

Case Report

Clinical Strategies in Endodontics for Management of Complex Trauma Cases- A Case Report

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ABSTRACT:

Maxillary anterior teeth are most prone to fracture. The emergency management of teeth is required to prevent permanent damage. This case report of 28 years old male highlights endodontic management of complex trauma using various clinical strategies. Rapid surgical extrusion of complicated crown root fractures involving incisors is a viable treatment option and has many clinical and financial advantages over others. Unforeseen complications like sodium hypochlorite accident may occur and its management is a challenge. Finally the grossly fractured tooth was restored to its form and function.

Key words: Extrusion, Fracture, Sodium hypochlorite.

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INTRODUCTION

Tooth trauma is a frequent emergency situation at dental offices. The most common tooth to get traumatized is maxillary anterior tooth. It is more frequently observed in males compared to females. Traumatic dental injuries are more common in permanent teeth compared to deciduous teeth and usually involve the anterior teeth of the upper jaw.¹

The high rates of violence, car accidents, and greater participation of children in sports activities have contributed to consider tooth trauma as an increasing public health problem. Severity of trauma to dental tissues may present as simple enamel fracture to the total loss of the tooth. Enamel and dentin fractures without pulp exposure do not require an emergency treatment. Crown fractures with pulp exposure, intrusive luxation, concussion, subluxation and primary tooth trauma are considered injuries of moderate severity and demand an early treatment.²

The restorations in fractured anterior teeth are aesthetic-functional solutions for the consequences of a tooth trauma. They are also demanded by the patients to improve their appearance, providing greater comfort and psychosocial

well-being. Treatment of the fractured central incisor maintains the integrity of the tooth, as well as patient's self esteem, due to the improvement of tooth aesthetic and consequently of the patient's emotional state.³

Endodontic treatment is mandatory in order to salvage the tooth. When the injured teeth are symptomatic whilst in function due to damage to the periodontal ligaments, a temporary splint for the injured teeth may relieve the pain and enhance eating ability.⁴

CASE REPORT

A 28 yrs old male patient reported to the department of Conservative Dentistry & Endodontics with a complaint of fracture in his upper front teeth. History revealed trauma to his upper front teeth in an accident 2 days back. Patient experienced mild but continuous pain. Lacerations on the face, and multiple injuries were seen on the body. Patient was unable to speak and continue his daily activities since 2 days.

Extra oral examination revealed lacerations on lower lip, over the chin and forehead. Swelling was observed on upper lip. On intra-oral examination, 11 was fractured with distal

fracture line extending subgingivally (Ellis class IV). Tenderness on percussion was positive. 21 was discolored (Fig- 1).

Figure 1: Preoperative Clinical picture (facial and occlusal) showing fractured 11 and discolored 21



Thermal Vitality test was performed and with cold test 12, 13, 22 & 23 showed response while 11 & 21 had no response. Heat test showed delayed response with 12, 13, 22 & 23 and 11 & 21 had no response. IOPA of 11 & 21 showed Ellis class IV fracture with 11. IOPA of 21 showed PDL widening with 21 and obliteration in pulp chamber and root canal suggestive of calcific metamorphosis (Fig- 2).



Figure 2: Radiograph with 11 and 21

Ellis class IV fracture wrt 11 and presence of calcific metamorphosis with 21
Based on history, clinical and radiographic examination, final diagnosis was pulpal necrosis secondary to trauma with 11 and calcific metamorphosis in 21.

Treatment plan

For 11 Root canal treatment followed by surgical extrusion, post and core & PFM /Ceramic crown. For 21 Root canal treatment followed by PFM /Ceramic crown was planned.

PROCEDURE :-

Root canal access opening was done with round bur #12(Mani) and canal patency was achieved with no.15K file (Mani). Working length was taken with the help of apex locator (J Morita Root ZX) and evaluated radiographically. Cleaning and shaping was done. The canal was prepared apically till #50 K file using step back technique. Coronal flaring was done using# 60 H file. The canal was irrigated with 3% sodium hypochlorite and saline intermittently. Intracanal medicament of calcium hydroxide dressing RC Cal (Prime Dental) was given. Temporary restoration was done (Cavit, 3M).

On second visit, root canal opening was done with 21. Radiograph revealed calcific metamorphosis with 21. Access opening was done with 21 using a round diamond bur (Mani). Magnification binocular loupes(Carl Zeiss), DG 16explorer (Premium) , #6,8,10 K Files(Mani) were used in order to negotiate the canal. The canal was irrigated with 3% sodium hypochlorite and saline intermittently. Swelling was immediately seen on the upper lip and the buccal vestibule, Patient complained of burning sensation & excruciating pain in gingiva & lips. Unknowingly perforation may have been created in the labial wall of the canal, as a result of which sodium hypochlorite leaked out of the root canal causing hypochlorite accident. Aspiration and immediate irrigation with saline was done to neutralize the action of sodium hypochlorite through the canal (Fig-3)

The patient was counselled & following instructions were given to the patient

- To apply cold compression
- Not to eat or drink anything hot, only cold food stuff to be taken
- Medications advised were: Tab Amoxicillin 250 mg tds and Cap. Becosule one OD for 3 days. Mucopain ointment was given for topical application.

