Case Report

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Conservative Management of Horizontal root fracture in Premolar: A Case Report

Abstract:
Permanent Teeth having closed apices and completely formed roots have increased probability of fracture due to the stable support given by the adjacent bone and periodontal tissues. Horizontal root fractures are mostly characterized by a fracture line that is perpendicular to the long axis of the root. In young patients, traditional apical surgery is deemed inappropriate unless remains the only option, instead, a conservative treatment approach is chosen to preserve the tooth. This case report details the management and a 2-year follow-up of a maxillary premolar exhibiting a horizontal root fracture which was filled with MTA and gutta-percha. MTA allowed healing and prevented the occurrence of clinical symptoms. Hence proving MTA to be a valid option for the horizontal root fracture by adding an advantage of speed of completion of treatment.

Key-words: Horizontal root fracture, Premolar, Conservative approach, MTA, PFM.

Introduction:

Horizontal root fractures are relatively uncommon amongst all the traumatic dental injuries, these account only for 0.5%-7% and can be classified based on location of fracture line of horizontal root fracture (apical third ,middle third, and cervical third of the root) and on the degree of dislocation of the coronal fragment. These occur most commonly in the middle third and rarely in the apical and coronal third of the root [1]. Clinically, root fracture can present as a mobile, extruded or displaced segment, but the definitive diagnosis requires appropriate radiographic examination [2].

The management of HRF is based on the location of the fracture, mobility and the vitality of the tooth. The best prognosis is seen in fractures at apical area and the worse prognosis is seen at cervical third. Whereas 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 tissues [3].

Factors that are considered for determining the prognosis regarding the vitality of pulp following luxation are the ones after healing of the fracture. Andreasen et al. in their study found that necrosis of pulp after horizontal root fracture occurs in nearly 25% of the cases [4]. Following this injury periodic checking of teeth is done to evaluate the vitality of pulp. But evaluation of pulp vitality can be difficult in these cases. Actual pulp vitality can be determined even after several months as said by Feiglin [5,6]. The vitality test does

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not tell about true status as the nerve supply is damaged & non-functional but the blood supply remains intact.

The purpose of the case report is to present a case of horizontal root fracture in premolar which was managed with conservative approach at the middle third of root with MTA plug followed by obturation with gutta purcha and follow after 2 years.

Case Report:

A 14 years old male attended dental clinics with the complaint of pain on biting from upper right tooth since last four days. Patient had incident of eating something hard from that side. Clinical examination revealed fractured cusp of tooth # 14 (Federation Dentaire Internationale).Tooth exhibited tenderness to percussion and grade I mobility. Periapical radiograph revealed fracture at the middle third of root of tooth # 14 (Federation Dentaire Internationale) with Fractured cusp exposing radicular pulp. Fig. 1(A)

After explaining the entire procedure, a written consent was taken; local anaesthesia was administered in premolar region. Access opening was done, followed by working length determination Fig.1 (B) and canals were cleaned biomechanically and irrigated with a sodium hypochlorite 2.5% (Niclor OGNA) solution. The canals were then dried with paper points. The MTA material (Proroot MTA, Dentsply) was mixed in a 3:1 proportion and was carried with a MTA carrier and Plugger to middle third of the premolar.

To check the correct positioning of the MTA mixture, an intra-oral periapical radiograph was taken. Fig.1(C). A wet cotton pellet with sterile water was then placed in the pulp chamber and the access cavity was closed with temporary filling material IRM (Caulk/ Dentsply, Milford DE, USA). After 24 hours, the IRM and the cotton pellet were removed and the set of the MTA was gently tested with gutta-percha and the rest of the Premolar root canal was obturated with gutta-percha and sealed with Endomethasone-N® (Septodont). The final restorations were sealed with composite resin coronally. Fig. 2(A).

Patient was recalled after 1 week and PFM Crown was delivered wrt 14. Fig.2 (B).A radiographic follow-up after two years two years revealed adequate clinical function and no tenderness of percussion, pain or discomfort since the root canal obturation and no abscess formation. Fig.2(C).This case illustrates the potential for repair of horizontal root fracture sealing with MTA.

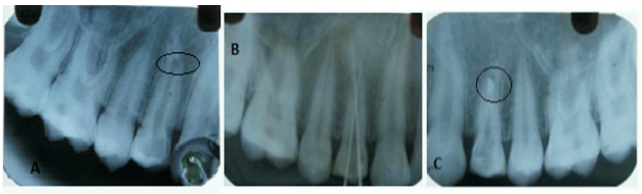

Fig. 1(A) Preoperative radiograph showing fracture line. (B) Working length determination.(C) MTA plug placed in 14.

Fig. 2 (A) Obturation Done in 14. (B) PFM crown delivered wrt 14. (C) Follow up after 2 years.

Discussion:

The prognosis and healing of root fractures is dependent on 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 patient [6]. One of the most important factors considered during management of horizontal fracture is extent of fracture line and its communication with the oral environment which can cause contamination from bacteria.

When the pulp-tissue vitality is preserved, the odontoblasts and the cells from the cementum are usually responsible for the healing process [7].Deposition of calcified tissue occurs, with the possibility of a connection of the root pieces. The ratio of healing is dependent on odontoblasts or cementoblasts appearance in response to the injuries. The possibility of spontaneous healing after a root fracture in teeth that maintains pulp vitality is clinically significant [7]. Whereas, if the pulp injury is severe, healing does not occur and granulation tissue separates the fractured segments, without the hard-tissue healing [7]. In the case reported, pulp vitality tests and the patient's symptoms influenced the decision to perform root canal treatment.

Conventional endodontic treatment in horizontal root fracture includes filling the canal with gutta-percha, and creating a stop using non-setting calcium hydroxide or MTA. Due to various drawbacks of calcium hydroxide such as the need for multiple applications, possibility of re infection, and the potential for root fractures in immature teeth [8] made MTA as a choice of material for teeth with necrotic pulps and open apices. MTA having an edge over calcium hydroxide has increased fracture resistance, improved success in achieving

apical closure, reduced failure rates, enhanced hard tissue formation, and reduced inflammation [9]. Due to these factors MTA was selected over calcium hydroxide in the present case for better treatment outcomes.

Radiographic detection of horizontal root fractures requires proper angulation of X-rays. It is recommended to take multiple radiographs from various angles when suspecting a horizontal root fracture, therefore different preapical radiographs were taken at various angles [10]

In the present case, the periapical radiograph revealed a horizontal root fracture without significant displacement of the segments. In the two-year follow-up, the radiolucent lesions had significantly resolved, and the fracture site had healed with fibrous tissue as seen through radiographic examination.

Root fractures in teeth can heal with various mechanisms, such as direct bone healing, connective tissue healing, or the development of fibrous tissue. Various factors contribute to fibrous tissue healing, including delayed treatment, significant displacement of fracture segments, and poor periodontal tissue health. As fibrous tissue does not restore the tooth's original strength or functionality, it generally is less favourable than bone or hard tissue healing. As a result of the lack of mineralization associated with bone healing, fibrous tissue repairs tend to be weaker and less stable. There is a potential for re infection or further damage to teeth. The formation of mineralized tissue during bone or hard tissue healing results in a more efficient restoration of tooth structure and function, reducing the risk of long-term complications [11].

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