

## MANAGEMENT OF OPEN APEX WITH MINERAL TRIOXIDE AGGREGATE - A CASE REPORT

Dr. Priti Thakare<sup>1</sup>, Dr.T. Manisha Choudary<sup>2</sup>, Dr. Bharat Deosarkar<sup>3</sup>.

Post graduate student<sup>1</sup>, Prof. and HOD<sup>2</sup>, Senior lecturer<sup>3</sup>.

Department Of Conservative Dentistry and Endodontics,  
Saraswati Dhanwantari Dental College & Hospital & Post Graduate Research Institute, Parbhani,  
Maharashtra, India.

**Abstract:** Apexification is a method to induce a calcific barrier across an open apex of an immature, pulpless tooth. The purpose of apexification is to induce closure of the open apical third of the root canal. A 15 year old girl reported to department of conservative dentistry and endodontics with the chief complaint of pain in upper front region of jaw since 1 month. On clinical examination, there was pain on percussion. On radiographic examination, it was revealed open apex with tooth 11 and 21. After rubber dam application, the working length was determined with the help of apex locator. The root canals were irrigated with 5% sodium hypochlorite and 2% chlorhexidine, disinfected with calcium hydroxide for 2 weeks. MTA apical plug was then placed in the apical 4mm of the root canal. The remaining part of root canal was filled with thermoplasticized gutta percha and coronal restoration was done with light cure composite resin. MTA is an effective material for treatment of teeth with open apices.

**Keywords:** MTA, Apexification, Open apex.

### Introduction

Traumatic injuries sustained before closure of the apex often results in immature pulpless teeth. In such situations, the absence of a natural constriction at the end of the root canal makes control of filling materials difficult. Due to the lack of an apical constriction, an alternative to standard root canal treatment, apexification or root end closure has been advocated.<sup>1</sup>

The purpose of apexification in immature teeth is to induce the formation of hard tissue barrier at the root apex. Though there are several materials used for apexification like MTA, biodentine, calcium hydroxide,

magnesium oxide, barium hydroxide, zinc oxide. In this case, MTA was used.<sup>2</sup>

Calcium hydroxide was the material of choice to induce hard tissue formation at the apical end before placing the obturating material. However, calcium hydroxide shows certain limitations like the length of time needed to form apical barrier, the number of dressings needed for complete closure of apex, the risk of infection in the canals and fracture of the tooth in between the appointments.

Mineral trioxide aggregate (MTA) was developed at the Loma Linda University,

California, USA, as a root-end filling material in surgical endodontic treatment. It consists of tricalcium silicate, dicalcium silicate, tetracalcium aluminiumferrite, bismuth oxide, traces of free crystalline silica, calcium oxide, magnesium oxide, potassium & sodium sulphate. MTA induces reparative dentin formation at a greater rate and has superior structural integrity.<sup>3</sup>

MTA has been suggested to create an apical plug at the root-end and helps to prevent the extrusion of the filling materials. When MTA is mixed with sterile water, it forms a colloidal gel, and its setting time is 3 - 4 hours in the presence of moisture. This case describes the use of MTA as an apical plug for treatment of permanent maxillary central incisor.

### **Case report –**

A 15, year old girl reported to Department of conservative dentistry and endodontics with chief complaint of pain in upper front region of jaw since 1 month. She gave a history of traumatic injury 5 year back when she fell down but patient had not undergone any treatment. On clinical examination there was pain on percussion & discoloration seen with 11. Teeth did not respond to vitality test & Class 2 fracture seen with 11 & 21. Radiographic examination revealed an immature tooth with a wide open apex and a radiolucent area in the apical region right maxillary central incisor. After the application of the rubber dam, an access cavity was prepared. Approximate working length was established with the apex locator (Root ZX, J Morita MFQ Corp., Kyoto, Japan) which was 22 mm with both the teeth (Fig 2). The root canal was lightly cleaned using k- files under irrigation with 5% sodium hypochlorite and 2% chlorhexidine solution. Then the root canal was dried with sterile paper points and calcium hydroxide

