

PULPOTOMY IN MATURE PERMANENT TEETH WITH MTA :18 MONTH FOLLOW UP CASE SERIES

Dentistry

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ABSTRACT

The main emphasis in endodontics is shifting towards vital pulp therapy. Mineral trioxide aggregate (MTA) is one of the first introduced biocompatible bioactive cements that was recommended as a pulpotomy agent. This case report will help clinicians know clinical standard operating protocols to follow for complete pulpotomy procedure using MTA and its outcome with 18-month follow up. MTA can be considered as an effective and affordable alternative to root canal treatment in mature permanent tooth with carious pulp exposures.

KEYWORDS

MTA, Pulpotomy, Vital Pulp Therapy

INTRODUCTION

Endodontology has recently shifted its focus to the preservation of vital pulpal tissues which would shorten the course of treatment and improve the long-term prognosis for tooth retention/function.¹

Root canal treatment is taken into account for carious pulp exposures. However, root canal treatment is very challenging and technically demanding, as well. A high rate of poor quality obturation (25-62%) and a high percentage of apical periodontitis associated with root-filled teeth (45%) have been observed in various studies. Additionally, malpractice claims in endodontics are most commonly associated with technical complications and mishaps.²

Vital pulp therapy (VPT), which includes direct pulp capping and partial or full pulpotomy of exposed pulp in carious teeth, has been generally accepted as a minimally invasive approach.^{3,4}

Pulpotomy procedure includes removal of the coronal pulp with inflammation, which is under the exposure. This is followed by inserting a particular material in addition to a restoration. The purpose of adding restoration is to form an enclosed cover⁵

Calcium hydroxide is one of the first materials used in pulpotomies due to its ability to induce hard tissue formation through its high alkalinity⁶

The use of biocompatible substances has become a significant interest in modern dentistry. Mineral trioxide aggregate (MTA) was one of the first introduced biocompatible bioactive cements that was recommended as a pulpotomy agent. MTA has become the new gold standard for pulpotomy.⁷

This case report will help clinicians know clinical standard operating protocols to follow for complete pulpotomy procedure using mineral trioxide aggregate and its outcome with 18 month follow up.

Case Selection:

Inclusion criteria:

- The patient should be ≥ 12 years old.
- Teeth with deep caries extending more than $2/3^{\text{rd}}$ of dentin.
- Tooth should give positive response to cold pulp testing.
- Clinical diagnosis of reversible or irreversible pulpitis with or without periapical pathosis.

Exclusion criteria:

- No pulp exposure after caries excavation.
- Negative response to cold pulp testing.

- Insufficient bleeding after pulp exposure (pulp is judged necrotic or partially necrotic).
- Teeth with periapical pathosis.
- Signs of pulpal necrosis with sinus tract or swelling.
- Bleeding could not be controlled after full pulpotomy in 10 minutes.

Case Study

Complete Pulpotomy Procedure:

After clinical and radiographic diagnosis, case selection is done. Local anesthesia is administered and rubber dam isolation is carried out. The isolated area is then disinfected with 5% sodium hypochlorite. Initial caries excavation is done and pre-endo build-up is carried out in the tooth involving proximal surfaces. Caries excavation and complete coronal pulpotomy are done using a sterile autoclaved round bur. A sharp spoon excavator is used to remove the pulpal tissues from the floor and orifice. Hemostasis is achieved by placing cotton dipped in 3% hypochlorite and checked at 2, 4, 6, 8, and 10 minutes. If bleeding is uncontrolled after 10 minutes, the case is excluded from pulpotomy, and root canal treatment is carried out. If bleeding is controlled, MTA is mixed and placed with the help of a carrier and condensed using a condenser without pressure. A damp cotton is placed over MTA and the cavity is restored with glass ionomer cement as a temporary restoration. A permanent restoration is completed after 24 hours with a composite restorative material. Follow-up after 24 hours, 1 week, 1 month, 3 months, 6 months, 9 months, and 12 months were recorded.

Case 1:

A 38-year-old female patient presented with a chief complaint of pain on chewing since 15 days in relation to tooth 46. The pain was spontaneous and lingering. Clinical examination recorded that the affected tooth had a large proximal carious lesion and sensitivity to percussion. Pain on cold test lasted longer than contralateral teeth. The periapical radiograph illustrated a deep proximal carious lesion. Based on the clinical and radiographic examinations, the diagnosis was symptomatic irreversible pulpitis. The patient consented to the full pulpotomy treatment and the procedure was carried out as explained. The clinical and radiographic figures are given in Figure 1.

