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ENDODONTIC MANAGEMENT OF SEPARATED INSTRUMENT AND PERFORATION IN TOOTH WITH CALCIFIC METAMORPHOSIS: A CASE REPORT.

Endodontics

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ABSTRACT

The successful endodontic treatment of depends on ability to negotiate the canal to its apical terminus, thorough debridement or disinfection and obturation of the prepared canal space. In situations such as Calcific Metamorphosis, calcific deposits block the access to the canal, and falls under difficult category cases. One should have the thorough knowledge about such anatomical and pathological variations so that the complications can be avoided. Present case reports endodontic management of maxillary right central incisor with calcific metamorphosis with previously failed endodontic treatment having separated root canal instrument and canal perforation. Even though there was separated instrument and perforation site, the proper management increases the prognosis of the tooth.

KEYWORDS

Calcific Metamorphosis, Instrument Retrieval, Perforation Repair, Mta

INTRODUCTION

Teeth with calcific metamorphosis are one of the great challenges to the endodontist. Its diagnosis and treatment procedures are of great importance in providing the best treatment. According to American Association of Endodontists (2014)[1], 'calcific metamorphosis is a pulpal response to trauma characterized by rapid deposition of hard tissue within the canal space'. Patterson and Mitchell (1965)[2] described calcific metamorphosis as a tooth that is darker in hue than the adjacent teeth and exhibits a dark yellow color because of decrease in translucency from more thickness of dentin under the enamel.

Calcific metamorphosis is a challenge which complicates entry in to the root canal system due to heavy calcific deposits and hence difficulty in locating the canal. Attempting to locate canals following calcific metamorphosis and negotiating it to full working length may lead to iatrogenic errors such as ledge formation, separated root canal instrument, missed canal, gouging and/or perforation.[3]

Present case reports endodontic management of maxillary right central incisor with calcific metamorphosis with previously failed endodontic treatment having separated root canal instrument and canal perforation.

CASE REPORT

A 45 year old male patient reported to Department of Conservative Dentistry and Endodontics with a chief complaint of pain in upper anterior teeth region. Patient gave history of trauma to upper teeth 10 years back while playing, and also informed us about some previous dental treatment at a private dental clinic 15 days back, with no relief from pain. The clinical examination revealed discolored maxillary right central incisor (Figure 1a.), with large access cavity palatally, suggestive of previous attempt for the endodontic treatment. The tooth was tender to percussion and associated with pus discharging sinus labially. Patient presented an IOPA radiograph (Figure 1b) which was taken before the treatment from previous dentist. It was suggestive of obliterated root canal space in coronal and middle third and a very thin radiolucent line in apical third of the canal space, in maxillary right central incisor. On taking radiograph of present condition, there was a large radiolucency in coronal region that coincided with previous attempt for access cavity preparation (Figure1c). Also there was presence of a radio-opaque separated instrument in middle third region of the canal and a radiolucent periapical lesion of approximately 8×8 mm with the same tooth (Figure1c). Adjacent teeth were seen with normal pulp chamber and root canals. On the basis of history and radiographic examination, the present case was diagnosed as a tooth with calcific metamorphosis and periapical abscess.

Root canal treatment was planned for maxillary right central incisor. Under rubber dam isolation of the tooth, after modifying the access cavity with a safe-end access bur (EX-24, Mani, Japan), a separated instrument and a perforation in buccal direction were seen. Presence of perforation was confirmed on radiograph (Figure 1d).

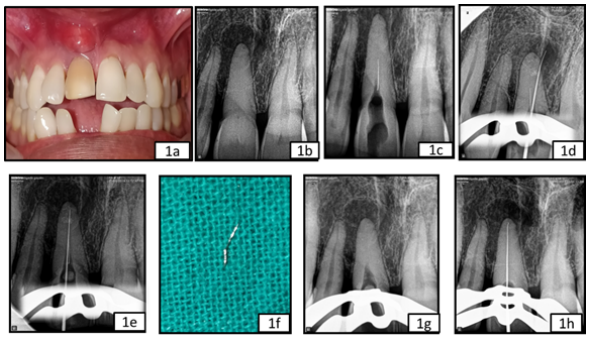

Figure 1a) Discolored maxillary right central incisor with pus discharging sinus.
1b) Obliterated root canal space seen from previous radiograph presented by patient.
1c) Present radiograph showing previous attempt for access cavity preparation.
1d) Presence of perforation was confirmed on radiograph.
1e) Radiograph showing bypassed separated instrument and main canal negotiated.
1f) Retrieved separated instrument from the canal.
1g) Radiograph after retrieval of separated instrument.

