

Case Report

Non-surgical management of iatrogenic lateral root perforation: a case report

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ABSTRACT

Perforation is a procedural accident that occurs during root canal treatment, creating an artificial communication between the root canal and the supporting periodontal apparatus. Iatrogenic root perforation is a major complication of endodontic and restorative treatments, leading to impairment of tooth prognosis. Successful management of root perforations is dependent on early diagnosis of the defect, location of the perforation, choice of treatment, materials used, host response, and the experience of the practitioner. This case report presents the successful management of an iatrogenic lateral root perforation in a tooth with radiographic evidence of periodontal healing over one year follow-up.

Keywords: Iatrogenic, MTA, Perforation

INTRODUCTION

Root perforation is an artificial communication between root canal system and the supporting tissues of teeth or the oral cavity.¹ They represent significant complications of endodontic treatment. Perforations may occur during preparation of access cavities, postspace preparation, or as a result of the extension of internal resorption into the periradicular tissues.^{2,3} Often, the cause is iatrogenic as a result of misaligned use of rotary burs during endodontic access preparation and search for root canal orifices. Inappropriate post space preparation for permanent restoration of endodontically treated teeth is another common iatrogenic cause of iatrogenic perforation.⁴

Treatment of a root perforation can be achieved through the access cavity (intracanal repair) or by surgical intervention (extracanal repair). When repair of a perforation fails after an intracanal approach or if the perforations are inaccessible through the access cavity, surgical repair of these incidents is indicated.² The prognosis of perforations depends on the time of contamination, location and size of the lesion.⁵

The interval between perforation and repair is one of the critical factors for success.

Various materials have been used in managing perforations, including zinc oxide eugenol, amalgam, calcium hydroxide, resin composite, glass ionomer and

resin-modified glass ionomer. Mineral trioxide aggregate (MTA) has been regarded as an ideal material for perforation repair.⁶ MTA is a bioactive silicate that consists of hydrophilic particles, whose principal components are tricalcium silicate, dicalcium silicate, tricalcium aluminate, tricalcium oxide, bismuth and iron compounds. The interaction of MTA with phosphate-buffered saline promotes the release of hydroxyl ions, apatite deposition and a sustained high pH for extended periods.⁷ The examination under X-ray diffraction and scanning electron microscopy (SEM) analysis showed that when mixed MTA is compacted against dentine, a dentine-MTA interfacial layer forms in the presence of phosphates, resembling hydroxyapatite in composition and structure.⁸ This interface between dentine and MTA has demonstrated superior marginal adaptation and sealing ability compared with amalgam, intermediate restorative material (IRM) and Super-EBA.⁹

The high degree of biocompatibility of MTA has been well-documented in laboratory and animal studies. In studies in which set white and grey MTA have been analysed for cellular metabolic activity, both materials have the potential to induce periodontal ligament (PDL) and osteoblast cell adhesion to the material and subsequent stimulation of biomineralization and healing of osseous periapical defects.¹⁰

This paper reports a case of non-surgical repair of lateral root perforation in mandibular molar with MTA with longer follow-up demonstrating the response of periradicular tissues.

CASE REPORT

A 31-year-old male patient was referred from a general Practitioner to Department of Conservative Dentistry and Endodontics for management of perforation in the root. After discussion about the case with general practitioner, Clinical examination of patient and radiographic interpretation following, findings were recorded. The patient was undergoing root canal in relation to (i.r.t) #37 tooth for deep dental caries. After obturation, in the next visit iatrogenic perforation was created with peso reamer in an attempt to prepare the post space in the distal canal.

Realizing the fact about the limitation of his clinical skill to manage the case, the general practitioner rightfully sent the patient to specialist for management at Department of Conservative Dentistry and Endodontics same day.

On clinical examination patient was found asymptomatic i.r.t 37 and IOPAR revealed satisfactory obturation in the mesial and distal canals and the post space as radiolucency in the distal canal of 37 going away from the canal path (Figure 1). After radiographic interpretation and clinical examination, the case was diagnosed as previously RC Treated with iatrogenic

lateral root perforation and it was decided to seal the perforation with MTA.

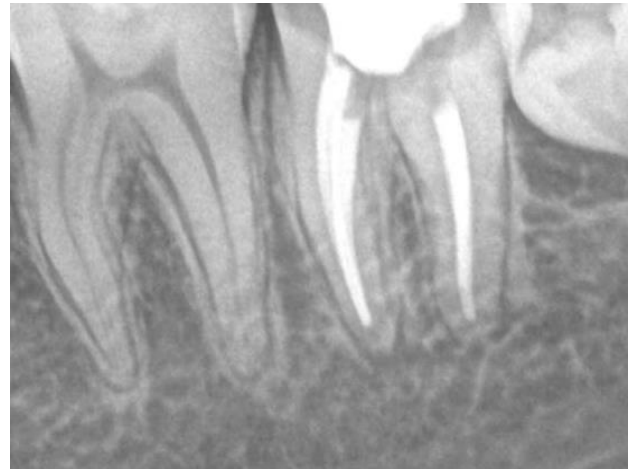


Figure 1: Pre operative intraoral periapical radiograph i.r.t # 37.

