OPEN ACCESS
Global Journal of Research in Dental Sciences
ISSN: 2583-2840 (Online)
Volume 04 | Issue 05 | Sept. – Oct. | 2024
Journal homepage: https://gjrpublication.com/gjrds/
Case Report

Non-Surgical Management of Central Incisor with Apical Third Root Fracture – A Case Report

*Dr. Ashwini KS [1,2], Dr. Nagaveni NB [3,4]

[1]Senior Lecturer Department of Conservative Dentistry and Endodontics, SJM Dental College and Hospital, Chitradurga, Karnataka, India.
[2]Consultant Endodontist Dental wing, Karnataka ENT Hospital and Research Centre Chitradurga, Karnataka, India.
[3]Professor, Pediatric Dentist "Garike Dental Care" Davangere, Karnataka, India.
[4]Consultant Pediatric Dentist, Dental wing, Karnataka ENT Hospital and Research Centre Chitradurga, Karnataka, India.

DOI: 10.5281/zenodo.13628724 **Submission Date:** 05 Aug. 2024 | **Published Date:** 02 sept. 2024

***Corresponding author:** Dr. Ashwini KS
Senior Lecturer, Department of Conservative Dentistry and Endodontics, SJM Dental College and Hospital, Chitradurga, Karnataka, India

Abstract
Although dentin is flexible and resilient however, sometimes fractures are seen in human teeth following traumatic injury. The management of crown fractures is easy but root fractures is always difficult. Though different types of healing patterns have been mentioned in the literature, still most of these teeth suffer from either continuous pain or they get extracted. To conserve such fractured teeth different techniques have been explained and many a times surgical approach has also been used but the results have often not been that promising. The present case report describes the successful management of a permanent maxillary right central incisor with a horizontal root fracture at the level of apical third.

Keywords: Horizontal Apical Root Fracture, Maxillary Right Central Incisor, Non-surgical treatment, Hard tissue barrier.

Introduction
Traumatic injuries of teeth are the main cause of emergency treatment in clinical practice and they range from simple enamel cracks to complex dento-alveolar fractures leading to avulsion/ intrusion or complete loss of teeth [1]. Horizontal root fractures are more frequently observed in the maxillary anterior teeth and in young children. The most common type of root fracture is in the middle third, followed by apical and coronal third [1]. It was reported that 31% of the patients with root fractures were identified only during routine dental radiographic examinations. 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 [2]. Different types of root fractures are seen ranging from either vertical or horizontal and they encountered more in the maxillary anterior teeth because of long straight roots [1]. 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 [1,2]. It is also confirmed that most of the traumatic injuries occur at the premises of home or schools or playgrounds. Hence, an awareness and knowledge among parents, guardians, sport masters and school teachers about immediate management of traumatic injuries including tooth avulsion in children highly essential [3,4]. Of all the root fractures, apical third fractures have most favourable prognosis and if left untreated often heal by themselves by natural healing patterns. 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. Immediate treatment in horizontal root fractures includes repositioning of coronal segment and splinting and delayed management by endodontic treatment of coronal fragment. This paper describes the successful management of a horizontal apical root fracture using Calcium Hydroxide dressing in the maxillary central incisor.

Case report

A 30-year-old male patient reported with the chief complaint of pain in upper front teeth region in the past 2 months. Patient had history of frontal impact due to fall from bike about 3 months back. Medical history was non-contributory. On clinical examination maxillary left central incisor showed slight intrusion and grade I mobility. Pain was moderate, intermittent in nature. Maxillary left central incisor was tender on percussion and showed no response to vitality test (both thermal and 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 (Figure 1 – A).

On basis of clinical and radiographic findings, diagnosis of irreversible pulpitis with horizontal apical root fracture in relation to maxillary left central incisor was made. A widened periodontal ligament (PDL) was apparent surrounding the fracture site, without loss of continuity in lamina dura in relation to the maxillary left central incisor. Treatment plan consisting of occlusal reduction, endodontic treatment of only the coronal root fragment in relation to maxillary left central incisor was planned as the fracture fragments were not approximated and the possibility of the apical root fragment retaining pulp vitality. Endodontic treatment was decided and informed consent was taken.

