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Case Report

Management of furcation perforation using Mineral trioxide aggregate in Young permanent molar- A 12 months follow up

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ABSTRACT

One of the significant iatrogenic complications during endodontic treatment is Furcal perforations which may lead to endodontic failure. Mineral trioxide aggregate (MTA) has been regarded as an ideal material for perforation repair. This case report describes repair of furcal perforation in a young permanent mandibular molar of a 10year-old male patient using MTA. The tooth was treated endodontically followed by placement of zirconia crown in respect to 46. Follow-up was done 3 months, 6 months, 9 months and 12 months. After 12 months of follow-up, complete barrier formation of the furcation area was seen and no pain in relation to tooth no 46.

1. Introduction

Root perforation is one of the most common reasons for the failure of endodontic treatment which may occur due to tooth resorption, carious lesions or might be iatrogenic during endodontic treatment or during post space preparation.[1] There can be different factors that can influence the prognosis of perforated teeth which include size, time of repair and location of the perforation.[2] According to these characteristics, it is decided whether the perforation should be managed either surgically or non-surgically. The prognosis is generally excellent if the problem is properly diagnosed and the repair is performed with a material which can provide proper sealing ability and biocompatibility.[3]

There are different materials that are used for furcal perforations, including amalgam, Intermediate Restorative Material (IRM), Super EBA, Cavit, Glass Ionomer, composites. None of these materials have however been able to fulfill the criteria of an ideal repair material which include the ability to seal and biocompatibility.[3] MTA was introduced by Arens and Torabinejad as an appropriate perforation repair material, in retrograde filling, pulp capping, and apexification.[1,3]

MTA is a mineral powder that consists of hydrophilic particles, with principal components as tricalcium silicate, tricalcium aluminate, tricalcium oxide, and other mineral oxides. MTA is present in 2 forms, grey (GMTA) and white (WMTA). WMTA has lower amounts of iron, aluminum and magnesium compared to GMTA.[3]

MTA has the ability to set in the presence of moisture in approximately 4 hours. MTA has many favorable properties when used as a repair material for furcal perforations. It has a good sealing capability, biocompatibility, bactericidal activity, radiopacity, and ability to set up in the presence of blood.[3] MTA have also demonstrated repair of the periodontium, and formation of new cementum after perforations in the furcal area. The repair capacity of MTA can be due to its antimicrobial properties and high pH (12.5) of MTA. These characteristic of MTA promote growth of the cementum and formation of bone.[4]

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Thus, this present case report describes non-surgical management of furcal perforation using MTA in young mandibular molar, with a follow-up of 12 months.

2. Case Report

A 10year-old male patient reported to the Out Patient Department of Pediatric and Preventive Dentistry, K.D Dental college and hospital, Mathura with a chief complain of chronic pain since 6 months and swelling in right lower back tooth region since 10 days. The patient revealed that he had undergone endodontic treatment 1 year back in respect to (i.r.t) 46 in a private clinic. Extra oral swelling was present near the lower border of the mandible. Intra oral restoration was present on tooth 46, the tooth was sensitive to percussion and painful on palpation. Intraoral Peri Apical Radiograph (IOPAR) revealed failed endodontic treatment with perforation involving the furcation area i.r.t 46. Radiolucency was seen in the furcal region and presence of peri apical radiolucency i.r.t 46. The diagnosis made was peri apical abscess with furcation perforation involvement i.r.t 46. Treatment advised included nonsurgical repair of the perforation with MTA followed by root canal re-treatment and permanent restoration.

Faulty restoration was removed followed by re access opening i.r.t 46. The perforation area could be clinically seen. Hemorrhage was observed in the furcation area, which was controlled by a cotton pellet impregnated with 2.5% sodium hypochlorite for 30 s. The working lengths were determined. The root canals were cleaned and shaped using rotary files in a crown-down technique followed by alternate irrigation of the canals with 5.25% sodium hypochlorite (Chemident, India) followed by 0.2% Saline (Denis Chem Lab Limited, Gandhinagar). Triple Antibiotic paste was placed in the canals for 14 days and the furcation area was sealed with Mineral trioxide aggregate (MTA) - (BioStructure, SafeEndo) which was placed in furcation area with an amalgam carrier. A cotton pellet was then placed in the pulp chamber to produce a humid atmosphere for the MTA to achieve its solidification, and the tooth was temporary filled with Cavit (Safe Endo) temporary restoration material.

After 14 days, RVG was taken which revealed perforation site was sealed. The canals were cleaned and Calcium hydroxide paste (CalciCure, SafeEndo) was placed in the canals for 1 month. After 1 month, IOPAR revealed reduction in peri apical radiolucency. Obturation was done with gutta-percha points and sealer (Sealapex, Kerr) using the lateral condensation technique. The tooth was sealed with permanent restoration followed by placement of zirconia crown i.r.t 46. Follow up was done for 3, 6, 9 and 12 months. Radiograph revealed complete osseous healing at the furcation site and no radiolucency was seen in the peri apical region i.r.t 46 at 12 month follow up.

