

## Apexification With Mineral Trioxide Aggregate - A Case Report

### Abstract

Complicated crown fractures of recently erupted or young permanent teeth have immature roots. Difficulties are encountered in obturating the root canal with gutta-percha cones achieving adequate apical seal. Apexification procedure is the treatment of choice which can be performed by calcium hydroxide or a recent material i.e. MTA. This case report describes the apexification of a 14 year old male patient with a fractured right central incisor with a blunder-buss apex, with MTA as the material of choice over calcium hydroxide with six months follow up.

### Key Words

open-apex, mineral trioxide aggregate (MTA)

### Introduction

Trauma causes cessation of root development. Fragile root canals becomes weak. It is difficult to create an artificial barrier or induce closure of apical foramen with calcified tissue.<sup>[1]</sup>

MTA was first described in dental scientific literature in 1993<sup>[2]</sup> and was given approval for endodontic use by the US Food and Drug Administration in 1998. Upto 2002, only one MTA material consisting of grey coloured powder was available and then white MTA was introduced. Both formulae contain 75% Portland cement, 20% bismuth oxide and 5% gypsum by weight.

The aim of this procedure is to limit bacterial infection and production of mineralized apical tissues in immature anterior tooth.

The inadequacy of calcium hydroxide apexification due to its long time span and re-infection because of temporary seal<sup>[3],[4]</sup> led the use of MTA.

This forms a barrier and prevents micro leakage. It is bio- compatible and forms dentinal bridge, cementum and periodontal ligament regeneration.<sup>[5]</sup> It has the ability to stimulate cytokine release from the bone cells, indicating that it actively promotes hard tissue formation.<sup>[6]</sup>

### Case Report

A 14 year old male presented with fractured maxillary right central incisor (**Fig. 1**). The patient reported of no tooth ache. The treatment of tooth was attempted by other dentist. Pulpectomy alongwith calcium hydroxide had been used as apical barrier for his last 6 months. But the treatment was not successful as seen in the radiograph (**Fig. 2**). The treatment involved was endodontic retreatment followed by esthetic enhancement by composite restoration of the tooth.

### Clinical Steps

The tooth was isolated and access cavity re-negotiated. Canal was cleaned by endodontic files and 5% NaOCL and the length determined. The length was recorded for further refence. (**Fig. 3**).

The canal was dried with sterile paper points and once again calcium hydroxide



Figure 1

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dressings was given for 1 week by placing it with leutulo spirals (Dentsply Inc.).

After 1 week the calcium hydroxide was removed and rinsing of canal was done again with NaOcl and EDTA alternately. Finally after rinsing with sterile water canal was dried. MTA (Angelus,

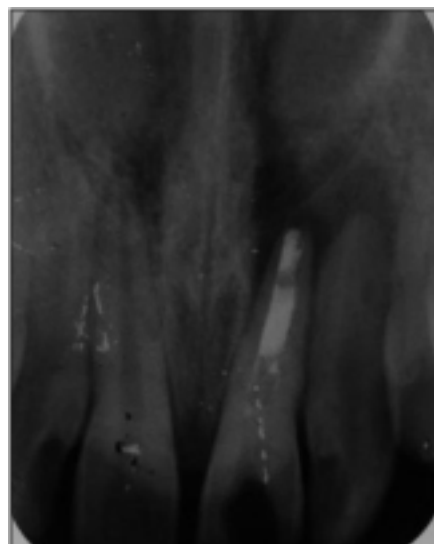


Figure 2

Londrina, PR, Brazil) was prepared according to manufacturer recommendation (Fig. 4). Mineral trioxide aggregate was placed in the apical portions of canals with a thickness of 3-5 mm. (Fig. 5).

A sterile moist cotton pellet was placed over the canal orifice and the access cavity was sealed temporarily.

Correct placement was confirmed radiographically (Fig. 6). After one week the canal was filled with gutta percha points (Dentsply Tulsa) (Fig. 7). The esthetics of the fractured central incisor was restored with composite (shofu Inc. Japan) (Fig. 8).

Case was reviewed radiographically after an interval of 6 months (Fig. 9). The tooth was free of any visible or radiographic symptoms. Radiographically periapical tissue was normal and tooth was healthy.

