

Conservative Management of Displaced Horizontal Root Fracture in Vital Maxillary Premolar: a Case Report

SUMMARY

Background/Aim: The management of horizontal root fracture is not straight forward. It depends upon the location of the fracture, mobility and vitality of fractured tooth segment. The goal of treatment is to restore the shape and function of affected tooth. **Case report:** This following case report described the conservative management of horizontal root fracture which was also displaced but somehow maintained its vitality. The affected tooth was initially stabilized and followed up in the subsequent appointments for evaluation of vitality that turned out to be vital, thus, preventing any unnecessary intervention. **Conclusions:** Horizontal root fractures in the vital teeth should be initially managed conservatively and every effort should be made to preserve the vitality of tooth.

Key words: Horizontal Root Fracture, Vital Tooth, Conservative Management, Displaced Fracture, Splint

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CASE REPORT (CR)

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Introduction

Root fractures constitute 0.5–7% among all dental traumatic injuries and horizontal root fractures comprise only 3% of all dental injuries^{1, 2}. Horizontal root fracture (HRF) can occur at coronal, middle or apical third but mostly occurred in the middle third of the root³. HRF presents a diagnostic and treatment challenge for the endodontist³. Clinically, root fracture can present as a mobile, extruded or displaced segment, but the definitive diagnosis requires appropriate radiographic examination⁴.

The management of HRF is based on the location of the fracture, mobility and the vitality of the tooth. Fractures in the apical third usually have good prognosis and do not require any treatment while cervical third fractures have worse prognosis and usually require extraction of the tooth especially when the coronal fragment displays severe mobility^{5, 6}. Fractures at the middle third of root have favorable prognosis and depends on whether it is displaced or un-displaced. If the coronal

fragment is displaced the initial management comprise of repositioning the fractured fragments, followed by stabilization to allow healing of the surrounding periodontal tissues². The decision to perform endodontic procedure should be deferred till the assessment of tooth vitality on the subsequent visits till the signs of necrotic tooth appears^{7, 8}.

The purpose of the case report is to present a case in which conservative management of displaced horizontal root fracture at the middle third of root was performed and followed up to 2.5 years.

Case Report

A 58 years old male attended Aga Khan University Hospital dental clinics with the complaint of pain on biting from upper right tooth since last four days. Patient had incident of biting hard object from that side. Clinical examination revealed uncomplicated fractured palatal cusp of tooth # 14 (Federation Dentaire Internationale).

Tooth exhibited tenderness to percussion and grade II mobility. Pulp sensibility testing was carried out using electric pulp tester (Gentle pulse, Parkell) that demonstrated a positive response on the affected tooth. Periapical radiographs revealed fracture at the middle third of root of tooth # 14 (Federation Dentaire Internationale) with mild displacement of coronal segment. (Figure 1A)

The treatment plan comprised of reduction and flexible splinting of the coronal fragment of tooth followed by evaluation for tooth sensitivity on subsequent appointments. Patient was informed about the treatment and informed consent was taken. Flexible splinting was carried out from tooth # 13 to 15 with co-axial wire and light cure composite resin (Figure 1B). Analgesic was prescribed and patient was called for follow up after two week.

On the follow up appointment after two weeks, sensibility testing was repeated using electric pulp tester that revealed a positive response; however, tooth was mildly tender on percussion. Patient was reassured and called after two weeks to evaluate and remove the splint if symptoms improved. On the next appointment after four weeks, sign and symptoms were improved with no tenderness to horizontal and vertical percussion.

Periapical radiograph was taken that showed with intact and uniform periodontal ligament space and lamina dura around the root of tooth # 14 (Figure 1C). Sensibility testing of the tooth showed positive response on electric pulp tester (Gentle pulse, Parkell). Splint was removed, patient was counseled and advised to report back after 6 months for follow up visit.

Patient was recalled after six months for fractured tooth assessment. The clinical and radiographical examinations were carried out that showed normal periodontal ligament space and lamina dura. The periapical radiograph showed a less radiopaque line between fractured segments with slight rounding of edges, which means that healing had occurred with interproximal connective tissue (Figure 1D). Patient was called for follow up after one year to evaluate the fractured tooth and he was perfectly doing well clinically and radiographically and tooth remained vital.

