

Case Report

Management of an open apex with mineral trioxide aggregate apexification: A case report

ABSTRACT

Mineral trioxide aggregate (MTA) has the advantage of being less soluble than calcium hydroxide and offers an enhanced seal due to its setting expansion which hermetically seals the pulp space, preventing bacterial contamination from the outside. The use of MTA as an alternative material to calcium hydroxide for apexification has gained popularity. This case report presents the use of MTA as an apical plug for an open apex central incisor with periapical lesion.

Keywords: Apexification, matrix, mineral trioxide aggregate, periapical lesion

INTRODUCTION

The anatomy of the apical foramen changes with age as root formation has yet to be completed when teeth erupt. The completion of root development and closure of the apex occurs up to 3 years after eruption.^[1]

Patients who present with immature apical formation [Figure 1] pose a challenge due to the presence of large open apices along with divergent and thin dentinal walls that are susceptible to fracture. Historically, we have tried to generate the formation of an apical barrier by the repeated placement of calcium hydroxide over many months, or more recently by immediate barrier formation with a mineral trioxide aggregate (MTA) plug.^[1,2]

CASE REPORT

A 22-year-old male patient reported with a chief complaint of pain and discoloration in the upper right front tooth region. The patient's history revealed that he had suffered a trauma 10 years back, for which he did not undergo any treatment. The medical history was not significant. On clinical examination,

right maxillary central incisor was discolored and tender on percussion. On doing the pulp-vitality test, there was a negative response to heat and electric pulp testing. Periapical radiograph showed a wide open apex associated with periapical lesion in relation to the right maxillary central incisor. With the evident clinical and radiographic findings, final diagnosis of necrotic pulp with an open apex in relation to upper right central incisor was established [Figure 1]. After discussing different treatment options with the patient's, we opted to go for MTA apexification with the use of an apical matrix.


On the first appointment, access opening was done using round bur No. 2 and endoaccess bur. Working length was determined.

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Biomechanical preparation was completed with copious irrigation of 2.5% sodium hypochlorite and a final flush of 2% chlorhexidine digluconate for 5 min. On the second appointment, the length of the hand plugger that was to be used for MTA plug was confirmed radiographically. Thereafter, MTA (angelus white reparative cement) was mixed and loaded into the canal in increments with MTA carrier and gently condensed against the matrix to form 4 mm of apical plug [Figure 2]. The access cavity was restored with Temp Paste (pyrAx Co. Add. Roorkee, India). Thereafter, the patient was recalled for the next visit. For the third visit, master cone was selected and confirmed radiographically. Obturation was done with lateral condensation with zinc oxide eugenol sealer [Figure 3]. Postobturation filling was done with composite restoration, and the patient was recalled for follow-up visit. At 6 months follow-up, the patient was completely asymptomatic, and the periapical lesion had evidently healed [Figure 4].

DISCUSSION

MTA has been extensively studied and is currently used for

perforation repairs, apexifications, regenerative procedures, apexogenesis, pulpotomies, and pulp capping. External resorption may occur when the tooth undergoes any sort of trauma such as intrusion and luxation, thereby resulting in an early necrosis of pulp with incomplete root formation, resulting in an blunted or open apex.^[3,4]

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.^[5] This barrier is mandatory to allow the compaction of the root-filling material. Calcium hydroxide has been considered as an efficient material for this purpose. Single-visit apexification technique using MTA as osteoconductive apical barrier has gained popularity.^[6,7] MTA stimulates cementogenesis and is relatively noncytotoxic.

This material generates a high-alkaline aqueous environment by leaching the calcium and hydroxyl ions, rendering its bioactive by forming hydroxyapatite in the presence of

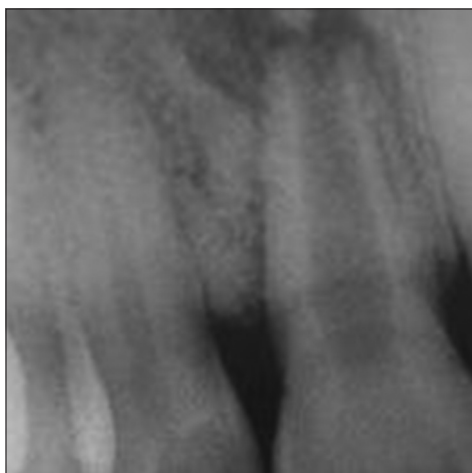


Figure 1: Preoperative



Figure 2: Mineral trioxide aggregate 4 mm plug



Figure 3: Postobturation

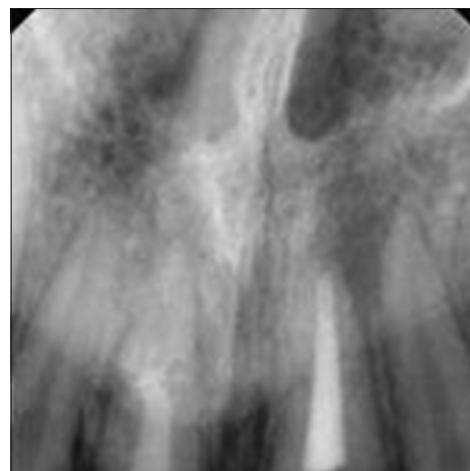


Figure 4: Six months follow-up

phosphate-containing fluids.^[8,9] The apical plug created with MTA can thus serve as an artificial barrier to condense the subsequent root canal filling material, thereby preventing reinfection of the canal system.

Hence, the first choice of material suitable for single-visit apexification is MTA^[9,10] because of it is highly biocompatible, shows high bacteriostatic activity^[11,12] and good sealing ability and acts as root end filling material.^[13]

MTA offers an alternative for conventional treatment with Ca(OH)₂. Clinical and radiographic examination showed success after MTA treatment.^[14,15]

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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