FURCAL PERFORATION REPAIR WITH MTA: A REPORT OF TWO CASES

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Mineral trioxide aggregate (MTA) has emerged as a reliable bioactive material with extended applications in endodontics. Furcal perforation is a complication of endodontic therapy. However a clinician can overcome these procedural accidents with the advent of better restorative materials. Here, two cases of treatment of furcal perforation repair with MTA have been described.

Key words: Mineral trioxide aggregate, Furcal perforation.

Perforation, according to the glossary of endodontic terms, is defined as ***"the mechanical or pathological communication between the root canal system and the external tooth surface."*** Perforation of the root, especially at the furcal region, is one of the most common procedural accidents which occur because of misdirection of the bur by the operator during or during instrumentation. In a study on endodontic failures, it has been shown that perforations were the second greatest cause of endodontic failures and furcal perforation results in peri-radicular breakdown, usually leading to loss of the tooth[1,2].

The etiology and location of the perforation as well as the size and the time delay before perforation repair are significant factors for the prognosis and treatment planning[3,4]. A good prognosis can be expected in case of fresh, small, coronal, and apical perforation[3,4]. When left untreated, perforations in the cervical third of the root or on the floor of the pulp chamber have the worst prognoses[5,6]. Ideally, a material with good sealability might be used to prevent continuous exposure to a contaminating environment[7].

Mineral trioxide aggregate (MTA) is now regarded as an ideal material for perforation repair, retrograde filling, pulp capping, and apexification. Various studies have demonstrated its excellent sealing ability and biocompatibility[3,4,5]. Microscopic examinations of periodontal tissues after perforations in the furcal area and subsequent sealing with MTA demonstrated repair of the periodontium, and new cementum formation over the material[3]. On the basis of the physical and biological property studies of MTA, this material may be suitable for closing the communication between the pulp chamber and the underlying periodontal tissues. This case series supports this hypothesis.

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CASE REPORTS

Case 1

A 45 year old male patient reported to the Department of Conservative Dentistry and Endodontics with a chief compliant of pain in relation to the lower left first molar region. The medical history of the patient was non-contributory. His dental history revealed initiation of the root canal treatment at a general dental practitioner in the same tooth about 2 days back. On clinical examination, it was found that access opening had been performed, and there was a perforation in the furcation area. (fig 1, 2) The tooth in question did not have any temporary restoration and a cotton pellet was plugged in the pulp chamber. Removal of the cotton pellet revealed little hemorrhage. The hemorrhage was controlled by pressure application with sterile cotton moistened with normal saline. The canals were lightly debrided; intracanal calcium hydroxide dressing was given. The perforation was sealed with mineral trioxide aggregate-sterile saline paste mixed to a workable consistency (fig 3, 4). A temporary restoration was then placed. Patient was kept under antibiotic and analgesic

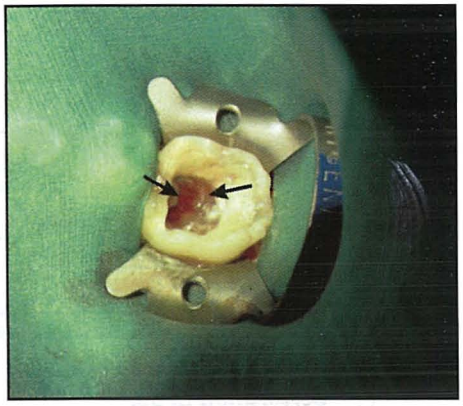


Fig. 1. Preoperative photograph showing perforation in 36.

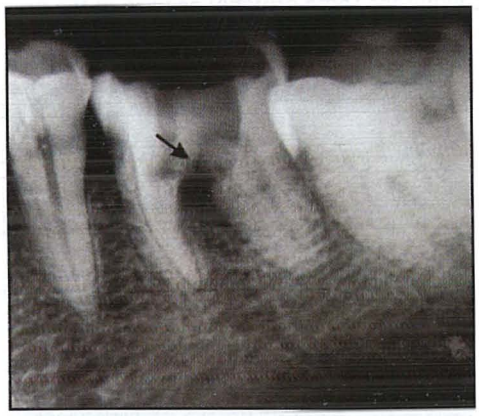


Fig.2 . Preoperative radiograph showing extensive furcal perforation in 36.