### Discussion

For many years the calcium hydroxide has been used in apexification in procedures. MTA is the material of choice which has been suggested with a choice which has been suggested with a repairing mechanism similar to calcium hydroxide but in a shorter period of time. It causes significantly less inflammation and also provides a hard-setting, non-resorbable surface without the presence of tunnels in the dentinal barrier.<sup>[7],[8],[9]</sup> Therefore in the case presented, MTA was used as material for apexification.

Many in vivo and histological studies have reported the superior physical and biological properties of MTA in a short-follow-up period.<sup>[10],[11],[12]</sup>

Calcium hydroxide is unpredictable and have lengthy course of treatment and presents a challenge of re-infection as studied by Magura ME et al.<sup>[13]</sup>

Felippe WE et al.<sup>[14]</sup> & Regan JD<sup>[1]</sup> et al<sup>[15]</sup> used MTA as root end filling with promising results.

### Conclusion

Long-term follow-up of MTA as not end filling shows good prognosis for immature fractured permanent teeth. One-step obstruction with MTA allows permanent restoration in a short time. Attempts are being conducted to improve the working properties of MTA via the addition of setting accelerators, shorter

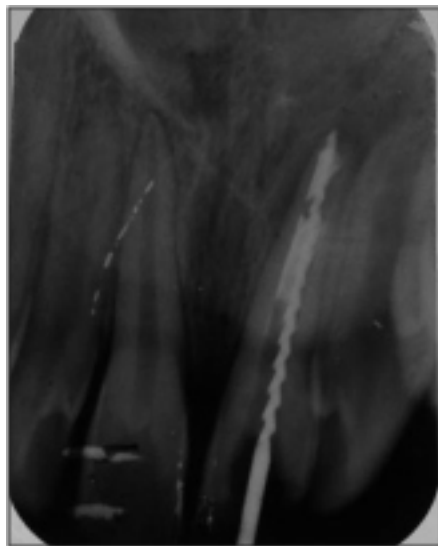


Figure 3

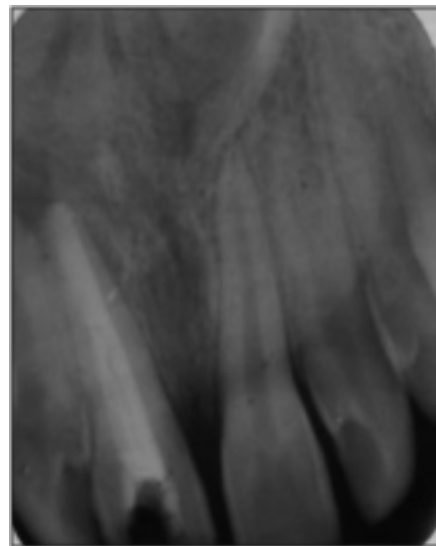


Figure 7



Figure 4



Figure 8



Figure 5

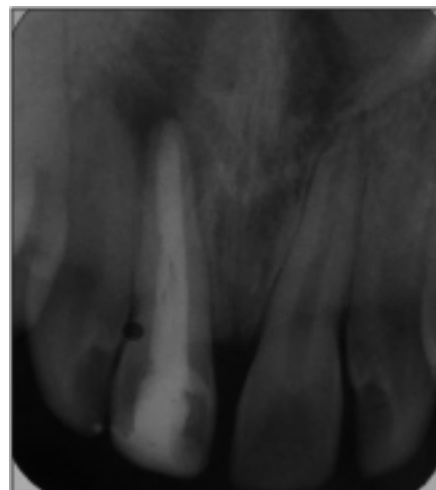


Figure 9

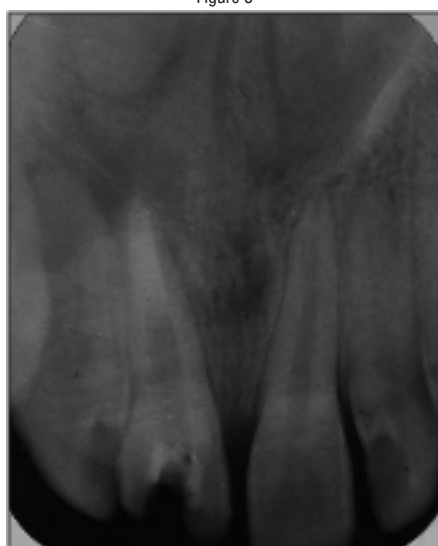


Figure 6

setting time, better handling properties and a similar sealing ability.

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