# Non-Surgical management of Apical third root fracture with MTA: A Case report

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Abstract: Though dentin is flexible still at times the teeth undergoes fractures. Coronal fractures are easy to manage and repair but when it comes to root fractures, treating them has always been a tough job. Though different types of healing patterns have been mentioned in the text, still most of these teeth suffer from either continuous pain or they get extracted. To conserve and salvage such fractured teeth different techniques have been explored and many a times surgical approach has also been used but the results have often not been that promising. Delayed management of traumatic teeth injuries reduce the success rate. This case report describes the management of a permanent maxillary right lateral incisor with a horizontal root fracture at the level of apical third after 3 months following trauma by mineral trioxide aggregate (MTA) and fiber reinforced composite with good prognosis.

Keywords: - Horizontal Apical Root Fracture, Maxillary Right Lateral Incisor, MTA.

## I. INTRODUCTION

Traumatic injuries of teeth are the main cause of emergency treatment in dental practice and they range from simple enamel cracks to complex dento-alveolar fractures leading to avulsion/ intrusion or complete loss of teeth. Horizontal root fractures are more frequently observed in the maxillary anterior region and in young patients. The most common type of root fracture is in the middle third, followed by apical and coronal third. [1-3].It was reported that 31% of the patients with root fractures were identified during routine dental

radiographic examinations [3].

Most of the injuries are often limited to coronal part of the teeth and root fractures of permanent teeth are fairly uncommon unless the impact forces are very high and bluntly directed to the roots of the teeth [4]. Root fractures seen mostly are either vertical or horizontal and they happen more in the maxillary anterior region owing to long straight roots. This kind of fractures usually occur because of severe trauma, such as traffic accidents and sports injuries, and it has been reported to occur in less than 3% of all dental injuries.

Of all the root fractures, apical third fractures have most favourable prognosis and if left untreated often heal by themselves by one of the healing pattern. But if the underlying aetiology is not controlled or irradicated, it may lead to non-healing of dental tissues and may cause continuous pain and might lead to loss of tooth [5].Immediate treatment in horizontal root fractures includes repositioning of coronal segment and splinting and delayed management by endodontic treatment of coronal fragment.

This paper reports the management of a horizontal apical root fracture using mineral trioxide aggregate (MTA) and fiber reinforced composite.

## **II .CASE REPORT**

A 40-year-old female patient reported with the chief complaint of pain, mobility & extrusion of teeth in upper front region of jaw for the last 3 months. Patient had history of frontal impact due to fall from bike about 3 month back. Medical history was non-contributory. On clinical examination teeth 11 showed extrusion and grade II mobility ["fig"1a]. Pain was moderate, intermittent in nature .Teeth 11, 12 were tender on percussion; probing depth was 2mm & demonstrated no response to vitality test (thermal & electrical test). Intraoral periapical radiograph showed transverse radiolucent line at the apical one third of the root with gap in between two segments was seen with 12 ["fig"1b].

On basis of clinical and radiographic finding, diagnosis of irreversible pulpitis with horizontal apical root fracture in relation to 12 and chronic apical periodontitis with 11 was made. A widened periodontal ligament (PDL) was apparent surrounding the fracture site, without loss of continuity in lamina dura with 11.Treatment plan comprised of reduction, semirigid splinting and endodontic treatment of only the coronal fragment in relation to 12, as the fracture fragments were not approximated and the possibility of the apical fragment retaining pulp vitality as well. Endodontic treatment of the 11 teeth was decided and informed consent was taken. Teeth 11,12 were splinted labially with fiber splint (Interling, Angelus, Brazil) which was bonded to tooth surface with composite resin.



Figure 1: (a) Preoperative clinical photograph.



(b) Preoperative radiograph showing fracture line at apical third of root with 12.

Local anesthesia was established using 2% Lidocaine with 1:2,00,000 Adrenaline. Endodontic therapy was initiated access was gained through lingual surface of teeth 11 & 12, pulp chamber was irrigated with 2.5 % NaOCl & Saline. Working lengths were determined using apex locator in 11, 12["fig"2 a] and confirmed with radiographs. Cleaning and shaping was completed. Canal was shaped to apical size 60 using K-files. Both the canals were cleaned and shaped to size 70 and 60 respectively . Calcium hydroxide intracanal medicament was placed with 11and 12. The access cavities were sealed with cotton pellet and temporized with a temporary restorative material. Oral hygiene instructions were given and the patient was recalled after one week. After 1 week intracanal medicament was removed from tooth 11 and the canals were obturated with gutta percha and resin based sealer using lateral condensation technique with 11.