Local anesthesia was administered using 2% Lidocaine with 1:2,00,000 Adrenaline. Endodontic therapy was initiated. Access cavity was prepared through palatal surface of maxillary left central incisor. Pulp chamber was irrigated with 2.5 % sodium hypochlorite and saline. Working length was determined using apex locator and confirmed with radiographs (Figure 1 -B). Chemomechanical preparation was completed. Canal was shaped to apical size 60 using K-files. Canal was cleaned and shaped to size 60 and 70 respectively. Intra canal medicament such as calcium hydroxide was placed and was changed every two weeks for one month. The access cavity was sealed with cotton pellet and temporized with a temporary restorative material. Post operative instructions were given and the patient was recalled after one week. After one-month intracanal medicament was removed from tooth 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 did not pass through the fracture line indicating the presence of barrier. There was evidence of healing at the fracture line with normal periapical features. Maxillary left central incisor was found asymptomatic and no periapical pathology was observed. Finally, obturation of the root canal with gutta percha and resin-based sealer using single cone technique was performed (Figure 1 – C & D) followed by post endo restoration.

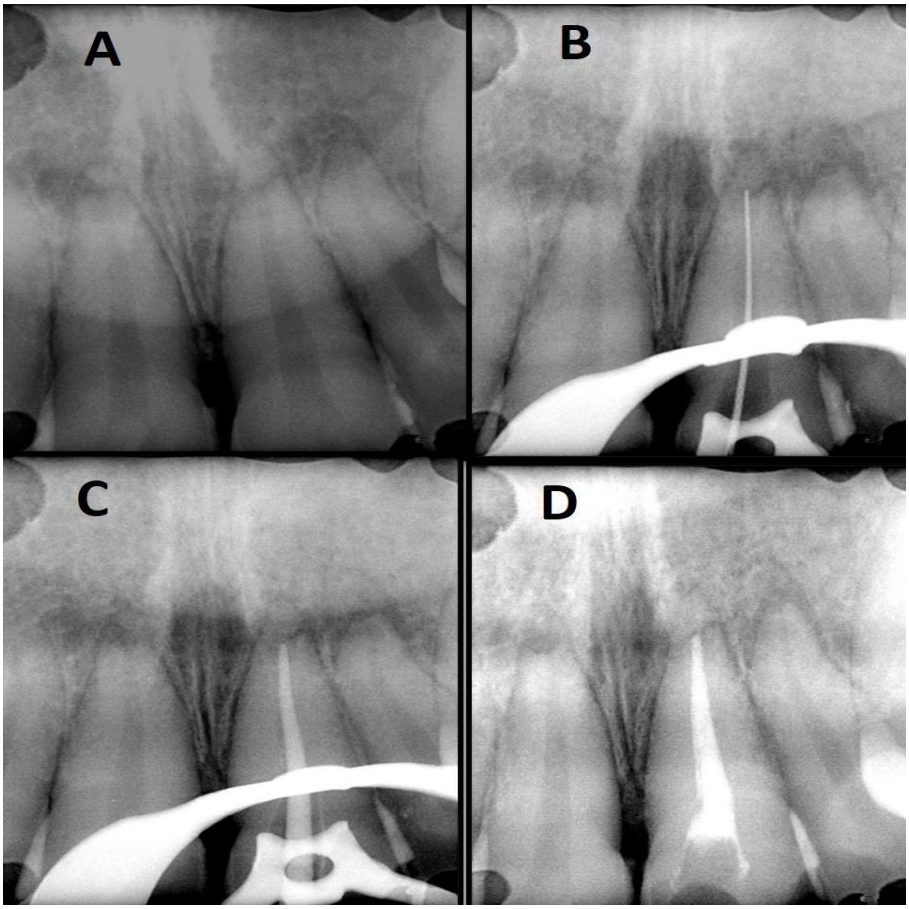

Figure 1: Radiograph showing apical third root fracture (A), Working length determination (B), Master cone selection (C), Post-obturation radiograph (D).