A 2.5 years follow up was performed with clinical examination and a 3D cone beam computed tomogram was obtained to evaluate the healing of the fractured root segment. No signs of pathology were observed and healing had occurred with interproximal connective tissue (FIGURE 2).



Figure 1. A: radiographs showing horizontal root fracture at the middle third of the root. B: radiographs showing composite and wire splint. C: radiographs showing healing at four weeks of follow up with normal periodontal ligament space and intact lamina dura. D: healing at six months follow up with radio opaque line between the fractured segments

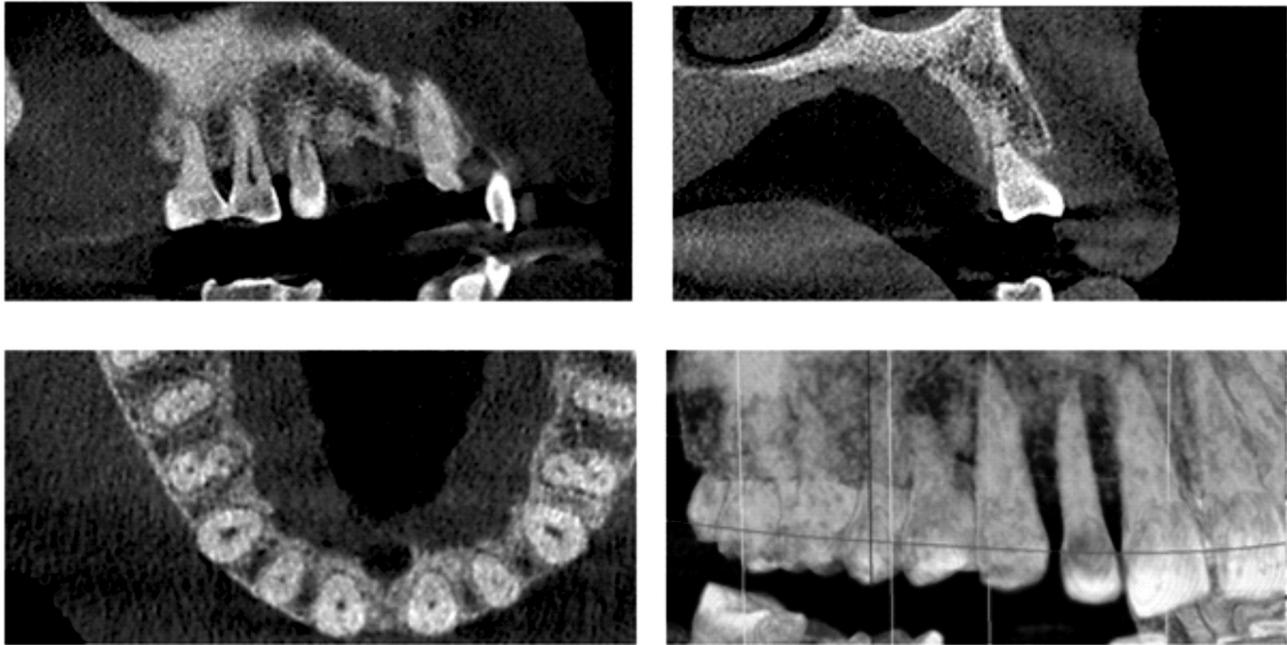


Figure 2. Cone beam computed tomography showing healing of the fractured segment without any signs of pathology

Discussion

The prognosis and healing of root fractures is governed by the extent of the fracture line, status of the pulpal and periodontal tissues, occlusion, dislocation/displacement of fractured segments and the overall health of the patient⁹.

In the present case report, clinical and radiographic examination reveals favorable healing pattern of a tooth with horizontal root fracture i.e. healing of calcified tissue with interposition of connective tissue. This type of union is achieved by the presence of vital pulp tissue and healthy periodontium. Available literature and multiple case reports suggest that healing outcome in horizontal root fractures is considered ideal if pulp remains vital and fragments heal with absence of any pathological changes after several years of trauma⁹⁻¹¹. Endodontic therapy of coronal portion should be performed only in cases where pulp testing reveals non-vital pulp tissue, or if signs and symptoms of pain or discomfort arise in affected tooth^{9, 10}.