The intracanal medicament was removed after 1 month with 12 and the fractured tooth was checked for barrier formation at the junction of coronal and apical fragment by passing a #15 K-file through the root canal. The file went past the coronal fragment indicating absence of any barrier. The decision was then made to place MTA plug in the coronal fragment followed by reinforcement with fiber-reinforced composite. MTA plug was prepared according to manufacturer's recommendations by mixing with a powder: liquid ratio of 3:1 ["Fig"2 b]. After placing MTA plug of 4mm in the root canal, a moist cotton pellet was placed in the pulp chamber and the access cavity was sealed with a temporary restorative material. Patient was recalled after 24 hours. At the following appointment, setting of MTA was verified at the apical third of 11and remaining canal

was obturated by warm injectable guttapercha using Obtura II (Obtura Spartan) along with AH plus sealer(Dentsply)["Fig"2c].

The access cavity were etched with 37 % phosphoric acid for 30 secs. Followed by washing and drying two coats of bonding agent was applied to access cavity and remaining root canal space and light cured. A required length of fiber material that was preimpregnated with bonding agent was cut and placed in the access cavity with its two ends extending on buccal and lingual walls of root. A flowable composite was placed in the remaining root canal space and then light cured. The access cavity was sealed with a nanocomposite resin . Splint was removed after 2 week & mobility was within normal limits. At recall visits teeth were asymptomatic and responded normally to palpation and percussion. The patient was reviewed at 1 year ["fig"2e]. There was evidence of healing at the fracture line in relation to 11& 12 with normal periapical features . Patient was asymptomatic and no periapical pathosis developed. 12 months follow up revealed no mobility in teeth with a good clinical and radiographic prognosis ["Fig" 2d and e].



Figure 2: (a) Working length radiograph with 11,12.



(b) Placement of MTA Apical plug with 12.



(c) Post treatment IOPA with 11,12.



(d) Post operative clinical photograph



(e) Follow up radiograph after 1 year.

#### III. DISCUSSION

Root fracture is a complex injury to the periodontal ligament, pulp, dentin and cementum. The injury to the coronal segment can be considered a luxation injury, with resultant trauma to the periodontal ligament and neurovascular supply to the coronal pulp. The apical fragment remains essentially uninjured. To facilitate healing, optimal repositioning and stabilization of teeth is considered essential [1]. Horizontal root fractures may cause injury to neurovascular supply of the coronal fragment. On the contrary, the apical fragment remains essentially viable. When a root fracture horizontally, mostly the coronal fragment get displaced and the apical segment does not generally displaced. The pulpal circulation is usually maintained in the apical segment and pulp necrosis of the displaced coronal segment has been reported in 25% of the cases [1]. The necrotic and infected pulp tissue is responsible for the inflammatory changes along the fracture line.

Basically, four types of conservative endodontic treatment have been described [6-7]. They are i) cleansing and gutta-percha (GP) filling of the root canal of the coronal fragment only, ii) cleansing and filling of the root canal in both fragments, iii) cleansing and GP filling of the root canal of the coronal fragment and surgical removal of the apical fragment, and iv) treatment of the root canal with calcium hydroxide followed by filling with GP. However, there are cases of horizontal root fractures with signs of healing without any treatment. In case of displaced coronal fragment, immediate treatment requires re-approximation of the fragments and splinting for four weeks [8,9,10]. Following splinting, it is essential to monitor vitality of pulp. But in cases with delay between time of injury and initiation of treatment, close approximation is not always possible. In such cases, healing mainly occurs by formation of granulation or connective tissue, which is a sign of pulp necrosis and an indication that endodontic treatment of the tooth is necessary[10].

Placement of calcium hydroxide intracanal medicament was done in an attempt to allow barrier formation at the apical part of coronal fragment. Even though no barrier was formed after 1 month, long term placement of Calcium hydroxide was not done to avoid compromising the fracture resistance of tooth structure. Moreover it has a disadvantage of increased treatment time, unpredictable results and delays in completing final restoration. MTA apical barrier technique was used to create a 4mm apical plug. MTA is a tricalcium mineral complex and is considered to be a potentially ideal material for apexification and perforation repair.Following MTA placement and obturation, 2mm of root canal space was left along with thin dentinal walls and

undermined tooth structure [10,11]. This necessitated the need for reinforcing the tooth structure. Fiber reinforced composite was used to achieve same. Follow up one year radiograph confirmed repair of root fracture with mostly hard and connective tissue interposition and there were no sign of resorption or periapical pathology.

#### **IV. CONCLUSION**

The primary purpose of the treatment of fractured elements is to keep a steady tooth and, when it's possible its vitality. It is important to remember that the maintenance of a natural tooth during growth could be an excellent intermediate solution before implant rehabilitation. The clinician must judge every situation on its individual merits and select a procedure that fulfils the needs of the case while maximizing stability and minimizing mobility. Adopting appropriate treatment strategy using material like MTA, for treatment of horizontal fracture at apical third can result in optimum healing and prolonged retention of the teeth, which would otherwise require extraction.

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