Case Report

Intra-radicular Stabilization of a Mid-Root Horizontal Fracture

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ABSTRACT

The maxillary anterior teeth are a vulnerable site for traumatic dental injuries. Because of a sudden blow or impact, sometimes root fractures occur separating the tooth into a coronal and apical part. The prognosis and treatment plan of these fractures depend on the location of fracture line, age of patient, completion of root formation and time elapsed between trauma and reporting. The present case report discusses conservative management of a mid-root fracture in maxillary central incisor using mineral trioxide based sealer and a nickel titanium file as an intra-radicular spint.

Keywords: Splinting, root fracture, traumatic dental injuries

INTRODUCTION

Maxillofacial region is a vulnerable site for trauma due to road traffic accidents, sports related injuries or fights. The maxillary anterior teeth, especially central incisors are most commonly affected by traumatic dental injuries leading to damage to the crown, root or both crown and root. Sudden impact on the teeth sometimes leads to root fracture, thus separating it into an apical and coronal part. Root fractures account for only 0.5-7% of all traumatic dental injuries in permanent teeth and are maxillary central incisors are most commonly affected (68%) followed by maxillary lateral incisors (27%) and mandibular incisors (5%).[1]

Prognosis of such injuries depends on many factors: site of fracture (apical, middle or coronal third), stage of root formation, age of patient and time elapsed between trauma and treatment. Fractures in the apical third and middle third have a fair prognosis, while those in the cervical one-third have a guarded prognosis.[2] Immediate splinting of the teeth is the first line of treatment, followed by endodontic therapy when required.[3] Additionally, intra-radicular stabilization can be given with the help of stainless steel file, metal posts, fibre posts or nickel titatnium files.[4]

The present case report discusses the management and follow up of a patient with a horizontal root fracture in the middle third of maxillary central incisor using intra-radicular stabilization with nickel titanium file and a mineral trioxide aggregate (MTA) based sealer.

CASE REPORT

A 23 year old, systemically healthy male patient reported to the Department of Conservative & Endodontics with the chief complaint of pain and mobility in the upper front teeth. The patient gave a history of trauma following a road traffic accident a few months back. Clinical examination revealed fractured 11 and 21 (right and left maxillary central incisors, FDI notation) (Fig. 1). Both teeth responded negatively to thermal and electrical pulp sensibility tests. Tooth 11 showed grade I mobility and was tender to slight percussion. The maxillary right and left lateral incisors were found missing from the arch. Intra-oral periapical radiograph of the teeth

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Figure1: Pre-operative clinical view showing fractured 11 and 21.

Figure 2: Pre-operative IOPA radiograph showing mid root fracture and radioluscency in 11.

revealed a horizontal fracture line in the middle third of the root in 11 (Type I, Div.2 (B), Loomba *et al.*)[2] (Fig. 2). Also, there was a round radioluscency at the level of the fracture line. Radiograph confirmed the absence of the lateral incisors or their impaction. Immediate stabilization of the teeth and intra-radicular stabilization of the fractured root was planned for tooth 11, and endodontic therapy for tooth 12.

The teeth 12, 11 and 21 were splinted with a fibre ribbon splint (Interlig, Angelus) (Fig. 3). After rubber dam isolation, access cavity was prepared in tooth 11 and the fracture line was by-passed with ISO size 20 K-file (Fig. 4). The canal was carefully enlarged till size 40 and filled with a non-setting calcium hydroxide

Figure 3: Teeth 13, 11 and 21 splinted with fibre splint.

paste (Metapex, META). During the instrumentation, canals were irrigated with normal saline and 2% Chlorhexidine. After one week, the calcium hydroxide dressing was removed and the root was stabilized with a 2% taper, size 40 M-two file (VDW, GmBH) cut to the working length, and MTA based sealer (Fillapex, Angelus) (Fig. 5). The butt end of the file was reduced with a wheel shaped diamond and access cavity was sealed with composite resin. Tooth 21 was prepared upto ISO size 40 K-file and was laterally compacted with gutta percha and AH-plus sealer (Dentsply, Maillefer). As the lateral incisors of the patient were missing, both implant placement and fixed partial denture treatment options were explained to the patient. But due to economic and time constraints, the patient requested aesthetic management of only the central incisors. After one month, full veneer metal ceramic

Figure 4: Fracture line by-passed with M-two file.

Figure 5: Intra-radicular stabilisation of 11 with M-two file.

crowns were given in relation to 11 and 21(Fig. 6). The patient was regularly followed up and reported asymptomatic at his one year follow up visit (Fig. 7).

DISCUSSION

Anderson has described four types of healing patterns after dental root fractures. type I, interposition of calcified tissue (callus formation, radiographically fractured fragments appear in close contact); type II, interposition of connective tissue, (peripheral rounding of the fracture's ends visible); type III, interposition of bone and connective tissue, (appears on a radiograph as a clear separation between fractured ends); and type IV, the interposition of granulation tissue, caused by an infected or necrotic pulp. Among these, the Type II pattern in most commonly associated with successful treatment outcomes.[5]

Figure 6: Metal ceramic crowns in relation to 11,21.

Location of the fracture line and pulpal status has a major role in deciding the treatment plan as well as prognosis of the affected tooth. Teeth having fractures in the apical third of the root and a positive response to pulp sensibility tests do not always require root canal treatment, and sometimes only splinting with a rigid splint for few weeks is the only treatment required. Spontaneous healing untreated horizontal fractures even without any clinical intervention have been reported.[6] However, these cases should be followed for a long time to watch for any development of pulpal pathosis in future. Sometimes root canal treatment may be limited only to the part coronal to the fracture line.[7] Repositioning of the fractured parts by approximating them along the fracture line (if in coronal part) and rigid splinting of the teeth is the primary line of treatment and has a good prognosis in the middle and apical root fractures.[8] Intra-radicular stabilization of the fractured root using stainless steel or nickel titanium files and metal or fibre posts has been reported in earlier literature also.[4,9] In the present case, the fracture line was in the middle third of the root, and could be bypassed with a K-file ; and a lesser mobility of fractured tooth was perceived after file placement. So, it was decided to stabilise the tooth with a sterlised Ni-Ti file keeping in view the biocompatible nature of the alloy. Moreover, MTA based root canal sealer was used as MTA is biocompatible, cementogenic and also has good sealing and setting characteristics even in the presence of blood.[10,11] The follow up radiograph

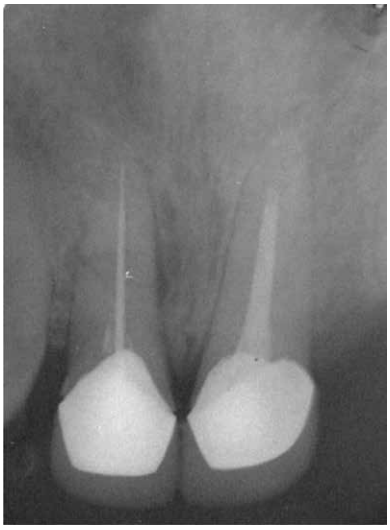

Figure 7: 1 year follow-up radiograph.

showed rounding of the peripheral ends of the fracture line, which is considered to be a sign of healing and repair at the site of fracture.

CONCLUSION

The present case report discusses an attempt towards a convenient and conservative management of a mid-root fracture and emphasizes on the importance of preserving natural teeth as far as possible instead of planning for extraction and prosthetic/implant replacement.

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