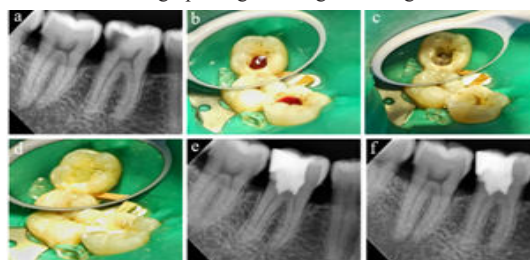


Figure 1: (a) Preoperative RVG (b) Access Opening (c) Bleeding

control (d) MTA placement (e) Postoperative RVG (f) Follow up

Case 2:

A 25-year-old female patient presented with a chief complaint of pain on chewing since 15 days in relation to tooth 36. The pain was spontaneous and lingering. Clinical examination recorded that the affected tooth had a deep occlusal carious lesion and sensitivity to percussion. On the cold test, pain lasted longer than contralateral teeth. The periapical radiograph illustrated a deep occlusal carious lesion. Based on the clinical and radiographic examination, the diagnosis of symptomatic irreversible pulpitis was established. The patient consented to the full pulpotomy treatment and the procedure was carried out as explained. The radiographic figures are given in Figure 2.

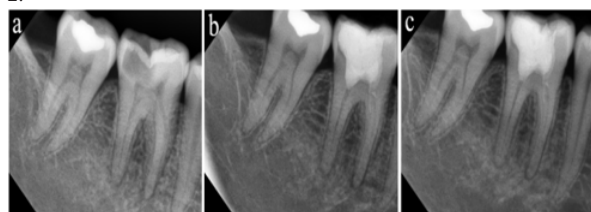


Figure 2: (a) Preoperative RVG (b) Postoperative RVG (c) Follow up.

Case 3: A 32-year-old female patient presented with a chief complaint of pain on chewing since 1 month, in relation to tooth 36. The pain was spontaneous and lingering. Clinical examination recorded that the affected tooth had a deep proximal carious lesion and sensitivity to percussion. On the cold test, pain lasted longer than contralateral teeth. The periapical radiograph illustrated a deep proximal carious lesion. Based on the clinical and radiographic examination, the diagnosis of symptomatic irreversible pulpitis was established. The patient consented to the full pulpotomy treatment plan and the procedure was carried out as explained. The clinical and radiographic figures are given in Figure 3.

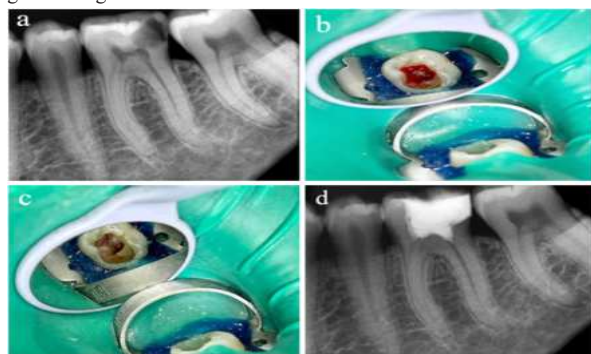


Figure 3: (a) Preoperative RVG (b) Access opening (c) Bleeding control (d) Postoperative RVG

DISCUSSION

Heretofore, endodontic treatment was contemplated for teeth with irreversible pulpitis. Non-surgical endodontic treatment is considered to be an invasive and nonbiological treatment because it removes the entire inflamed, infected, and healthy pulp, thus losing its regenerative potential, proprioceptive properties, and innervation.⁸

Accurate clinical diagnosis is significant in Vital Pulp Therapy (VPT), but it has been shown that clinical examination gives only a temporary diagnosis that may be incorrect^{9,10}. The control of bleeding after removal of the infected pulp tissue has been suggested as an additional diagnostic indicator for the evaluation of the degree of inflammation and the healing potential of the remaining pulp tissue^{11,12}.

Hemostasis is recommended for VPT procedures; a recent systematic review has revealed that the time for hemostasis in different studies on VPT varies from 1 to 10 min¹³. An old review has stated that if pulpal hemorrhage cannot be controlled in < 10 min, the inflammation has progressed into the radicular pulp and therefore, VPTs should be shifted to pulpectomy/RCT¹⁴.

Numerous pulp capping agents are described in the literature which include calcium hydroxide, calcium hydroxide covered with ZOE or IRM, MTA, ZOE, CEM, Biodentine, and PRF.

Mineral trioxide aggregate (MTA) is a widely used material in vital pulp therapy because of its ability to maintain pulp vitality and its ability to induce hard-tissue formation in pulpotomy treatment. It can produce effective dentinal bridging in a short time period with less pulpal necrosis and inflammation. MTA presents high clinical, radiographic, and histological success¹⁵.

Biodentine (BD) is a material developed with active biosilicate technology. Previous studies showed the positive effects of BD on vital pulp cells, for the early formation of reparative dentin and stimulating tertiary dentin formation. BD exhibits excellent biological properties like MTA and can be placed near the dental pulp.¹⁵

A definitive coronal restoration is recommended as soon as possible after a full pulpotomy¹⁶.

CONCLUSIONS

Full pulpotomy in mature permanent teeth can be contemplated as an effective and affordable alternative to root canal treatment in mature permanent teeth with carious pulp exposures.

Clinical Significance

Accurate clinical diagnosis and treatment plan will help in maintaining tooth vitality for long term.

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