Print ISSN: 2321-6379
Online ISSN: 2321-595X

Case Report

Repair of an Iatrogenic Furcal Perforation with Mineral Trioxide Aggregate: A Case Report with 6-Month Follow-Up

Sabir Muliyar[1], Abdul Shameem[2], Rekha P Thankachan[3], C Aswathi[4], Elvis Chiramel David[5]

[1]Professor and Head, Department of Conservative Dentistry and Endodontics, MES Dental College, Perinthalmanna, Kerala, India, [2]Professor, Department of Conservative Dentistry and Endodontics, MES Dental College, Perinthalmanna, Kerala, India, [3]Professor, Department of Conservative Dentistry and Endodontics, MES Dental College, Perinthalmanna, Kerala, India, [4]Post Graduate Student, Department of Conservative Dentistry and Endodontics, MES Dental College, Perinthalmanna, Kerala, India, [5]Post Graduate Student, Department of Conservative Dentistry and Endodontics, MES Dental College, Perinthalmanna, Kerala, India

Abstract

Furcal perforations are significant iatrogenic complications of endodontic treatment and could lead to endodontic failure. Successful treatment depends on the immediate sealing of the perforation and prevention of infection. Several materials used initially to repair the perforation were considered inadequate due to their bacterial leakage and lack of biocompatibility to the underlying tissues. Recently, mineral trioxide aggregate (MTA) has been regarded as an ideal material for perforation repair, retrograde filling, pulp capping, and apexification. Successful management of an iatrogenic furcal perforation using MTA on mandibular first molar is described in this case report. The tooth was endodontically treated and coronally restored with resin composite. After 6 months, the absence of periradicular radiolucent lesion indicated a successful outcome of sealing the furcal perforation using MTA.

Key words: 2% Chlorhexidine gel, Furcal perforation, Mineral trioxide aggregate

INTRODUCTION

Root perforations are the second greatest cause of root canal treatment failure accounting for 9.62% of all unsuccessful cases.[1] It can occur during preparation of access cavities, post-space preparation, or as a result of the extension of an internal resorption into the periradicular tissues.[2] They can be managed surgically or nonsurgically. The prognosis becomes questionable for perforation occurring at the level of the radicular furcation. However, the prognosis is usually good if the problem is diagnosed correctly and repaired with a material having suitable sealing ability and biocompatibility.[3] Factors influencing the perforation repair are the level and location of the perforation, size of perforation, time of repair, presence of periodontal disease, and pre-endodontic pulp vitality status.[4] Different materials were used for the repair of furcal perforations such as amalgam, intermediate restorative material, Cavit, super ethoxybenzoic acid (EBA), and glass ionomer and composites. However, none of these materials fulfill the criteria of an ideal perforation repair material.

The mineral trioxide aggregate (MTA) was developed by Dr. Torabinejad at Loma Linda University in the year 1993. MTA is used for perforation repair, retrograde filling, pulp capping, and apexification and for managing root resorption. MTA is a mineral powder that consists of hydrophilic particles, with principal components as tricalcium silicate, tricalcium aluminate, tricalcium oxide, and other mineral oxides. It has a pH of 12.5, which is comparable to that of calcium hydroxide, and sets in the presence of moisture in approximately 4 h. MTA is currently marketed in two forms, gray MTA (GMTA) and white MTA (WMTA). Lower amounts of iron, aluminum, and magnesium are present in WMTA compared to GMTA. MTA has all the ideal properties for a perforation repair material such as biocompatibility, antibacterial, non-

Access this article online

www.ijss-sn.com

Month of Submission : 01-2019
Month of Peer Review : 02-2019
Month of Acceptance : 02-2019
Month of Publishing : 03-2019

Corresponding Author: Dr. C Aswathi, Department of Conservative Dentistry and Endodontics, MES Dental College, Perinthalmanna, Kerala, India. E-mail: draswathi20@gmail.com