Fig. 3. Application of MTA to repair perforation.

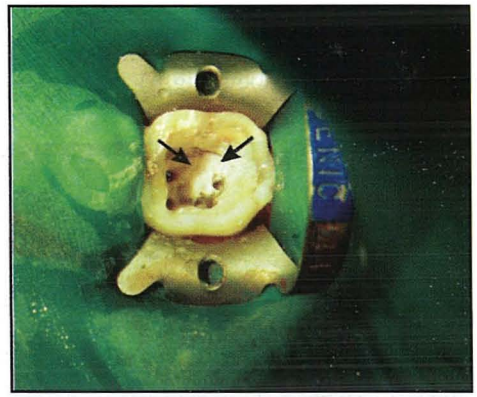


Fig. 4. Perforation repaired with MTA.

coverage for relief of pain and inflammation. After 3 days, the patient was recalled, local anesthesia was administered, the root length was determined radiographically. The canal was cleaned and shaped using the crown -down technique and constant irrigation with 5.25% sodium hypochlorite and then obturated with gutta-percha points and resin sealer using lateral condensation technique (fig.5). The access cavity was restored with resin modified glass ionomer cement.

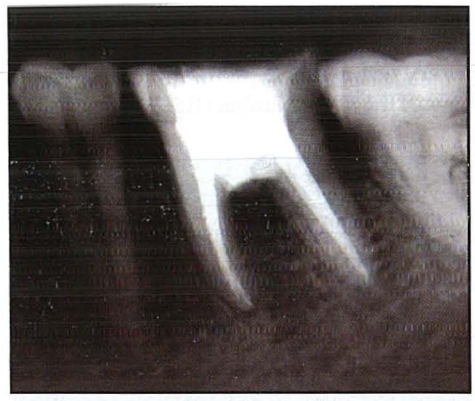


Fig. 5. Immediate post obturatin radiograph after permanent restoration.

At the first recall visit, a month later, the patient related the tooth to be asymptomatic with no sensitivity to percussion. At the 4-month recall, tooth

remained asymptomatic. The results were considered to be satisfactory. A full veneer crown was then placed on the tooth (fig. 6)

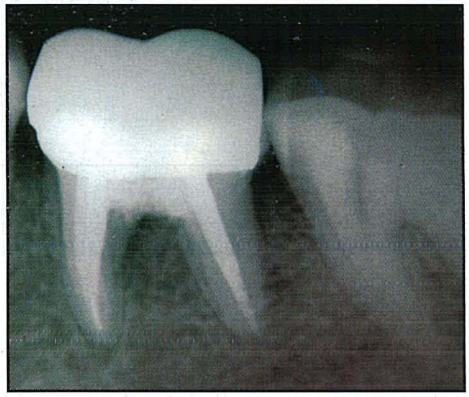


Fig. 6. Six month recall radiograph showing osseous repair radiograph.

Case 2

An 18 year old girl reported to the department of Conservative dentistry and Endodontics with a history of initiation of root canal treatment in mandibular left first molar by a general dentist elsewhere 4 days back. After the initial visit, the general dentist advised extraction of the tooth predicting poor prognosis; which prompted her to expert opinion elsewhere. On removal of the temporary restoration, a perforation was revealed on the floor of the pulp chamber (fig. 7, 8)

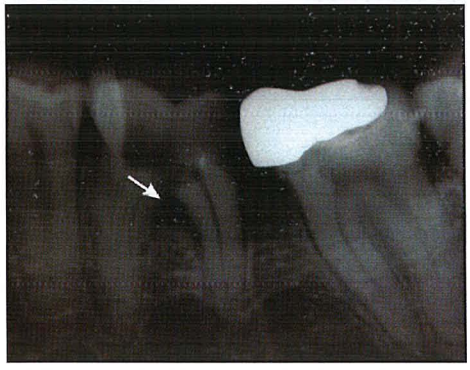


Fig. 7. Preoperative radiograph showing perforation in 36.