1h) Working length confirmed by radiograph.

Gates-Glidden drills (#1 and 2; Dentsply Maillefer) were used for troughing around the separated instrument fragment with taking care of perforated site. The separated instrument was bypassed (Figure 1e) and the actual calcific metamorphosed thin canal was located with the help of #8 and #10 K files (Dentsply Maillefer). Canal irrigation was performed with a 3 % sodium hypochlorite solution and 17 % EDTA (Dent wash, Prime dental, India). The instrument fragment was loosened and removed with the help of ultrasonic device (Newtron P5, Satelec, France) and confirmed with radiograph (Figure 1g). The ultrasonic tips were rotated in a counterclockwise direction around the separated instrument using lower power.

Working length was determined using electronic apex locator (Root ZX mini, J Morita, Japan), confirmed by radiograph (Figure 1h). Cleaning and shaping of the canal was performed up to 20/0.04 (Neoendo Rotary Files, India). The root canal space and perforation defect were passively irrigated with 3 % sodium hypochlorite and normal saline, and finally dried with absorbent paper points. The main canal was blocked with the help of gutta percha master cone (Figure 2a, 2b).

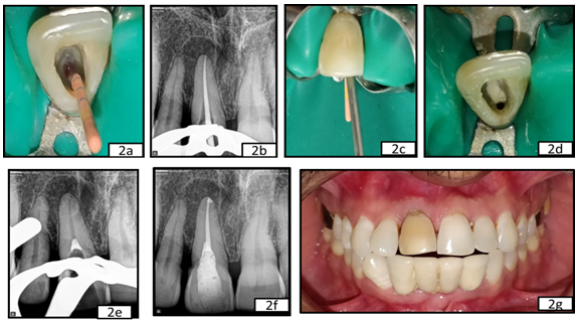

Figure 2a) The main canal was blocked with the help of gutta percha master cone.
2b) Radiograph showing master cone in main canal before perforation repair.
2c) MTA placed over the perforation with the help of MTA carrier.
2d) Hardened MTA had adapted well and sealed the perforation site after 24 hours.
2e) Radiograph after perforation repair.
2f) Radiograph after complete obturation and post-obturation.
2g) Clinical picture after 8 days recall, shows resolved pus discharging sinus.

Mineral trioxide aggregate (ProRoot MTA-white, Dentsply) was mixed and placed over the perforation with the help of MTA carrier (Figure 2c) and condensed with an appropriately fitting plugger. Repair of the perforation was carried out by progressive placement and packing of small increments of the Mineral Trioxide Aggregate at the perforation site. After initial setting of MTA, the gutta percha point was removed and moist cotton pellet was placed over the MTA, and then, closed with non-eugenol temporary restoration (Cavit, 3M ESPE, Germany). The MTA was allowed to set for approximately twenty four hours. After removal of temporary restoration on the next day, it was found that, hardened MTA had adapted well and sealed the perforation site (Figure 2d) and confirmed with radiograph (Figure 2e). After final irrigation and drying, obturation was completed using gutta percha 20/0.04 (DiaDent, Korea) and AH Plus sealer (Dentsply), followed by post endodontic composite restoration (Figure f). All the steps during the procedure were monitored by taking radiographs. On follow-up after 8 days the tooth was asympomatic and showed resolved pus discharging sinus.

Porcelain fused to metal crown was fabricated and cemented for aesthetic purpose (Figure 3a). At 3 months follow up, radiograph showed excellent periapical healing (Figure 3b).