Figure 1: Pre-operative X-ray

Figure 2: Furcal perforation

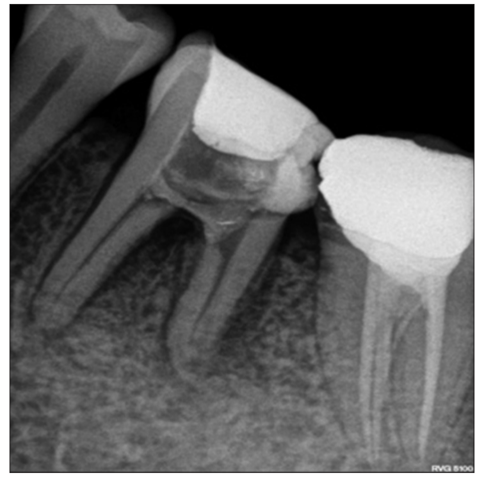

Figure 3: Repair with mineral trioxide aggregate

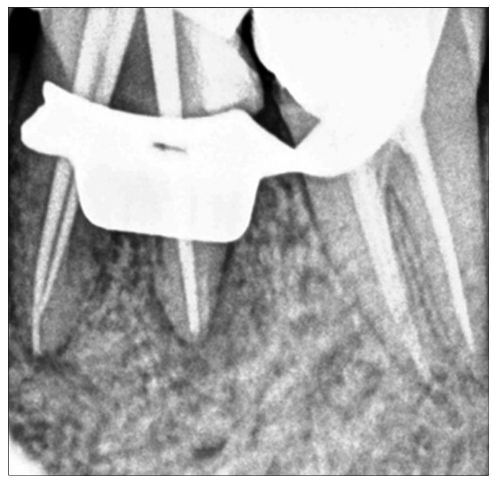

Figure 4: Master cone X-ray

cytotoxic, radiopaque, good sealing ability, regeneration of periodontal attachment, and ability to set even in the presence of blood. It can also induce cementogenesis and osteogenesis. Inflammatory tissue layer will not be found on perforated roots treated with MTA; instead, root cementum was formed and attached to the MTA.

This case report describes the successful non-surgical repair of an iatrogenic furcal perforation on mandibular first molar using MTA with 6-months follow-up.

CASE REPORT

A healthy 23-year-old woman was referred to the Department of Conservative Dentistry and Endodontics with a chief complaint of episodes of pain in the left lower back tooth region. Intraoral examination revealed a deep carious lesion on 36 with grade 1 mobility and increased probing depth of 4 mm distally. The tooth was sensitive to percussion and palpation. Radiographic examination revealed a small radiolucent area in the furcal region, bone loss, and periapical radiolucency [Figure 1]. The diagnosis of pulpal necrosis with acute apical periodontitis was made. Periodontal consultation was obtained and endodontic treatment was initiated.

After the administration of 2% lidocaine with 1:100000 epinephrine, the tooth was isolated with a rubber dam. Access opening was done and three canals were located. While searching for the 4^{th} distolingual canal with an ultrasonic instrument, perforation into the furcal area occurred. There was mild bleeding from the perforated site which was confirmed radiographically [Figure 2]. Treatment options for the tooth were extraction, hemisection, bicuspidation, or non-surgical repair of the perforation. The option of saving the tooth by perforation repair using MTA was decided, and informed consent from the patient was obtained.

Under rubber dam isolation, the perforated site was irrigated with 1% sodium hypochlorite (NaOCl) to control

Figure 5: A 6-month recall

hemorrhage and allow visualization of the perforation. The perforated site was irrigated with saline solution and 2% chlorhexidine gel. MTA (Angelus, Londrina, Parana-Brazil) was prepared according to the manufacturers' instructions and placed into the perforated site with an amalgam carrier and gently packed with a condenser. A moist cotton pellet was placed over MTA and temporary restorative material was given [Figure 3].