placed into the root canal. After placing a sterile cotton pellet, the access cavity was closed with a temporary filling material. After a 2-week, calcium hydroxide dressing was removed by instrumentation and irrigation with 5% NaOCl and rinsed with saline. The root canal was dried with sterile paper points. MTA (Pro- Root MTA, Dentsply Maillefer, Ballaigues Switzerland) was mixed and placed with a small MTA carrier to the canal orifice. The MTA mixture was then adapted to the canal walls using a plugger which was 4 millimeters shorter than the working length (Fig 4). Correct position of the MTA mixture was checked with a periapical radiograph (Fig 3). A wet sterile cotton pellet was then placed in the coronal part of the root canal and access cavity was closed with a temporary filling material for the setting of the MTA. The temporary filling material and cotton pellet was removed after two days and the set of the MTA was gently tested. The rest of the canal was obturated with thermoplasticized gutta-percha in association with a root canal sealer AH Plus (Dentsply, DeTrey, Konstanz, Germany). Coronal restoration was completed with composite resin (Fig 5).

In this case, 6 month, 9 month and 1 year radiographic and clinical follow ups revealed the complete healing of the periapical lesion and osseous healing.

Fig 1



Fig2



Fig 3

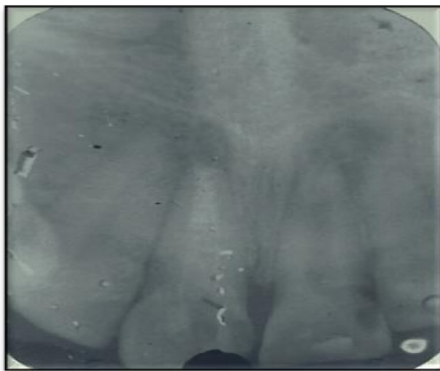
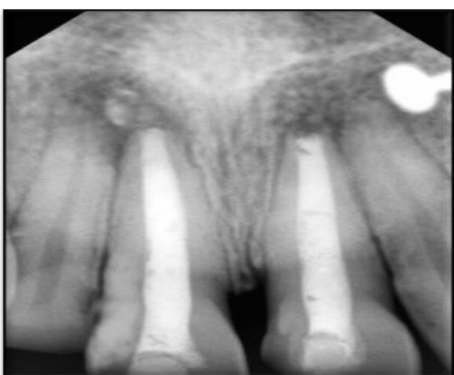


Fig 4



Fig 5



## Discussion

Calcium hydroxide is the most commonly used material for apexification. It has a high success rate when used for apexification treatment in several studies. Multiple appointments and esthetic problems may be a reason of patient complaint in the calcium hydroxide apexification treatment.<sup>5</sup>

In recent times, creating MTA apical plug in single visit is suggested for the treatment of the nonvital immature permanent teeth as an alternative to long-term apexification treatment. Lee and colleagues first described this material to dental literature in 1993. MTA is a material which has less leakage, better antibacterial properties, high marginal adaptation, short setting time (~ 4 hours), with a pH of 12.5 and is more biocompatible. A bioactive material MTA stimulates the production of interleukins and cytokine release. So it is capable of promoting the hard tissue formation.<sup>6</sup>

Gunes and Aydinbelge in their apical plug method for treatment of nonvital immature permanent maxillary incisors have concluded that there is radiological and clinical successful healing of incisor teeth after 1 year follow up. MTA apical plug method is effective because less requirement of treatment time, appointment, radiograph and better fracture resistance.<sup>2</sup>

Muhamad abu-hussein suggested that when MTA is used as an apical plug in necrotic teeth with immature apices, the canal can be effectively sealed. Follow-up radiographs showed osseous healing and during clinical examination, the patients were asymptomatic.<sup>3</sup> Govila et al concluded that MTA can be considered as an effective material for apical plugging in permanent teeth with open apices with periapical lesions. This allows long term apexification

to be replaced by apical plugging with MTA this also reduces the treatment time.<sup>4</sup> **Conclusion** –

Single step apexification with a biocompatible material like MTA is boon in the effective management of teeth with open apex.

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### **Corresponding Author Details:**

Dr.Priti Thakare, PG student,  
Department of Conservative Dentistry  
& Endodontics, Saraswati Dhanwantari  
Dental College & Hospital & Post  
Graduate Research Institute, Parbhani,  
Maharashtra, India