Research Article

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Apexification with White MTA by using Apical Plug Technique in an Immature Permanent Tooth: Case Report

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ABSTRACT

Background: Apexification is a procedure by which we treat immature necrotic tooth by closure of the open apex. Apexification is done by two materials Ca (OH)2 and MTA in which calcium hydroxide is gold standard and MTA is a new boon in effective management of nonvital tooth with an open apex[1]. The physical and biological properties of MTA associated with appropriate instrumentation and obturation technique make this material an excellent option in endodontic therapy of immature permanent teeth. This article describes the apexification using an apical plug of MTA. In this article we discuss a case of an immature permanent maxillary right central incisor which presented pulp necrosis secondary to trauma and was treated by apexification with white MTA apical plugging followed by conventional RCT.

Keywords: Apical plug, Minereal trioxide aggregate(MTA) ,immature necrotic tooth, calcium hydroxide, open apex, pulp necrosis.

INTRODUCTION

For the successful completion of root canal treatment there must be presence of natural apical constriction at the end of the root canal. But due to interference in root development by trauma or infection can lead to interruption in root development which presents with thin and fragile dentinal wall resulting in an open apex at the end of the root apex. This condition create a challenging task for clinician .When we trying to seal the canal by obturating material there is leakage of sealing material through an open apex. So for completion of successful root canal therapy before sealing the canal by obturating material we have to seal the root canal apex by forming an artificial barrier to allow optimal filling of root canal obturating material which avoid over extrusion[2].

Calcium hydroxide has been widely used for the induction of hard tissue barrier but it takes 5 to 20 months to form the hard tissue barrier resulting a long term follow up of patient is required which is hard to maintain. Use of calcium hydroxide also reported that it weakens the resistance of the dentin to fracture[3]. Due to all these properties and time-consuming procedure many alternatives has been aimed mainly at the development of one step procedure (single visit apexification). It includes apical barrier with MTA.

MTA has an outstanding property like its biocompatibility, sealing ability, potential for regeneration of periradicular tissues, good compressive strength and antibacterial property. In this case we are representing case of MTA apexification[4].

CASE REPORT

A 17 year old male patient reported with chief complaint of swelling, pus discharge and discoloured maxillary right central incisor. History revealed that patient had suffered from trauma 6 to 7 year back and undergone treatment at local clinic. Medical history was not significant. On clinical

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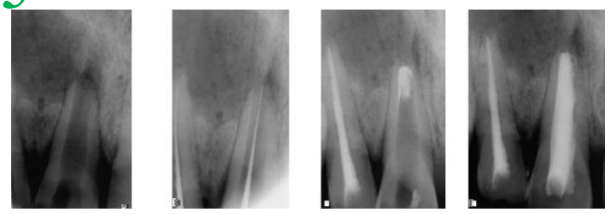

Fig A: Preoperative radiograph of the maxillary right central incisor. Fig B: Working length determination. Fig C: Placement of the MTA apical plug. Fig D: Canal obturation after induction of apical barrier.

examination there is the presence of a draining sinus tract in the periradicular area of the maxillary right central incisor. The tooth did not demonstrate any abnormal mobility and also not responded on electric and thermal testing. On radiographic examination there is the presence of a radiolucent periapical lesion located lateral to the apex of the tooth #11 & presence of blunderbuss canals with incomplete root development (fig A). The final diagnosis was pulpal necrosis with chronic apical periodontitis # 11.

Considering all above finding and discussing with patient and his parents the treatment plan opted was apexification with MTA. After that written consent was taken from patient's parents. Isolation was done by using rubber dam and coronal access was prepared without local anaesthesia. Then canal was located and accessible pulpal remnants were removed by using barbed broaches. Working length was determined with an electronic apex locator and was confirmed with a radiographic image (Fig B). After the working length determination cleaning and shaping of the canal done with minimum instrumentation by using hand files under irrigation 2.5% NaOCl and saline.

Intracanal medicament i.e., Ca (OH)2 and iodoform combination dressing was given. After 3 weeks patient remained asymptomatic, the tooth was reassessed and canals were irrigated. The canal was dried with absorbent paper point and MTA was mixed with provided liquid according to the manufacturer instruction. By using Schilder pluggers a 4 mm thick MTA apical plug was gently applied to the apical portion of canal and repeated radiograph were taken to check adequacy of MTA. (Fig C).The blunt end of #60 paper point was moistened with water and left in the canal to promote setting for 4-6 hr. A cotton pellet was placed in chamber and tooth was restored with temporary cement. After 4-6 hr. the tooth was isolated and accessed as before. To confirm the hardened setting a hand plugger was lightly tapped against MTA. The canals were dried by using absorbent paper point and obturated by roll cone technique. Final radiograph was taken. (fig.D) After 8 month follow up a periapical radiograph was taken and it shows that there is continuity in lamina dura and consistent width of PDL space suggest healing of the periapical lesion.

DISCUSSION

Apexification is defined as a method to induce a calcified barrier in a root with an open apex or the continued development of an incomplete root in teeth with necrotic pulp[5]. However the conventional apexification material calcium hydroxide has shown some inherent disadvantages long treatment procedure ranging from 5-20 months due to which difficult in patient follow up, uncertain apical closure, frequent instrumentation, recurrence of infection , failure in controlling infection, cervical fracture and increased risk of root fracture.[6] MTA has superior biocompatibility and it is less cytotoxic and presence of calcium & phosphate ions results in attraction of blastic cells and promotes favourable environment for cementum deposition[7].

MTA was introduced in 1993 at the Loma Linde University (USA) initially as a root end filling material. It enables treatment to be completed more quickly with high rate of clinical success.MTA has come up as a very good alternative[8]. It has got a very good sealing ability, as the material immediately bonds with the roots and creates a Monoblock. Its high Ph helps to destroy the surrounding microorganism and its bioactive nature stimulates blastic cells to create favourable environment for healing. It also promotes cement deposition on it [9]. Moreover, due to its fast-setting time fewer follow up appointments are required to carry out this treatment. Apexification with MTA apical plug requires specific facilities such as points and carriers to facilitate its insertion and correct adaptation within the ideal apical limit may be more difficult in extremely large foramina[10]. Nevertheless studies have reported that the MTA placement technique using passive ultrasonic vibration can improve the marginal adaptation of the material.

It is recommended that a 3-5 mm thick plug of MTA should be placed at the end of root apex during apexification. Therefore, in the present case after canal disinfection the apical region can be blocked by about 4mm of MTA as an apical plug.

CONCLUSION

Single visit apexification by MTA is nowadays more recommended procedure for nonvital immature teeth with incomplete root development and wide-open apex, because this is less time consuming, simple procedure, less patient appointment with good result, good biocompatibility, good sealing ability and it is more resistant to fracture. All these qualities make this material an excellent option in the endodontic therapy of immature permanent teeth.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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