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Apexification Using Mta: A Case Report

Ruchi Gupta[1], Anil K Tomer[2], A Pritish Kumar Reddy[3]
[1]Professor, [2]Professor and Head, [3]PG Student,
Dept of Conservative Dentistry and Endodontics,
Divya Jyoti College of Dental Sciences and Research, Modinagar, Ghaziabad

***Corresponding Author:**
Dr. Ruchi Gupta
Professor, Dept of Conservative Dentistry and Endodontics, Divya Jyoti College of Dental Sciences and Research, Modinagar, Ghaziabad

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Abstract

Aim: Endodontic management of open apex using MTA as an apical matrix.

Summary: An immature tooth with pulpal necrosis and periapical pathology imposes a great difficulty to the endodontist. Endodontic treatment options for such teeth consist of conventional apexification procedure with and without apical barriers. Mineral trioxide aggregate (MTA) is a dental material with biocompatibility properties to oral and dental tissues. MTA was developed for dental root repair in endodontic treatment and it is formulated from commercial Portland cement, combined with bismuth oxide powder for radiopacity. This article demonstrates the use of MTA as an apical matrix barrier in root end apexification procedure.

Conclusion : Apexification in one step using an apical plug of MTA can be considered a predictable treatment.

Keywords: Apexification, MTA, Open apex, Discoloration

Introduction

The root growth is a gradual phenomenon and a root apex closure takes place for up to three years after the tooth eruption. If some damage to the tooth occurs during this period, it will impede the root apex closure process. The root canal with thin and delicate walls is therefore wide and the apex is always open. This impairs the instrumentation of the root canal and prevents an appropriate apical stop. It is essential that an artificial apical barrier is created, or the apical foramen is closed with calcified tissue to permit the condensation of the filling material and to facilitate apical sealing in such cases. The apexification of premature permanent teeth with open apices may be a feasible alternative.

Apexification is defined as a method to induce a calcified barrier in a root with an open apex or the continued apical development of an incomplete root in teeth with necrotic pulp.

Although several methods have been suggested using various material to induce the forming of root end barriers, calcium hydroxide has been accepted as widely as possible. While this strategy has many drawbacks, it is effective with predictable results. The disadvantages are the unpredictable time necessary to construct apical barrier, the need for multiple visits, patient conformity, re-infection as a result of temporary restoration and predisposition to tooth fracture. The nature of the barrier, which, while seemingly calcified, is still porous and often even containing tiny quantities of soft tissue is another downside of this strategy.

Mineral trioxide aggregate (MTA) has become a common alternative to traditional apexification treatment with calcium hydroxide. Current literature supports its efficacy in several procedures including apexification or as a root end filling material for root

end closure of non-vital teeth with open apices. MTA is biocompatible, bactericidal and able to set up in the presence of blood. It exhibits good sealing properties and favours the regeneration of periradicular tissues including bone and cementum.

Case Report

A 35-year-old female patient reported with a chief complaint of discoloration of tooth in upper front teeth region since last 25 years . The patient gave a history of fall 25 years back. She was asymptomatic. The medical history of the patient was noncontributory.

The extraoral examination was normal. Intraoral examination revealed Ellis class IV fracture in 21. Tooth 21 was discolored. The teeth was not mobile and probing depth was within physiological limits.

Pulp vitality test with electric pulp tester (EPT) showed that 21 was necrosed. EPT grading on adjacent teeth gave a response on the score of 3 while no response was seen in 21. Thermal tests with heated Gutta-percha (GP) and pencil ice sticks gave a negative response.

Apexification was planned as a treatment option. Single visit apexification with MTA was decided. The treatment plan was discussed with the patient and consent was taken.

The tooth was anesthetized with 1.8 ml of 2% Lignocaine containing 1:200,000 adrenaline and rubber dam was applied. An endodontic access was established using Endo Access bur. Minimum instrumentation was performed and circumferential filing was done with 80 K file. Copious irrigation was performed with 3% sodium hypochlorite and normal saline using side vented irrigation needle. After cleaning and shaping working length was established by radiograph. Intracanal dressing with calcium hydroxide was given for 1 week and access cavity was temporized with Cavit.

On recall visit, the tooth was asymptomatic. After removing the provisional restoration copious irrigation and circumferential filing was done to remove calcium hydroxide from the canal. The canal was completely dried with size 80 absorbent paper point. Suitable pluggers were selected to condense MTA. MTA was mixed with distilled water to a consistency of wet sand and placed in increments in the apical region of the canal using micro apical placement (MAP) system in tooth 21. MTA was condensed with light pressure using prefitted hand pluggers until entire canal was filled with MTA. The tooth was restored with composite.

(Preoperative radiograph)

(MTA plug)

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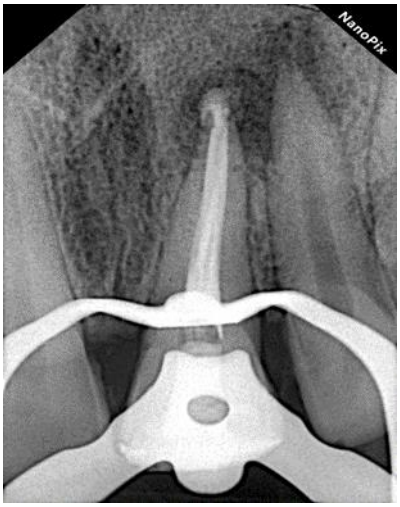
(After obturation radiograph)

(Postoperative radiograph)



Discussion

Apexification procedure aims at formation of an apical barrier to prevent the passage of toxins and bacteria from the root canal into periapical tissues. Technically this barrier is necessary to allow compaction of root filling material and to confine the obturating material into the root canal preventing an overfill.

Apexification is defined as 'a method to induce a calcified barrier in a root with an open apex or the continued apical development of an incomplete root in teeth with necrotic pulp' (American Association of Endodontists 2003). The goal of this treatment is to obtain an apical barrier to prevent the passage of toxins and bacteria into periapical tissues from the root canal. Technically, this barrier is necessary to allow compaction of root filling material. Despite higher success rate of apical barrier formation using calcium hydroxide, long term follow-up is essential. Using a suitable biocompatible material reduces leakage in the sealing material and allows favorable response of the periodontal tissues for periapical healing and apexification.

The clinical applications of MTA have proved that it is suitable for Apexification. The desirable properties of MTA make it a useful material in repairing the root end repair. MTA offers a biologically active substrate for bone and cells, and osteoblasts also have shown a favorable response to MTA. It has also no mutagenic potential, low cytotoxicity, and stimulates the formation of mineralized tissue. The high levels of calcium leached out from the cement also account for it biocompatibility.

Because of the hydrophilic characteristics of MTA, moisture in the surrounding tissue acts as an activator of a chemical reaction in this material. To assure proper setting, some authors suggested that moisture must be provided from the internal aspect of the teeth by using a wet cotton pellet.

Conclusion

Single visit apexification with a novel biocompatible material like MTA has shown promising results as a root end filling material for effective management of teeth with wide open apices. This innovative procedure is predictable and less time consuming with a high overall success rate and good patient compliance.

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