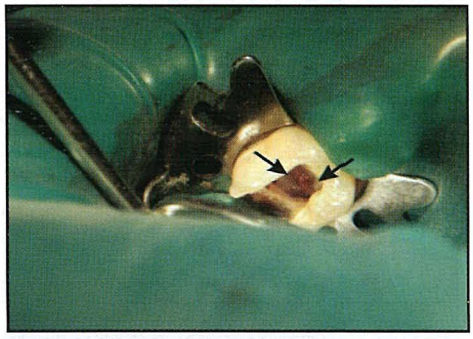


Fig 8. Preoperative photograph showing perforation in 36.

MTA was used to seal the perforation effectively following the same protocol as used in the previous case (fig. 9). Endodontic treatment was subsequently

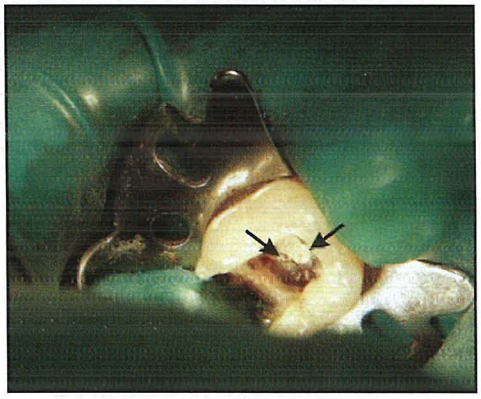


Fig. 9. Placement of MTA to repair perforation.

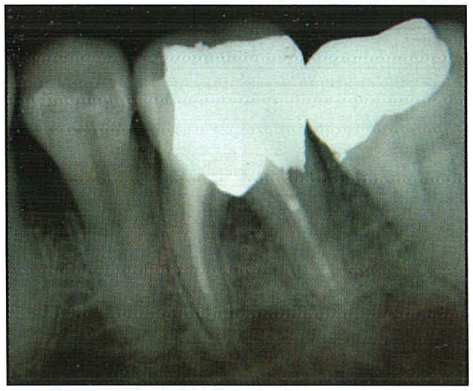


Fig. 10. Immediate post obturation radiograph after permanent restoration.

completed. The coronal access was sealed with composite resin restoration (fig. 10). After a 6-month recall, when the tooth was asymptomatic and radiographs revealed adequate sealing of the defect, the patient was referred for placement of full coverage restoration.

DISCUSSION

Available clinical data shows that untreated infected perforations lead to marked inflammation, poor organization of fibrous connective tissue, and abscess formation with subsequent proliferation of the crevicular epithelium.

Repair of unintended communication between the root canal system and periodontal attachment has been strongly advocated and favorable healing of the periodontal tissues occurs when the communications are sealed effectively. The post treatment prognosis of a perforation depends on the location; time elapsed since the event until repair and the size of the defect. Small perforations promote a direct and immediate restoration of the defect with lesser chances of overfills of repair material. If the defect is of a large size the prognosis is uncertain due to the large contact surface area of the restorative material with the periodontium that can allow inflammatory irritants to continuously diffuse into the surrounding vital tissues. Marginal adaptation to the tooth structure also decreases with increased defect circumference[6].

Another important element affecting the outcome of perforation repair is the selection of an adequate material for repair. The ideal repair material should be biocompatible, antimicrobial, non-carcinogenic, promote osteogenesis and cementogenesis, and should possess satisfactory sealing ability to allow repair of the periodontal tissues. MTA has been the first choice for perforation treatment because it provides optimal conditions for repair, stimulating new cell migration and differentiation and also proliferation of cementoblasts, fibroblasts, and osteoblasts. Moreover, MTA was shown to leak significantly less than amalgam and glass ionomer in the repair of lateral root perforations.

The two main challenges faced by a clinician when attempting to repair a perforation are hemostasis and the controlled placement of a restorative material. Barriers help produce a "dry field" and also provide an internal matrix or "back stop" against which to condense restorative materials. MTA can be used both as a non-absorbable barrier and restorative material and is the material of choice when there is potential moisture contamination or when there are restrictions in access and visibility. However further improvements are needed to enhance the properties of MTA, for example, to make it more radio opaque, less technique sensitive and to seal better against fluid leakage and bacterial contamination.

CONCLUSION

A thorough knowledge about endodontic mishaps is essential for their prevention. Recognition of a procedural accident is one of the most important steps in its management. With the advent of newer and improved materials, endodontic perforations can be repaired and satisfactorily treated ensuring success.

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