



REPAIR OF THE LARGE IATROGENIC PERFORATION DEFECT USING ORTHOGRADE MTA : A SERIES OF 2 CASES

Endodontic

Dr. Shashin Shah	Professor and HOD , Department of Conservative Dentistry and Endodontics, Goenka Research Institute of Dental Science, Gandhinagar
Dr. Aadil Thimwala*	3 rd Year Post graduate student, Department of Conservative Dentistry and Endodontics, Goenka Research Institute of Dental Science, Gandhinagar *Corresponding Author
Dr. Najaf Norah	2 nd Year Post graduate student, Department of Prosthodontics and Crown & Bridge, AME's Dental College, Raichur
Dr. Bhairavi Udeshi	3 rd Year Post graduate student, Department of Conservative Dentistry and Endodontics, Goenka Research Institute of Dental Science, Gandhinagar
Dr. Manini Soni	3 rd Year Post graduate student, Department of Conservative Dentistry and Endodontics, Goenka Research Institute of Dental Science, Gandhinagar

ABSTRACT

Endodontic therapy is a delicate process comprised of carefully accessing the pulp chamber and negotiation of the root canal orifices followed by chemo-mechanical preparation and obturation of the canals. Aggressive cutting of the dentin during procedural steps specially in root canal negotiations can lead to floor perforation. Iatrogenic perforation of the furcation of the multirrooted can lead to tooth extraction. The influencing factors include the location and the size of the perforation, potential microbial colonization of the endodontic system, the time lapse between the occurrence of the perforation and repair, and the filling material. There were several materials used to seal different types of perforation defects. MTA is one of these restorative materials that is considered the most effective, biocompatible, non-toxic, and non-irritant, promote bone healing and cementum regeneration. The present case reports describe the non surgical management of extensive pulp chamber floor perforations created iatrogenically during the failed attempts of root canal orifice negotiation.

KEYWORDS

Furcal perforation, Mineral Trioxide Aggregate, Perforation management

INTRODUCTION

Perforations of the pulp chamber floor or the root can occur accidentally during root canal treatment or restorative procedures¹. Root perforation is an artificial communication between the root canal system to the supporting tissues of teeth or to the oral cavity. Perforation can be of two types, one that results from a resorptive process and the other, that is iatrogenically produced, which can occur during access cavity preparation and location of canal orifices or biomechanical preparation of the root canal or during a postendodontic procedure. Factors of significance to the prognosis for treatment are time, size, and shape of the perforation as well as its location impacts the potentials to control infection at the perforation site. Frequently, the cause is iatrogenic as a result of the misaligned use of rotary burs amid endodontic access preparation and search for root canal orifices. Such perforations resulted in the formation of granulation tissue as a chronic inflammatory reaction of the periodontium that either led to irreversible loss of attachment or tooth². The treatment of these perforations is either surgically or nonsurgically depends on the case. A good prognosis obtained when the problem is correctly diagnosed and treated with a suitable material of sealing ability and biocompatibility. Prognosis of perforation depends on the time of contamination, location and size of the lesion³. The material of choice for treating radicular perforations should be nontoxic, non-absorbable, radiopaque, bacteriostatic, bactericidal and provide a seal against micro leakage⁴. In 1998 the U.S. Food and Drug Administration approved MTA⁵. This material showed good results in treating cases of lateral radicular and furcal perforation, root-end surgery, direct pulpal coverage, apexification and radicular resorption⁶. This case series explains the management of pulpal floor perforations using orthograde placement of MTA non surgically.

Case Report 1

A 42 year old female patient reported to the Department of Conservative Dentistry & Endodontics, complaining about the severe pain in the lower left back tooth region. Patient gave history of previously initiated root canal therapy in the same tooth in other institution. The previous dentist failed to negotiate the root canals and asked the patient to extract the tooth. On clinical examination the tooth was present with Grade I mobility and gingival pocket of 3 mm and with mild gingival swelling. On radiographic examination the tooth revealed the large pulpal floor perforation (Fig. 1). On clinical

opening of the pulp chamber a large furcal defect noticed must have been caused by the failed attempts of root canal negotiation (Fig. 1).

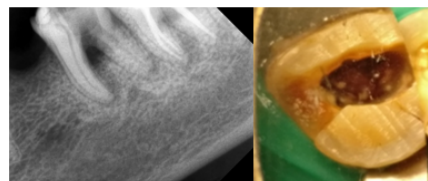


Fig. 1

The treatment plan was formulated as follows –

- Location of canals and working length determination.
- Perforation repair using mineral trioxide aggregate (MTA).
- Cleaning and shaping followed by obturation.
- Postendodontic restoration.

Tooth isolated using rubberdam. The root canals negotiated using #15 K files (Dentsply Mellifier). After determining working length the perforation sealed using MTA (Angelus) (Fig 2). The root canals shaped using K files (Dentsply Mellifier), mesials upto #25 K and Distal upto #40 K. The root canals were obturated using cold lateral condensation technique after complete radiographic evaluation of sealing of perforation (Fig 3).



