

## CASE REPORT

Laila Shafie<sup>1</sup> DDS, MS, Farhad Farzaneh<sup>2</sup> DDS, MS, Maryam Alsadat Hashemipour<sup>3\*</sup> DDS, MS

### Repair of horizontal root fracture: A case report

1. Assistant Professor of Pediatric Dentistry, Dental School, Kerman University of Medical Sciences, Kerman, Iran.

2. Assistant Professor of Pediatric Dentistry, Dental School, Shiraz University of Medical Sciences, Shiraz, Iran.

3. \*(Correspondence author) Assistant Professor of Oral Medicine, Kerman oral and dental diseases research center/Dental School, Kerman University of Medical Sciences, Kerman, Iran. E-mail: m\_s\_hashemipour@yahoo.com

**ABSTRACT:** Horizontal root fractures in permanent teeth are uncommon injuries among dental traumas. The principle of treating horizontal root fractures of permanent teeth is repositioning and fixation of fractured segment. Diagnosis of tooth fractures based on radiographic findings and the fracture healing process are affected by factors before and after injury. The present case reports the treatment of horizontal root fracture located at the apical-third of upper left and right central incisors. Healing was observed at 1 year follow-up examination.

**KEYWORDS:** Healing, Horizontal, Tooth Root.

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#### INTRODUCTION

Horizontal root fractures are uncommon lesions accounting for 0.5-7% of traumas that occur in the permanent teeth (1-4). Horizontal fractures occur most commonly in the middle-third of the root and rarely in the apical-third (5-7). They involve the tooth's supportive tissue, dental pulp and mineralized structures, affecting mainly the middle-third of upper incisors in males during the second decade of life (8-10). Indeed, root fractures can be associated with bone alveolar fracture (11-13). Conventional radiography is a common way for finding root fractures (14).

Many factors may influence the healing process; these factors include the stage of root development, repositioning of dislocated fragments and any associated signs/symptoms such as pain and mobility (8,15-17). Although the outcome of a root fracture is generally favorable in 60-80% of cases, complications such as pulpal necrosis, radicular resorption and pulpal canal obliteration can arise (4). Therefore, after performing the adequate clinical management, following up the patients for clinical assessment of treatment success is crucial. The case report presents two root-fractured teeth treated by repositioning and fixation and their good healing at the 1 year follow-up examination.

#### CASE REPORT

On February 1, 2005, an 8 year-old female patient was referred to the Department of Pediatric of Shiraz Dental School, complaining of pain in the maxillary anterior teeth associated with a history of trauma on this region 7 days ago. Her medical history was clear. Intraoral examination revealed well-preserved maxillary central incisors teeth, with mobility in crown. There was sensitivity to palpation, and both traumatized teeth were sensitive to percussion. The upper right and left central incisors responded normally to the vitality test with cold spray. Radiographically, there were horizontal fractured roots on apical-third of the left and right upper central incisor (Figure 1A). The fractured root apices were completely formed and no periapical changes were noted. Based on the clinical aspects that showed pulp with cold-induced sensibility, absence periapical changes and non-discolored crown, we performed a rigid splinting with an 0.7mm orthodontic wire bonded to the labial surfaces of the maxillary teeth and photopolymerizable composite resin (canine to canine), which remained for 3 months (Figure 1B). Follow-up examinations were performed at 15 days, 1, 3 and 6 months to evaluate pulp sensibility and dental mobility, as well to evaluate the radiographic characteristics. After three months the splint was removed;



**Figure 1.** A: Periapical radiograph showing horizontal root fractures (white arrows). B: Initial treatment: splinting anterior teeth with a 0.7mm stainless steel wire and photopolymerized composite. C: Periapical radiograph of 4 month follow-up. D: Periapical radiograph of the teeth after 1 year.

however, due to mobility, it was decided to splint the teeth with composite resin at lingual aspect. After 120 days from primary observation, the clinical findings remained unaltered and therefore this split was removed (Figure 1C).

After 1 year of clinical follow-up, there were no signs and/or symptoms associated with the previously fractured tooth. The tooth was asymptomatic. There was neither spontaneous pain, periodontal inflammation, mobility, nor sign of previous and actual fistulae. Also there was no tenderness or pain to palpation of the soft tissues or pain to percussion. No tooth discoloration was seen. The teeth responded positively to electrical pulp testing. Radiographic examination showed no periapical or periradicular pathology (Figure 1D).

## DISCUSSION

Root fractures are uncommon lesions which may be due to severe trauma *e.g.* automobile accidents, sports injuries, violence, or malocclusion (4,18). Teeth with vertical root fractured and poor prognosis are classified as a genuine indication for ATT (6). Maxillary central incisors are most vulnerable to injury, sustaining approximately 80% of all dental injuries, followed by the maxillary lateral and the mandibular incisors (4,5). The extent of the fracture line, the pulp tissue situation, occlusion, dislocation of fragments and the general health of the patient are different variables that can influence the prognosis of root fractures (4). Horizontal root fractures situated on the middle or apical third of the root

present better prognosis in comparison with vertical fractures (7,4) and teeth with vertical root fractured and poor prognosis are classified as a genuine indication for autogenous tooth transplantation (19). According to dental pulp status, the rigid reduction should be done and the patients should be under clinical and radiographic follow-up to assess the healing status (3,4,20). In the first month, they should be observed weekly, and radiographic examinations, tests of pulp sensibility, and dental mobility should be performed. Consequently, they should remain under periodical control every 6 months during an extended of 5-10 years. During this period, patients who present inflammatory symptoms related to pulp tissue should undergo endodontic treatment (21,22). In the present case, healing with hard tissue and preservation of pulp vitality in both fragments were observed concurring with Ferrari *et al.*, Andrade *et al.* and Polat-Ozsoy *at al.* (3,4,20). The reduction and rigid splint of the coronal fragment was performed because splinting procedure is to immobilize the traumatized region, completely. The splinting period varied according to the severity of each case. It is not necessary to use splits beyond 3-4 months (15). In the present case the teeth were splinted for 4 months. After 120 days from primary observation, the clinical findings remained unaltered and therefore, this split was removed.

In the present case, we did not perform root canal therapy on the tooth with horizontal root fracture in the apical third, because research has demonstrated that the pulp will remain vital in most cases with high percentage of successful healing without receiving endodontic treatments (3,23).

The loss of vitality of the fractured teeth and sclerosis of root canals can usually be observed approximately at the end of the first year. A minimum observation period of 1 year is recommended for damaged teeth with no apparent complications (20). Thereby, it seems that for patients with injuries, the long-term follow up is important whereas pathological changes can occur during several years following injury (24).

### CONCLUSION

Clinical management, correct diagnosis, and subsequent radiographic follow-up are essential for treatment success of horizontal root fracture.

*Conflict of interest: none declared.*

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