

Management of Open Apex - A Case Report

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ABSTRACT

Introduction: Endodontic management of immature permanent teeth is a challenge for both clinicians and researchers. Open apex is an unusual wide apical foramen that results due to multiple reasons such as incomplete development, extensive apical resorption, caries leading to pulpal necrosis or trauma before complete root formation, root-end resection, or due to over instrumentation.

Aims: To prevent the risk of subsequent microbial contamination.

Case Report: This article is a case report showing the management of open apex with MTA plug and a thermoplasticized Gutta Percha technique for obturation.

Discussion: Traditionally, calcium hydroxide was used for inducing the formation of an apical barrier.

Conclusion: Currently, biomimetic materials like mineral trioxide aggregate (MTA) and biodentin have shown promising results for apexification procedures.

Key Words: Calcium hydroxide, Apexification, Trioxide, Thermoplasticized, Root, Microbial

INTRODUCTION

Frequent occurrence of dental trauma in the early childhood often leads to persistence of immature non-vital tooth supplemented by periapical periodontitis as well as inflammatory external root resorption. Such teeth pose several difficulties in front of the clinician primarily due to absence of definite apical stop. Mineral Trioxide Aggregate (MTA) was introduced as an alternative to traditional materials for the repair of root perforations, pulp-capping and as a retrograde root filling due to its superior biocompatibility and ability to seal the root canal system.¹ Traditionally, calcium hydroxide has been the material of choice for the apexification of immature permanent teeth but MTA holds significant promise as an alternative to multiple treatments with calcium hydroxide.²

CASE REPORT

A 22 year old male reported to Department of Conservative Dentistry And Endodontics, DY Patil School Of Dentistry, Navi Mumbai with chief complaint of fractured upper front teeth since 13 years. Patient had trauma 13 years back which led to fracture of upper front teeth and since 5 years the tooth had started to get discoloured. No abnormality was seen on extra oral examination and on intraoral examination (fig 1), Ellis class III fracture was seen with 11, pain on percussion test and mobility tests were negative. Cold test was carried out using Endofrost and there was no response to pulp vitality test. On radiographic examination, open apex with periapical radiolucency was seen with respect to 11 (Figure 2) and tooth was diagnosed with asymptomatic apical periodontitis with non blunderbuss canal and apexification with MTA plug was planned for the treatment.

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Figure 1

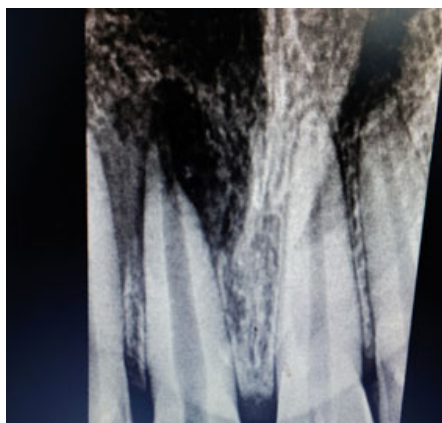


Figure 2

With informed consent, local anesthesia was administered using 2% lidocaine in 1:200000 adrenaline (Lox 2 %, Neon, and Thane, India) and root canal therapy was initiated under rubber dam.(product)(Figure 3). Initially complete caries excavation was done followed by access opening with sterile round carbide bur (Mani, India) in high speed airtor hand piece (Waldent, India) with water spray. The lingual shoulder was removed using Gates Glidden Drill no 1, 2 and 3 sequentially (Mani, India)(Figure 4)