Fig. 2

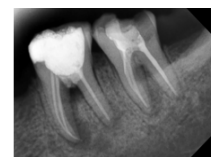


Fig. 3

Case Report 2

A 17 year old male patient was reported to the Department of Conservative Dentistry and Endodontics from a trainee for the management of perforation that was occurred during root canal procedure. Clinically the patient was present with pain in the upper

right back region of the jaw and extraoral swelling in the same region. Intraoral finding revealed large perforation defect and a sinus tract (Fig. 4). The treatment plan was formulated as mentioned earlier.

Root canal therapy initiated under rubber dam Isolation. After careful negotiation of root canals the orifice of the canals blocked using suitable file sizes and the perforation repair carried out using MTA (Angelus) (Fig. 5). Before sealing the perforation site, the disinfection of the perforated tissue carried out using 2% Chlorhexidine solution (Vishal Dent). Root canals shaped upto #25 4% (Neoendo, Neoflex) and obturated using cold lateral condensation.



Fig. 4



Fig. 5

DISCUSSION

The etiology of root perforations can be pathological, i.e., secondary to resorption or caries, or iatrogenic that occurs during root canal treatment. An average 2%–12% of endodontically treated cases have reported accidental root perforations⁷. Perforations may also occur during access cavity preparation, postspace preparation or as a result of pathological internal resorption extending into the periradicular tissues. The factor that is within the control of operator is the choice of material to be utilized for furcation repair.

Earlier different material including amalgam, gutta-percha, zinc oxide and glass ionomer cements, calcium hydroxide, composites were used. Newer materials such as MTA, biodentine, dentin chips, bioceramics, calcium enriched material, with and without the use of barrier could be used to seal the perforation⁸.

MTA has been considered as an ideal material for perforation repair, apexification, retrograde filling, pulp capping, etc. MTA is a mineral powder that is made up of hydrophilic particles, whose principal components are dicalcium silicate, tricalcium of silica aluminium and oxide along with other mineral oxides. Main et al. took note that MTA gives an ideal repair of tooth perforations and enhanced the prognosis of perforated teeth⁹. The drawback of the MTA is its difficult handling, slow setting, 24 h initially available and now up to 3–4 h, with the possibility of solubilized by being in contact with oral fluids¹⁰.

In this case series in the first case the perforation site was more on mesial side compare to second case in which the perforation was in the centre of the tooth with lateral opening. Prevention of such iatrogenic errors can be achieved by proper preoperative evaluation of the case which includes a few considerations such as position of the roots of the tooth, relationship of the crown to the root, rotation of the tooth in the arch, the relationship of the incisal edge or cusp tip to the long axis of the root.

CONCLUSION

Iatrogenic errors can be best prevented with proper anatomical

knowledge and careful evaluation of pre operative radiograph and taking utmost care during negotiation of the root canals.

MTA is the material of choice for repairing such large perforation defects with favourable outcome.

REFERENCES

1. Tsesis I, Fuss Z. Diagnosis and treatment of accidental root perforations. *Endod Top* 2006; 13: 95-107.
2. Al-Daafas A, Al-Nazhan S. Histological evaluation of contaminated furcal perforation in dogs' teeth repaired by MTA with or without internal matrix. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007; 103(3): e92-9.
3. Fuss Z, Trope M. Root perforations: classification and treatment choices based on prognostic factors. *Endod Dent Traumatol* 1996; 12(6): 255-64. Fuss Z, Trope M. Root perforations: classification and treatment choices based on prognostic factors. *Endod Dent Traumatol* 1996; 12(6): 255-64.
4. De-Deus G, Reis C, Brandão C, Fidel S, Fidel RA. The ability of Portland cement, MTA, and MTA Bio to prevent through-and-through fluid movement in repaired furcal perforations. *J Endod* 2007; 33(11): 1374-7.
5. Schwartz RS, Mauger M, Clement DJ, Walker WA III. Mineral trioxide aggregate: a new material for endodontics. *J Am Dent Assoc* 1999; 130(7): 967-75.
6. Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. *J Endod* 1999; 25(3): 197-205.
7. Seltzer S, Bender IB, Smith J, Freedman I, Nazimov H. Endodontic failures – An analysis based on clinical, roentgenographic, and histologic findings. II. *Oral Surg Oral Med Oral Pathol* 1967; 23: 517-30.
8. Tanomaru Filho M, Tanomaru JM, Faleiros FC. Capacities machining and adaptation of materials used in furcation perforations. *Rev Fac Odontol Lins* 2004; 16: 19-24.
9. Main C, Mirzayan N, Shabahang S, Torabinejad M. Repair of root perforations using mineral trioxide aggregate: A long-term study. *J Endod* 2004; 30: 80-3.
10. Hegde M, Varghese L, Malhotra S. Tooth root perforation repair – A review. *Oral Health Dent Manage* 2017; 16: 1-4.