the apical, medium, or coronal level (1-3). The apical and medium transverse fracture can be allocated using occlusal radiograph, while the bisecting angle exposure is used to detect the cervical fracture type (1). Furthermore, Cone Beam Computed Tomography CBCT can be of great benefits for better visualization and determination of the site, direction, and extension of the fracture line especially for complicated cases (1, 4). Clinically, the crown position could be sometimes displaced with visible mobility and tenderness, and pulp test is usually negative except for a few cases in which indicates high percentage of pulp survival (1).

Indeed, the vertical fracture followed by the cervical transverse type are considered with the worst prognosis (2, 3). To date, the common management of the former is achieved via extraction (1), although recently there are successful attempts to reunite the two fragments through the use of bioactive root canal filling materials and endodontic fibre-post along with full crown coverage (5, 6), while the treatment of the latter mainly depends on repositioning the coronal segment in case of displacement then applying a flexible splint usually for four weeks, but can be extended up to four months if the fracture site is close to the cemento-enamel junction(1). Regular monitoring of the broken root is mandatory and, thus, any sign of necrosis clinically or radiographically necessitates an endodontic treatment mostly limited to the coronal segment aiming for apexification at the fractured surface; the reason for this is the difficulty to determine an accurate working length at an irregular and oblique root fracture plane (1, 7, 8). On the other hand,
if the root fracture is located over the alveolar crest, the excision of the coronal fragment will become inevitable. Subsequently, an orthodontic traction, crown lengthening, or surgical repositioning of the remaining root accompanied with gingival recontouring or osteoplasty can be carried out to relocate the fracture plane in more appropriate coronal position through which the intracanal fibre-post and the full crown coverage will be better seated with respect to the biological width and marginal gingiva (1, 9, 10). On the other hand, the development of immature permanent incisors and the radicular pulp should be maintained after removing the coronal fragment. Therefore, it is advisable to perform partial pulpotomy using either of calcium hydroxide dressing or non-staining calcium silicate followed by reinforced glass ionomer or composite restoration aiming for apexogenesis. However, in the severe and non-restorable cases, coronectomy can be a suitable option to maintain the alveolar bone for subsequent implant installation (1).

In fact, research is still ongoing to maximize the survival rate of the teeth undergone root fracture. Hence, this case study reported a successful conservative management of cervical root fracture in the upper left central incisor located at the same level of alveolar crest in 18-year-old male.

**Case presentation**

An 18-year-old male patient was referred to paediatric dental clinic to treat broken anterior tooth after falling down the stair at school one week ago. The orthopantomogram taken in another clinic showed cervical root fracture in the upper left central incisor 21 (figure 1). No displacement was noticed but the crown was tender to percussion with a noticeable mobility. The pulp test, using Endo Ice spray (-50o), revealed that all upper incisors 11, 12, 21, 22 were positive, and the sulcus depth was within the normal range 2.5 millimetre MM. The patient and his parents were advised that the fractured tooth can be saved, and the treatment plan was discussed with them in collaboration with the referring dentist, then an informed consent was obtained before treatment. After debriding the upper incisors with Chlorhexidine 0.12%, a flexible splint using steel arch wire was adhered to the labial surface of the four upper incisors with composite, and the patient was advised to keep on soft diet for two weeks in addition to maintaining an optimum oral hygiene by using soft brush and chlorhexidine 0.12% mouth wash for seven days. The interproximal caries in 11, 21 were treated conservatively after two weeks utilizing indirect pulp capping technique to preserve the pulp, and an aesthetic composite restoration was applied over. Interestingly, When the splint was detached after four months, there was a noticeable improvement regarding the mobility and tenderness to percussion, also the sensibility test was still positive. Indeed, the patient was cooperative and taking care of his tooth perfectly by eating gently,
wire adhered to the palatal surface of upper central incisors through long-term stabilization by using an orthodontic management of cervical root fracture was carried out was only for four months, whereas a current conservative trauma. Actually, the splinting duration in this case report was the breadwinner of his family, the next observation was carried out after three years of dental trauma. Clinically, the tooth was asymptomatic and responding well to pulp test with normal mobility, also the gingival probing was within the normal average 2.5 mm. In addition, a localized fibrous connective tissue was observed on the labial gingiva at the same estimated level of the fracture line (figure 2). The periapical radiograph revealed that the root fracture was still visible through a thin radiolucent line at the same level of the crestal bone without any resorption or pathology around (figure 3).

**Discussion**

Root fracture is considered a serious dental trauma threatening the survival of the tooth in the oral cavity (2). Studies disclosed different types of interactions among the periodontium, dentin, and pulp at the fracture site by which the healing process will be directed and outlined (2, 3, 10). Commonly, the connective tissue will be interposed as a mediator connecting the two fragments together through a radiolucent line on radiograph. The second type of healing is formed by the interposition of radiopaque calcified tissue at the fracture site, whereas the least common is established by intermediating the fracture site by a combination of bone and connective tissue (4). However, failure can be recognised by the presence of granulation tissue invading the root fracture site accompanied with surrounding bone resorption. Clinically, the coronal fragment will suffer from increasing mobility and gingival swelling at the fracture site in addition to discharging sometimes through the gingival sulcus (4, 10).

This case study is distinguished by the healing process of a challenging cervical root fracture, located at the same level of alveolar crest, probably achieved through the interposition of connective tissue at the fracture site. Indeed, the periodontal ligament, junctional epithelium and the connective tissue attachment acted as an active barrier and prevented the intraoral bacteria from invading the fracture site; this can be added to the meticulous oral hygiene and care maintained by the patient after dental trauma. Actually, the splinting duration in this case report was only for four months, whereas a current conservative management of cervical root fracture was carried out through long-term stabilization by using an orthodontic wire adhered to the palatal surface of upper central incisors (11).

As a matter of fact, this case report has many limitations including the lack of regular observations according to the International Association of Dental Traumatology, in addition to the limited quality of radiographs. In fact, the patient was busy and engaged in his studying and working. Therefore, he hardly came back for follow up after three years, also he had Radiophobia and, thus, no other radiographs were taken to get better visualization of the fracture direction and healing process.

In a conclusion, within the limitations of this case report, the conservative management of cervical root fracture might be of great benefit to help the patient avoid the complicated prostho-dontic procedures and maintain aesthetics.

**References**