Figure 3

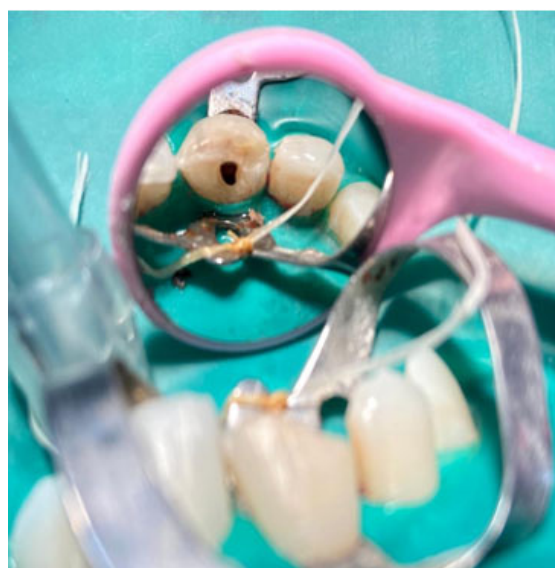


Figure 4

Working length determination was done using 80 no 2 % k file.(Figure 5). Circumferential filing was done till 100k file. Throughout the preparation, the canal was irrigated using 3% sodium hypochlorite and care was taken that irrigant did not extrude through the apex. Calcium hydroxide dressing was given as intra canal medicament and the patient was recalled after 1 week. On the second appointment, canal was irrigated again with normal saline and 3% sodium hypochlorite and calcium hydroxide dressing was given. After the canal was completely dried with paper points, MTA was mixed and placed at the apical region (Figure 6) according to the manufacturer's instructions and an apical plug of 5 mm was condensed.



Figure 5



Figure 6

MTA carrier was used to carry mixed MTA to the tooth and it was condensed with the use of hand plugger. The canal was obturated with gutta percha using backfill technique (Calamus, Dentsply). Three month follow up is shown in the figure 7.



Figure 7

DISCUSSION

Injury to anterior teeth is a common event, which when accompanied with immature apex requires a treatment approach that assures a tight seal at apex, which ensures complete biologic and functional restoration of the tooth involved.³

The maxillary central incisors are the most affected teeth in children with traumatic injuries. Consequently this will lead to loss of pulp vitality.

In immature teeth this can lead to incomplete formation of root causing an open apex.⁵ Such teeth having blunderbuss canals and open apex can be an endodontic challenge because of difficulty in obtaining an apical seal, and existing

thin radicular walls which are susceptible to fracture. Open apex can be due to incomplete root formation or resorption due to pulpal necrosis arising as a result of caries or trauma.

Different techniques and materials have been suggested for the creation of the apical plug commonly used material proposed has been calcium hydroxide, but despite its advantages it requires multiple visits and frequent change of dressings. This can result in secondary bacterial leakage. Bonte et al. found that 4 of 15 teeth in calcium hydroxide group developed root fractures compared with none in MTA group.⁶

MTA introduced by Torabinejad in the present has been exclusively used in pulp capping, pulpotomy cases, and sealing accidental perforations of the root canal, it became the material of choice for apexification therapy because of excellent biocompatibility and sealing ability.

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In addition, MTA showed antibacterial properties due to its alkalinity Nicoloso GF et al. mentioned in their report that MTA can be applied on the canal without a previous time of calcium hydroxide paste.⁶ Several studies ensure its good marginal adaptation that prevents bacteria leakage. In his in vitro study, Escribano-Escriba et al added that indirect ultrasonic vibration on the MTA in open apices teeth get better results and statistically significant in terms of filtration degree than those in which vibration is not performed.⁷ Because of its better handling properties, and reasonably better setting time, MTA is the material of choice for most of the clinicians.

Biodentine is a new bioactive dentin substitute cement. Biodentine has a shorter setting time of 12 minutes, in comparison with MTA, which is 2 hours 45 minutes. Zanini et al. suggested that Biodentine is bioactive because it induces differentiation of odontoblast-like cells and increases murine pulp cell proliferation and biomineralization. The major disadvantage of biodentine is its high alkalinity which induces denaturing of the organic matrix

Although comparative studies between MTA and Biodentine revealed that both materials offer excellent sealing performance after direct pulp capping. They prevent the risk of subsequent microbial contamination.⁸

CONCLUSION

Attempts should be made to achieve root development through apexogenesis whenever possible. If this treatment fails or pulp is necrotic, apexification should be initiated.

However, the most important factors are debridement of the canal and closure of this space with a suitable material. These aspects allow the body to reorganise and repair the periapical tissues.

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