The patient was recalled after 24 hrs and then after 3 days.

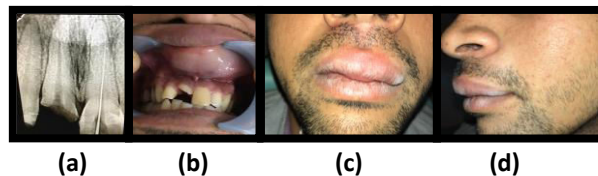


Figure 3: (a) Radiograph showing perforation on labial surface of root, (b, c, d) Clinical picture showing hypochlorite accident

On third visit patient was asymptomatic. Cleaning and shaping was completed and the canal was irrigated intermittently with sodium hypochlorite (3%) and saline (Prime Dental). Final wash with 17% aqueous EDTA (Prime Dental) and then obturation was done in 11 with lateral compaction technique.



Figure 4: Radiograph showing Obturation done with 11

On fourth visit, rapid surgical extrusion was done with 11. A 2 mm of crown structure was surgically extruded and exposed supragingivally using extraction forceps. Splinting

was done from 13 to 23 using a ligature wire (24 guage) and composite resin material (3M-ESPE).

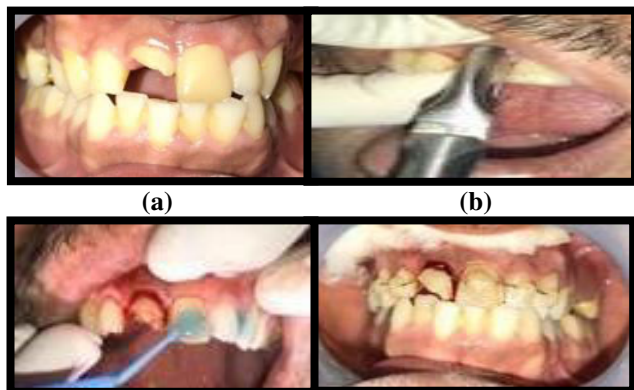


Figure 5. (a) Clinical picture with 11, (b) showing surgical extrusion with 11 (c,d) splinting done from 13 to 23

On fifth visit, perforation repair was planned under microscope with 21. The perforation site was evaluated under microscope and radiographically.

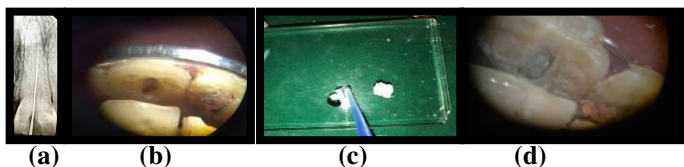


Figure 6(a): Radiograph showing perforation, (b) Microscopic picture of the canal opening and the perforation site ,(c) MTA angelus manipulation on a glass slab,(d)Microscopic picture showing perforation repair

On sixth visit post space preparation was done in 11 using peeso reamer # 2 (Mani).Fiber post(Hi-Rem, Prime Dental)was luted in the root canal using RelyX (3M-ESPE) luting material. Post-endodontic build up was done with 11 using composite resin (Z 350, 3M- ESPE)

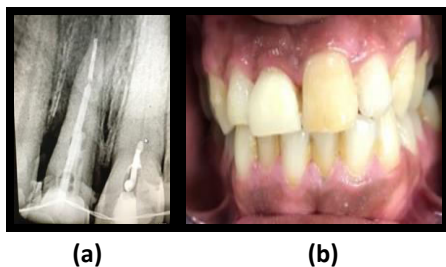


Figure 7 (a): Radiograph showing post placement with 11, (b) build up done using composite resin with 11

On seventh visit -The patient was recalled after one week and root canal treatment was again initiated with 21. Canal was negotiated with #10 K file. Working length was taken with apex locator (J Morita Root ZX) and confirmed radiographically. Cleaning and shaping was carried out. The canal was prepared apically till #35 K file,Followed by #

40,45 50 K, file respectively using Step Back technique. Coronal flaring was done using # 50 H file.The canal was irrigated with 3% sodium hypochlorite and saline (Prime Dental) intermittently. Final wash was done with 17% EDTA(Prime Dental) and Obturation was done with 21 using lateral compaction technique.Post endodontic restoration was done with Z350 Composite resin (3M ESPE).

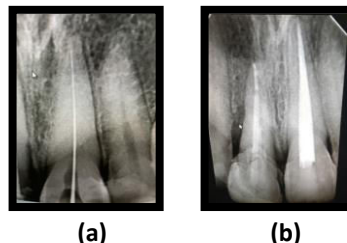


Figure-8(a) Working length radiograph with 21,(b) Obturation with 21

On Eighth visit -Gingival zenith was established with electro-cautery (Satelec, Acteon) and Periodontal pack (Coe pack, GC) given for 1 week.



