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Treatment of an Open Apex with One Visit Apexification using MTA: A Case Report

Abstract

A tooth with an open apex can pose an enigma to the most skilled of practioners. The lack of an apical stop complicates the obturation and achievement of good apical seal. Also these teeth tend to be more fragile due to thin walls. Calcium hydroxide has been routinely used in the past for apexification. But the disadvantages of long treatment time, fracture of teeth and incomplete calcification of apical bridge have led to the development of newer biocompatible materials which can complete apexification in a single visit. One visit Apexification has been defined as the non surgical condensation of a biocompatible material into the apical end of root canal. Although different materials are available, because of its superior clinical properties and demonstrated clinical success, MTA remains the material of choice for forming an immediate apical barrier. This case report highlights the use of MTA for formation of apical barrier in a non vital maxillary central incisor with open apex and obturation with custom made gutta percha.

Key Words

Herbs; periodontitis; ayurveda; gingivitis, plaque

Mukut Seal[1], Pratim Talukdar[2], Kartik Pendharkar[3], Amritaksha Bhattacharyya[4]

[1]MDS, Registrar, Department of Dentistry, FAA Medical College & Hospital, Barpeta, Assam, India
[2]Senior Lecturer, Department of Prosthodontics, Daswani Dental College & Research Centre, Kota, Rajasthan, India
[3]MDS, Conservative Dentistry & Endodontics, Private Practitioner, Mumbai, India
[4]MDS, Oral Pathologist, Private Practitioner, Guwahati, Assam, India

INTRODUCTION

A traumatized non-vital immature tooth presents a number of difficulties for adequate endodontic therapy.[1] Trauma causes cessation of root development.[2] The canal is often wider apically than coronally, since the apex is extremely wide, no barrier exists to stop the filling material from moving into and traumatizing the apical peridontal tissues. Also, the lack of an apical stop and extrusion of material might result in a canal that is susceptible to leakage. An additional problem in immature teeth with thin dentinal walls is their susceptibility to fracture both during and after treatment.[1] Above all these disadvantages, these types of cases are frequently associated with peri-apical pathologies.[3] Thus selection of material to treat these types of cases has to be done very conscientiously. The material that is going to treat this type of cases should have few properties like, it should be bio active in nature, should be able to create a fluid tight seal, should reinforce the root dentine, and should also be anti bacterial.[4] Earlier various materials like calcium hydroxide powder mixed with different vehicles, collagen calcium phosphate, osteogenic protein, bone growth factor and oxidised cellulose, have been tried to achieve successful treatment but none of these materials seem to achieve their desired goal efficiently within convenient time frame.[5,6] To overdrive this time consuming apexification technique, many alternatives have been suggested which has been aimed mainly at the development of one-step procedure (single-visit apexification). This includes creating a non-resorbable apical barrier with Mineral tri-oxide aggregate (MTA).[3] MTA provides a scaffolding for the formation of hard tissues and the potential of a better biological seal. It is a hydrophillic material that has a three hour setting time in the presence of moisture. MTA advantages include excellent sealing ability, good compressive strength and a good biocompatibility and cementum and PDL regeneration.[7] The aim of this case report is to highlight the management of an open apex of a non vital immature permanent tooth using single visit apexification with MTA to form apical barrier.

CASE REPORT

A 15 year old female patient reported to 32 dental clinic with a complaint of pain in the upper incisors and a history of trauma 4 years prior. There was no

Fig. 1: Pre operative IOPA

Fig. 2: Determination of working length

Fig. 3: Plugger selection to condense MTA

Fig. 4: Apical plug of MTA

Fig. 5: Post obturation

Fig. 6: 6 month follow up

Fig. 7: 1 year follow up

Fig. 8: 1 and a half year follow up

significant medical history. Also there was a history of attempted root canal treatment 1 week before. Clinical examination revealed a fractured incisal edge with 11 and an access cavity made on the palatal aspect which was blocked with cotton. Mild vestibular tenderness was present in relation to 11 at the root apex and subjected tooth was mild tender on percussion. Intraoral periapical radiograph demonstrated presence of a radiolucent periapical lesion with blunderbuss canal, in relation to 11 (Fig. 1). Nonsurgical endodontic apexification with MTA apical plug was planned for 11. An appropriate access cavity was prepared to allow the debridement of the necrotic pulp. Working length was determined 2 mm short of the apex, in order to not injure the apical tissue (Fig: 2). Gentle circumferential filing had been performed with minimal dentin removal using #80 H file. Saline and 2.5% sodium hypochlorite were used as irrigating solutions. Calcium hydroxide paste was placed in the canals for 1 week for disinfection. During the second appointment, calcium hydroxide was eliminated by mechanical instrumentation and rinsed out of root canals by means of sterile water irrigation. The canals were dried using sterile paper points. MTA (White MTA, Angelus) was mixed with provided liquid by the manufacturer and introduced inside the canal with a plastic filling instrument. Pre selected pluggers (Fig. 3) were used to gently condense MTA into the canal to create a plug of 5mm. After checking apical plug of MTA with radiograph, (Fig. 4) a moist cotton pellet was introduced inside the canal to hydrate the material. After 24hrs temporary restoration was removed and MTA was checked for setting. Obturation was done using a customized gutta percha cone (Fig 5). The tooth was restored with a light cured composite restoration. Follow up radiographs at 6 months (Fig. 6), 1 year (Fig. 7) and one and a half year (Fig. 8) demonstrate adequate healing of the periapical lesion.

DISCUSSION

Obtaining a good hermatic seal in teeth with necrotic pulp and wide-open apices is a challenge in endodontics. For more than 40 years, such cases are approached clinically with apexification using $Ca(OH)_2$, which acts as a initiator for the formation of osteoid or cementoid barrier over the apical foramen.[1,4] The traditional use of calcium hydroxide apical barriers has been associated with unpredictable apical closure, time taken for barrier formation, patient compliance, risks of re-infection resulting from the difficulty in creating long term seals with provisional restorations and susceptibility to root fractures arising from the presence of thin roots or prolonged exposure of the root dentin to $Ca(OH)_2$.[8] Thus there is increasing popularity with one visit apexification techniques. Revascularization which is a very conservative approach is considered as a good alternative

treatment option for these types of cases. However, there are no randomized controlled clinical trials available till date for the success of these procedures on teeth with persistent peri-apical infection.[9] Taking all these factors into consideration it was decided to perform apexification using MTA plug, which will allow immediate apical closure, promotes apical healing and strengthens the root dentin. MTA has come up as a very good alternative in treating these types of cases, where the material sets and creates an apical barrier readily. It has got a very good sealing ability, as the material immediately bonds with the roots and creates a mono block. Its high Ph helps to destroy the surrounding microorganisms and its bio active nature stimulates blastic cells to create favourable environment for healing.[4,10] It also promotes cementum deposition on it. Moreover, due to its fast setting time, fewer follow-up appointments are required to carry out this treatment.

CONCLUSION

Not only the selection of material, but also the thickness of apical MTA barrier has played a key role in clinical success. A 5mm thick apical MTA barrier has proven to be significantly stronger with lesser leakage than a 2mm thick barrier. In the present case since a condensed 5 mm apical MTA plug was made.

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