The patient was informed about the procedure and prognosis and an informed consent was taken.

After disinfection of the surfaces of teeth, rubber dam was placed to prevent ingress of saliva and contaminants in the canal. Slight bleeding was seen from the post space on checking the extent and path with #25 size K file confirming lateral root perforation. Since the perforation was done on the same day it was decided to do closure same moment. The post space was irrigated with 3% NaOCl for disinfection and to remove the blood contaminant. After the bleeding was stopped the post space was dried with paper point. Pro root MTA (Tulsa dentsply) was mixed in the ratio of 3:1 and placed at the orifice with the help of messing gun which was then condensed till the apical end of perforation with no 40 size plugger. The procedure was repeated until the entire post space was filled with MTA (Figure 2).

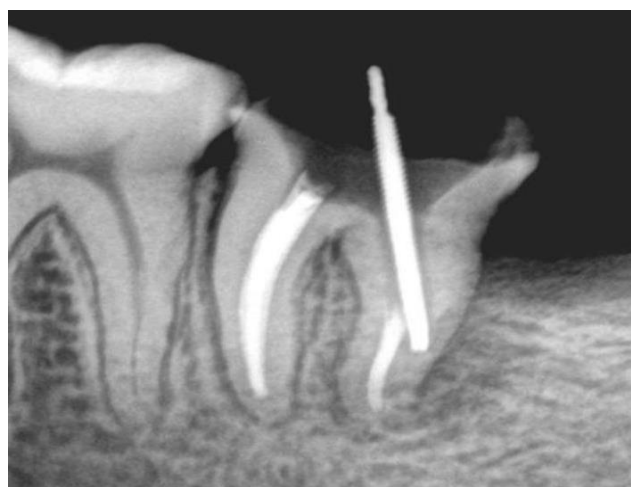


Figure 2: Lateral perforation diagnosed i.r.t # 37.

A wet cotton was then placed over the MTA and a temporary material (3M) was placed to seal the access and patient was asked to report next day. Next day patient was asymptomatic and after removal of wet cotton MTA was found set. Permanent restoration (post endo) was given in the form of double seal in which 2mm of type II GIC was placed over MTA and then adhesive composite resin on top. 1 year follow-up showed decrease in the size of periapical lesion radio graphically and asymptomatic patient suggestive of satisfactory healing and successful treatment (Figure 3).



Figure 3: Lateral perforation treated with MTA i.r.t # 37.

DISCUSSION

Despite the advances in techniques and materials, the management of root perforation repair remains a challenging clinical issue. This case report described the treatment of lateral root perforation due to wrong post space preparation.

It has been speculated that the important factors in determining the success of a perforation repair procedure are the location of the perforation, time lapse between the occurrence of the perforation and repair, the ability of the material to seal the perforation site, and the biocompatibility of the repair material.¹¹

A perforation in the cervical third of the root or in the floor of the pulp chamber has had a poorer prognosis than one at the apical or middle third of the root.¹¹ Furcal perforations have had a diminished prognosis because of the closer proximity to the oral environment, which has a higher potential to cause a periodontal defect.¹² A perforation of the pulpal floor of a tooth causes damage to the periodontal ligament with a subsequent inflammatory reaction. If the perforated region is exposed to bacterial contaminants from the oral environment for a substantial period, a downward proliferation of epithelium may occur. This can result in breakdown of bone and, ultimately, loss of the tooth. However, it has been shown that if the perforation is repaired without

delay, the prognosis is greatly improved.^{11,12} The main goal of management of a perforation is to arrest the inflammatory process and to preserve the healthy tissues at the site of the perforation.

In the present case, perforation was found to be lateral at the level of middle third, done on the same day and referred to specialist for the management. Due to the contamination of the post space with saliva, blood or any other infected source during the time elapsed between perforation and referral; it was disinfected with 3% sodium hypochlorite which is an effective disinfectant and also favors the healing response of MTA.⁶ Due to its biocompatibility, excellent reports on periradicular healing and ability to set in the moist environment MTA was used to seal the perforation defect.¹⁰

In the present case report, after 12 months, the treatment outcome was successful with clinical, radiological and functional criteria and this favorable healing process can be attributed to strict disinfection, immediate sealing and standard restoration protocols.

CONCLUSION

Time elapsed and the site is the important prognostic factor of the affected teeth due to high probability of persistent periradicular inflammation even after perforation repair. MTA because of its excellent sealability and ability to regenerate periradicular tissues have proved time and again an important material for perforation repair in spite of the newer material's with enhanced properties making their entry to the market.

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