Endodontic therapy should not be provided as a prophylactic intervention in cases with horizontal root fracture^{12, 13}. The pulp remains vital in many of the cases once the affected tooth is repositioned and adequately splinted as performed in the above case. However, the consensus on duration and type of splinting has not yet been established¹⁴.

The prognosis of treatment also depends upon the location of the fracture line. The fracture in the cervical third of the root results in the better prognosis

in terms of tooth vitality because of increased chances of revascularization as compared to the middle and apical third of root¹⁵. Even then the attempt should be made to stabilize the tooth having fracture at the middle or apical and keep the patient on follow up for the evaluation of signs of pulpal necrosis before embarking any endodontic procedure.

Thus it can be concluded that maintenance of vitality is the primary outcome that must be considered when treating a tooth with horizontal root fracture because fractured roots tend to heal spontaneously if the vitality of the pulp is preserved. Fixation of fragments using flexible splints without any other treatment leads to favorable treatment outcome in the presence of non-dislocated fragments and vitality. However, these patients require long-term follow-up because pathological changes can appear after several years following injury.

Conclusions

Horizontal root fractures in the vital teeth should be managed conservatively and every effort should be made to preserve the vitality of tooth. However, periodic follow up is mandatory for long term success of the treatment.

References

1. Davidovich E, Heling I, Fuks AB. The fate of a mid-root fracture: a case report. Dent Traumatol, 2005;21:170-173.

2. Karhade I, Gulve MN. Management of Horizontal Root Fracture in the Middle Third via Intraradicular Splinting Using a Fiber Post. *Case Rep Dent*, 2016;2016:9684035.
3. Welbury R, Kinirons MJ, Day P, Humphreys K, Gregg TA. Outcomes for root-fractured permanent incisors: a retrospective study. *Pediatr Dent*, 2002;24:98-102.
4. Tsai YL, Liao WC, Wang CY, Chang MC, Chang SH, Chang SF, et al. Horizontal root fractures in posterior teeth without dental trauma: tooth/root distribution and clinical characteristics. *Int Endod J*, 2017;50:830-835.
5. Gorduysus M, Avcu N, Gorduysus O. Spontaneously healed root fractures: two case reports. *Dent Traumatol*, 2008;24:115-116.
6. Ranka M, Shah J, Youngson C. Root fracture and its management. *Dent Update*, 2012;39:530-532, 535-538.
7. White I, Spiers G. Taking the trauma out of trauma: an easy to follow guide for the management of trauma to the permanent dentition. *Dent Update*. 2013;40:643-644, 647-648, 650-652 passim.
8. Clarkson RM, John K, Moule AJ. Horizontal palatal root fracture in a vital upper first premolar. *J Endod*, 2015;41:759-761.
9. Oztan MD, Sonat B. Repair of untreated horizontal root fractures: two case reports. *Dent Traumatol*, 2001;17:240-243.
10. Kucukyilmaz E, Botsali MS, Keser G. Treatments of horizontal root fractures: Four case reports. *J Pediatr Dent*, 2013;1:19-23.
11. Tziafas D, Margelos I. Repair of untreated root fracture: a case report. *Endod Dent Traumatol*, 1993;9:40-43.
12. Pan CS, Walker RT. Root fractures: a case of dental non-intervention. *Endod Dent Traumatol*, 1988;4:186-188.
13. Flores MT, Andersson L, Andreasen JO, Bakland LK, Malmgren B, Barnett F, et al. Guidelines for the management of traumatic dental injuries. I. Fractures and luxations of permanent teeth. *Dent Traumatol*, 2007;23:66-71.
14. Cvek M, Mejare I, Andreasen JO. Healing and prognosis of teeth with intra-alveolar fractures involving the cervical part of the root. *Dent Traumatol*, 2002;18:57-65.
15. Andreasen JO, Andreasen FM, Mejare I, Cvek M. Healing of 400 intra-alveolar root fractures. 1. Effect of pre-injury and injury factors such as sex, age, stage of root development, fracture type, location of fracture and severity of dislocation. *Dent Traumatol*, 2004;20:192-202.

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