The patient was recalled after 24 h. The tooth was found to be assymptomatic. Temporary restorative material and the wet cotton pellet were removed, and the hardness of the MTA was gently tested with an operative explorer. Working length was calculated radiographically. Under rubber dam isolation, three canals were cleaned and shaped using ProTaper file system in a crown-down technique. Irrigation of the canals was performed with 2% chlorhexidine gel and saline. After the root canals were dried with paper points, calcium hydroxide closed dressing was given. The patient was recalled after 2 weeks. The patient was totally assymptomatic. The canals were again irrigated and dried with paper points. Obturation was done with Gutta percha points and zinc oxide eugenol sealer [Figure 4]. Temporary restorative material was given.

The patient was recalled after 1 month. Fiber post was given on distal canal and core buildup was given with resin composite. Reevaluation was done after 2, 3, and 6 months. At the 6-month follow-up, bone formation was evident radiographically [Figure 5]. The repaired tooth was clinically and radiographically healthy and continued to satisfy the functional demands.

DISCUSSION

Different materials such as amalgam, composite resin, GIC, super EBA, and Cavit have been used for sealing furcal perforations. Studies have shown that MTA is apparently superior compared to these materials with respect to marginal adaptation and bacterial leakage.[5] MTA has no mutagenic potential and low cytotoxicity and stimulates the formation of mineralized tissue. The biocompatibility of MTA is mainly due to high levels of calcium leached out from the cement.

One of the important factors influencing the prognosis of furcal perforation is the time period elapsed between the occurrence of perforation and time of repair as the possibility of infection in the wound site increases with passage of time. Immediate sealing of perforation enhances the repair process due to the reduced possibility of bacterial contamination of the defect.

One of the main goals of perforation management is the control of inflammatory processes in the defect area. To achieve a better tissue response, the perforation sites were disinfected with 2% chlorhexidine gel. In this case, NaOCl was not used because it is known that it can be extremely aggressive and cause a damage to the surrounding tissues. Chlorhexidine is considered to being relatively non-toxic when compared to NaOCl; it has excellent antimicrobial power and prolonged time of action. These properties may offer clinical advantages of using chlorhexidine in furcal perforations.

In this case, furcal perforation of the mandibular left first molar was managed using non-surgical placement of MTA. The repaired tooth was clinically and radiographically healthy when recalled after 6 months.

CONCLUSION

Based on the outcome of the case presented, MTA is a good material for the repair of furcal perforations and has been proven effective even for larger perforations. Advances in technologies, such as the introduction of microscopes, new instruments, and materials like MTA, have provided for more controllable and predictable endodontic treatment outcomes, either surgically or nonsurgically. Nevertheless, an excellent initial radiographic examination, careful consideration of the anatomy, and position of the tooth should be the first factor to be considered before endodontic therapy to avoid procedural accidents. A smart combination of correctly chosen treatment and material and correct diagnosis is the key to successful management of iatrogenic perforation.

REFERENCES

1. Seltzer S, Bender IB, Smith J, Freedman I, Nazimov H. Endodontic failures-an analysis based on clinical, roentgenographic and histologic

findings. Oral Surg Oral Med Oral Pathol 1967;23:517-30.
2. Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. J Endod 1999;25:197-205.
3. Tsesis I, Fuss Z. Diagnosis and treatment of accidental root perforations. Endod Top 2006;13:95-107.
4. Ibarrola JL, Biggs SG, Beeson TJ. Repair of a large furcation perforation: A four-year follow-up. J Endod 2008;34:617-9.
5. Shabahang S, Torabinejad M, Boyne PP, Abedi H, McMillan P. A comparative study of root-end induction using osteogenic protein-1, calcium hydroxide and mineral trioxide aggregate in dogs. J Endod 1999;25:1-5.

How to cite this article: Muliyar S, Shameem A, Thankachan RP, Aswathi C, David EC. Repair of an Iatrogenic Furcal Perforation with Mineral Trioxide Aggregate: A Case Report with 6-Month Follow-Up. Int J Sci Stud 2019;6(12):236-239.

Source of Support: Nil, **Conflict of Interest:** None declared.