Discussion

As dental trauma occurs at home, schools and playgrounds, various awareness surveys have been published in the dental literature [3,4]. There are also reports showing embedding of tooth fragment in the soft tissues of the oral cavity following dental trauma in children [5]. In addition to these possibility of intraoral soft tissues injuries caused by foreign objects is evident in pediatric population as they engage in playing with objects like pencil, pen or toys. Root fracture is one of the major consequences observed following dental trauma [6]. The histological reactions seen at the fracture line are classified into four types: (I) Interposition of calcified tissue (callus formation); (II) interposition of connective tissue, which is characterized by peripheral rounding of the fracture's ends; (III) interposition of bone and connective tissue, radiologically characterized by the clear separation of the two fragments; and (IV) interposition of granulation tissue, caused by an infected or necrotic pulp [1]. Type I is found most commonly in root-fractured teeth in which the coronal fragment is not or only slightly dislocated. Type II often results after lateral dislocation or extrusion of the coronal fragment. If the trauma occurs before growth of the alveolar process is complete, the coronal fragment continues to erupt, but the apical fragment remains in its pre-trauma position. As a result, bone and connective tissue grow between the two fragments (type III). In type IV, infected or necrotic pulpal tissue causes an inflammatory reaction in the fracture line [2]. Calcium hydroxide cement plays a major role in closure of the root apex in immature permanent teeth [7]. The tooth discoloration caused by untreated long standing traumatic injury can also treated in successful method [8].

The patient's age at the time of injury is considered as one of the most important factors in pulpal healing following root fracture. Andreasen et al.,[9] studied the influence of "pre-injury and injury factors" on the healing of 400 intra-alveolar root fractures. Those authors found that the age of the patients, the stage of root growth, mobility of the coronal fragment, and dislocation of the coronal fragment exerted the greatest influence on healing at the fracture line and on the occurrence of pulpal necrosis. Calcium hydroxide dressing disinfect the root canal and maintain the root canal of high pH value, an environment suitable for hard tissue formation. [7,10] The guidelines by the International Association of Dental Traumatology (IADT) [10] recommend endodontic treatment only after pulp necrosis, and not as a prophylactic intervention. Nevertheless, root-fractured teeth in children and adolescents or root-fractured teeth with a minimum dislocation of the coronal fragment, independent of the patient's age, should not be prophylactically endodontically treated; rather, pulp healing should be carefully observed for a minimum of one year. However, in the present case, calcium hydroxide dressing resulted in healing of the pathology leading to successful obturation of the root canal.

References

1. Jethi N, Maheshwari K, Kaur K. Management of apical third root fractures in radiculomegaly of mandibular anterior teeth: a rare case report. Cureus 2024; 16(2): e55012.
2. Abbott PV. Diagnosis and management of transverse root fractures. J Endod 2019; 45(12S): S13-S21.
3. Shashikiran ND, Reddy VVS, Nagaveni NB. Knowledge and attitude of 2000 parents (urban and rural – 1000 each) with regard to avulsed permanent incisors and their emergency management, in and around Davangere. J Indian Soc Pedod Preven Dent 2006; 24(3): 116-121.
4. Nagaveni NB, Radhika NB, Umashankar KV. Knowledge, attitude and practices of parents regarding primary teeth care of their children in Davangere city, India. Pesquisa Brasilieira em Odontopediatria e Clinica Integrada 2011; 11(2): 129-132.
5. Nagaveni NB, Umashankara KV. Tooth fragment embedded in the lower lip for10 months following dentoalveolar trauma: a case report with literature review. Burns and Trauma 2014; 2(3); 141-145.
6. Nagaveni NB. Management of penetrating soft tissue injury involving maxillary labial vestibule in a pediatric patient. EC Dent Sc 2024; 23.6: 1-6.
7. Nagaveni NB, Umashankara KV, Radhika NB, Manjunath S. Successful closure of the root apex in non-vital permanent incisors with wide open apices using single calcium hydroxide (caoh) dressing – report of 2 cases. J Clin Exp Dent 2010; 2(1): e26-29.
8. Nagaveni NB, Umashankara KV, Radhika NB, Satisha TS. Management of tooth discoloration in non-vital endodontically treated tooth – a report of 6-year follow-up. 2011; 3(2): e180-3.
9. 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(4): 192-202.
10. Saoud TM, Mistry S, Kahler B, Sigurdsson A, Lin LM. Regenerative endodontic procedures for traumatized teeth after horizontal root fracture, avulsion and perforating root resorption. J Endod 2016; 42(10): 1476-82.

CITATION
Ashwini KS, & Nagaveni NB. (2024). Non-Surgical Management of Central Incisor with Apical Third Root Fracture – A Case Report. In Global Journal of Research in Dental Sciences (Vol. 4, Number 5, pp. 8–10). https://doi.org/10.5281/zenodo.13628724