Figure-9- Gingival zenith established with 11 and 21 using electro cautery

On ninth visit -Crown preparation and gingival retraction was done with 11 and 21. Impression was made using polyvinyl siloxane- light body and putty impression material (3M-ESPE). Temporary resin crowns were given. Coping trial was done and finallyfull ceramic crowns with 11 and 21 were cemented using RelyX luting cement (3M-ESPE)

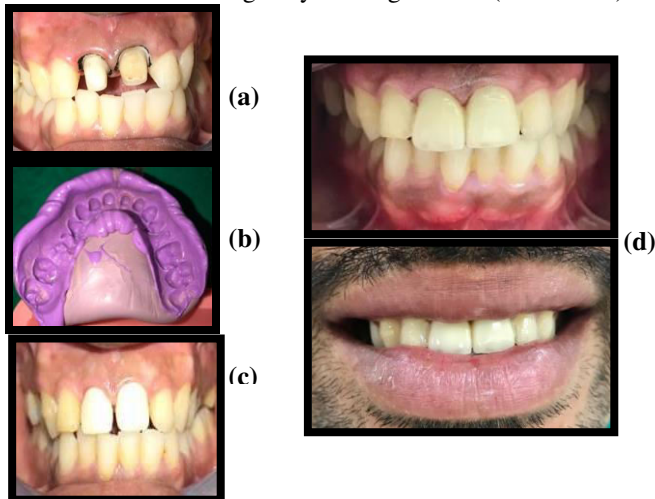


Figure 10 (a): Crown preparation with11&21,(b) impression taken, (c) Coping trial,(d)All ceramic crowns with 11& 21

DISCUSSION

The management of traumatic injuries to permanent dentition can present a significant challenge to dental practitioner. A detailed history of the dental trauma and a thorough clinical examination will assist the clinician in assessing orofacial injuries and are instrumental in formulating a proper diagnosis and plan treatment systematically. Dental trauma to the permanent dentition can lead to clinical complications.⁵ One such complication is calcific metamorphosis (CM) which can complicate entry into the root canal system in the future due to difficulty in locating the canal and gaining access. This condition is also known as Pulp Canal Obliteration, Dystrophic Calcification, Diffuse Calcification and Calcific Degeneration. Other causes of CM can be dentinal dysplasia and dentinogenesis imperfecta, mainly type 2 and teeth which have been rigidly splinted.⁶

Calcific Metamorphosis is defined by the American Association of Endodontists as “A pulpal response to trauma characterized by rapid deposition of hard tissue within the canal space.” Radiographically, CM can be classified as either partial Obliteration – the pulp chamber is not visible and the canal is markedly narrowed but visible or total obliteration. Literature suggests that a narrow canal is always present irrespective of its identification on the radiograph.⁷

CM is generally asymptomatic and clinically the patients present to the practitioner with yellow discoloration of the affected tooth crown. This discoloration is due to a greater thickness of dentine deposition. The incidence of pulp canal obliteration following dental trauma has been reported to be approximately 4-24%. Vital pulp testing may be unreliable (false negative) despite the presence of a vital pulp due to the increased thickness of dentine.⁸

Disinfection of a root canal is one of the primary objectives of root canal treatment. Sodium hypochlorite (NaOCl) is a widely used root canal irrigant in dental practice for endodontic treatment. Although, it is regarded as being safe it has the potential to cause complications when extruded through the root apex or any perforation.

Expression of sodium hypochlorite beyond confines of root canal and its subsequent consequences is known as ‘sodium hypochlorite accident’ and was first reported in 1974.⁹

The immediate care of the traumatized teeth and the future of the oral health of the patient demand not only the emergency treatment, but also an appropriate long-term follow-up. Because of the multidisciplinary involvement required for the treatment of such cases, a restorative dentistry specialist is the most appropriate professional to perform it.¹⁰

This case of traumatic injury with calcific metamorphosis having sodium hypochlorite accident was successfully treated with a multidisciplinary approach including surgical extrusion of tooth, esthetic contouring of soft tissue, along with endodontic treatment with functional and esthetic outcome.

CONCLUSION

A multidisciplinary approach with a definitive treatment plan can salvage any seemingly hopeless case. Rapid surgical extrusion of complicated crown root fractures involving incisors is a viable treatment option and has many clinical and financial advantages over other treatments. Calcific metamorphosis is not an uncommon finding in traumatized teeth. Considering the benefits of NaOCl irrigation for success of endodontic therapy and rarity of such complications, continued use of sodium hypochlorite is justified. The treatment described in this case report requires commitment and motivation from the patient and the clinician in order to achieve a satisfactory result.

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