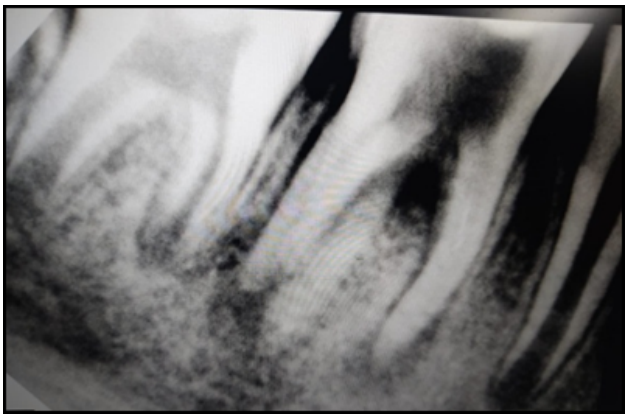

Fig. 1: RVG showing furcation perforation and peri-apical radiolucency i.r.t 46

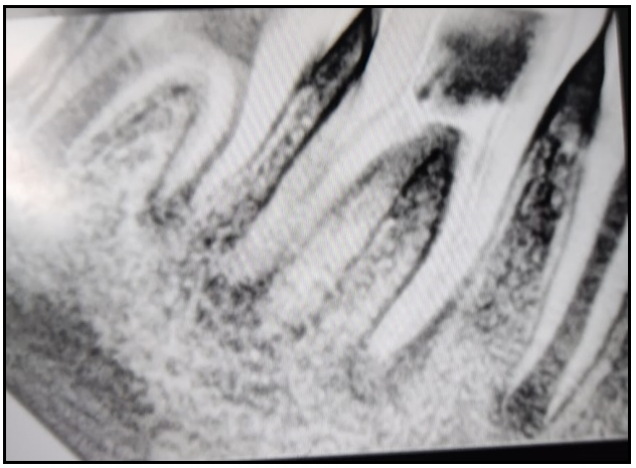

Fig. 2: After 21 days, barrier formation seen in the furcation area by MTA

Fig. 3: 3 months follow-up

Fig. 4: 6 months follow-up

Fig. 5: 9 months follow-up

Fig. 6: 12 months follow- up

3. Discussion

One of the most undesirable and unwanted problem during root canal treatment is Furcal perforation.[5] The important goal in management of perforations is to arrest the inflammatory process and loss of the tissue attachment by preserving healthy tissues at the location of the perforation.[6]

In the past years, amalgam, composite resin, and glass ionomer cements have been used for sealing furcal perforation.[4] However studies have shown that the desirable properties of MTA make it useful material in repairing the root and furcal perforations as it has superior marginal adaptation and reduction in bacterial leakage. Main et al. concluded that MTA provides an effective seal of root perforations and has potential to enhance the prognosis of perforated teeth that would be compromised otherwise.[4]

The prognosis of perforations depends on the location, size and time of contamination of the lesion. One of the factors influencing the prognosis of furcal perforations is the period of time in between the prevalence of the perforation and its repair, as the possibility of an infection in the wound site increases with the passing time.[3] The size of a perforation represents another important factor in determining the success of the repair procedure. In our case, furcal perforation was small, with a low risk of filling material extrusion. Finally, interval between perforation and repair is one of the critical factors for success. Immediate sealing of perforations enhances the repair process due to reduction in bacterial contamination of the defect.[3]

However, a study by Benenati et al. showed delayed perforation repair can probably give good results on the condition that there is no contamination. In the present case, recovery was achieved by creating optimal conditions despite a long time interval i.e 1 year gap between the occurrence of perforation and the repair procedure.[2] Disinfection of the site during perforation repair is also important. Nicholls et al. reported that perforations must be cleaned with sodium hypochlorite for disinfecting the area and controlling the hemorrhage.[6] In the present case too, 2.5% Sodium hypochlorite was used which improved direct visibility of the area and proper placement of the repair material.

MTA is used in the repair of furcation perforations as it has shown less microleakage when compared to amalgam and glass-ionomer.[1] Success rate increases if the lesion around the perforation area is small in size.[1] In the present case, the lesion of furcation perforation was small in size, whereas the time interval between the perforation and its repair procedure was long, but by controlling aseptic conditions, hemorrhage and proper placement of the repair material, success was achieved which was confirmed in the 12 months of follow-up.

Studies[1,6,7] have revealed that the final coronal restoration must be placed as soon as possible after root canal treatment in order to prevent coronal leakage and

failure of the treatment.[6] In the present case, the final restoration was placed within 1 week after treatment. Zirconia crown was placed after complete reduction of periapical lesions and repair of furcation area. At the end of 12 months of follow-up, clinically and radiographically the repaired tooth was healthy and it continued to satisfy the functional demands.[3]

4. Conclusion

In the present case, although the time interval between perforation and repair was long, prognosis was good which was confirmed radiographically and clinically in 12 months of follow-up. Based on the outcome of our case, it can be concluded that MTA is a good material for the repair of furcal perforations.

5. Source of Funding

None.

6. Conflicts of Interest

Nil.

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