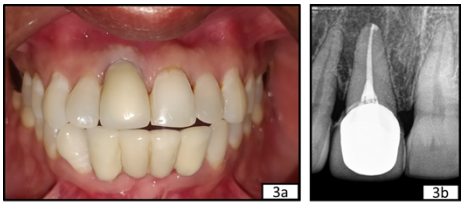

Figure 3a) Clinical picture after cementation of crown.

3b) Follow-up radiograph after 3 months showing excellent periapical healing.

DISCUSSION

Calcific metamorphosis is common sequel of trauma, and most authors have considered it to be relatively benign.[2] Calcific metamorphosis is also known as Pulp Canal Obliteration, Dystrophic Calcification, Diffuse Calcification and Calcific Degeneration.[3] The other etiological factors for calcific metamorphosis can be dentinal dysplasia and dentinogenesis imperfecta (mainly type 2)[4] and teeth which have been rigidly splinted.[5] Approximately 3.8 - 24 % of traumatized teeth develop varying degrees of calcific metamorphosis.

The American Association of Endodontists (AAE) has designed an Endodontic Case Difficulty Assessment Form that may be used by general dentists when deciding whether to refer endodontic treatment.[6] The conditions listed in the form are the risk factors and may complicate treatment which adversely affects the outcome. Teeth with Calcific Metamorphosis come under the high difficulty category. It is challenging for even experienced practitioners to achieve a predictable outcome in these cases[7].

It is evident usually in the anterior teeth as they are most affected teeth in traumatic incidences. Radiographically, it shows partially or totally obliterated canal space.[8] Negotiating such obliterated canals in a tooth with calcific metamorphosis is challenging and may lead to iatrogenic errors such as perforation or instrument separation.[3] Smaller endodontic instruments are more prone to distortion and subsequently separation as a result of stressing on small cross-section, especially in cases where the canal anatomy is unusual.[9]

The success of a file removal is greater in the coronal and middle thirds of canals, but it is much lower in the apical third. This is because the removal procedure, if the file is located in the middle or apical third of the root, reduces significant root dentin, and therefore, reduces root strength. Files in the coronal and middle thirds of the root, however, can be removed consistently without major complications.[10] In the present case, the instrument fracture was at the middle third of the calcified canal. Ultrasonics are considered the most conservative method for removal and have become the most universally and investigated technique.[11,12] The most commonly described technique involves the creation of a staging platform (classically created by a Gates-Glidden drill), which creates sufficient space to allow the specialized ultrasonic tips to trephine around the coronal aspect of the fragment and in so doing agitating, loosening and unwinding of the fractured instrument.[13] While using ultrasonics, frequent irrigation is essential to dissipate heat, remove debris and promote chemomechanical cleaning of the root canal system.

However, a perforation site was also seen after removing the temporary restoration. The major complication of endodontic and restorative treatment is the accidental perforation of the root or the pulp chamber floor. Perforation seen in the present case is might be due to an attempt to find or negotiating canal.[14] The first clinical appearance of a perforation frequently demonstrates profuse bleeding from the injured side and persistent pain on percussion.[15] Perforations are successfully treated when they are immediately sealed to prevent infection.[16] An ideal perforation repair material should provide a tight seal at the perforation site. Many materials used for managing perforations such as: glass ionomer, resin modified glass ionomer, zinc oxide–eugenol, amalgam, calcium hydroxide, composite resin, mineral trioxide aggregate (MTA), biodentin etc.[14] Various studies have been published where MTA was successfully used as a perforation repair material.[17,18] In the present case we have used white MTA for perforation repair.

In the present case, even there was separated instrument and perforation site, with the tooth having calcific metamorphosis, the proper management inscreases the prognosis of that tooth. The follow up radiograph after 3 months shows the periapical healing.

CONCLUSION

Diagnosis of calcific metamorphosis is a challenge and is of great importance in order to treat it successfully. It is also very challenging for the practitioners' skill to treat such cases without causing any endodontic mishaps. This article highlights the successful endodontic retreatment of maxillary right central incisor with calcific metamo rphosis, associated with previous separated root canal instrument and canal perforation.

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