

Case Report

Apical Barrier Formation after Orthograde MTA Placement in Teeth with Open Apex and periapical lesions - a case report

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Abstract: Immature teeth with necrotic pulps and large periapical lesion are a great challenge. The case represents apical barrier with MTA and successful periapical healing. The case presents traumatized upper anterior teeth. The radiographic evaluation revealed open apices and periapical lesions, the canal was cleaned using intracanal instruments and 5.25% NaOCl and final irrigation with 2% chlorohexidine. To obtain canal disinfection slurry of calcium hydroxide was temporized in the canal. In subsequent appointments 3-4mm apical stop was created with mineral trioxide aggregate and allowed to set. Subsequently the root canals were obturated with warm vertical compaction. A composite resin restoration sealed the access cavity. A 1 year follow-up revealed clinically asymptomatic and healing of periapical lesion. A periapical healing of this case is encouraging for the use of MTA as a apical plug, in immature teeth with open apex. Apexification in one step using an apical plug of MTA can be considered a predictable treatment and may be an alternative to use a long term calcium hydroxide apexification.

Keywords: Open apex, MTA, apical barrier

INTRODUCTION

Long term success of root canal treatment involves complete debridement and three dimensional obstruction[1]. Uncertain cases such as immature teeth or apical resorption due to trauma, absence of natural apical constriction creates a challenge. The goal of endodontic treatment thus is to form apical barrier or stop against which one can place root canal filling[2-3].

Several materials have been experimented to form apical barrier like calcium hydroxide, MTA, calcium phosphate, bone morphogenic proteins, hydroxyapatite crystals, PRP etc. among them Mineral trioxide aggregate (MTA) is reported to have a variety of potential uses[2]. Studies have demonstrated regeneration of periradicular tissues, such as periodontal ligament, bone, and cementum, by use of MTA in endodontic procedures[3]. Its superior biocompatibility with periodontal tissues has also been reported as well as an excellent sealing ability in the presence of moisture and adequate mechanical properties as an apical sealing material[4-5].

The application of MTA instead of calcium hydroxide for apexification of immature roots is based on its ability to facilitate normal periradicular architecture by inducing hard tissue barriers[6-7]. MTA could be an appropriate material for apical sealing of immature root canals with open apices, particularly in cases where obtaining an adequate obturation and seal with placement of a complete MTA plug is technically difficult and challenging. The following case reports demonstrate the formation of an apical barrier on permanent immature teeth with open apices and periradicular lesion.

CASE REPORT

An 18 year old female patient, reported to the Department of Conservative Dentistry and Endodontics, with a chief complaint of pain in the upper front teeth region since 2-3 months. Patient had history of trauma at the age of 9. There was Ellis class 3 # with 11 & 21 (figure 1 A). The patient experienced pain on percussion and discolouration in relation to 11 &

21. The concerned teeth did not respond to both electric and heat test. Detailed radiographic examination revealed a blunder buss apex with associated with periapical lesion in relation to maxillary right and left central incisor. A tentative diagnosis of pulp necrosis with symptomatic apical periodontitis was made. There are two treatment options either surgical removal of periapical lesion and retrograde filling or non-surgical root canal treatment followed by specification using apical plug of MTA. Considering the amount of surgical trauma and the age of the patient nonsurgical treatment was opted.

Access opening was prepared under rubber dam isolation and working length was determined (Figure 2B). Biomechanical preparation was done using no70 K-file using circumferential filing motion. Root canal debridement was done using alternate irrigation with 5.25% NaOCl and saline using 30 gauge needle and placing 2mm short of apex. Calcium hydroxide (ULTRACAL XS) was used as intracanal medicament for 1 week and temporary restoration with IRM. (figure 2C) At subsequent appointment after removal of dressing root canal was found completely dry and canal was debrided with 5.25% NaOCl followed by 17% EDTA and final rinse with 2% chlorohexidine. The canal was dried with paper points and Mineral trioxide aggregate (MTA Angelus) was placed with MTA carrier in the apical portion of the canal, subsequent increments were condensed with hand pluggers till thickness of 3-4 mm (Figure 2D). A wet cotton pellet was placed, access cavity sealed with temporary cement. In subsequent appointment root canal was back filled with warm vertical compaction (DIAGUN) access cavity sealed with composite (figure 1B, 2D). Patient was recalled after 1 week and was kept on follow up for 1 year. Clinical examination performed after 1 year revealed adequate clinical functions, absence of pain and tenderness to percussion. Moreover radiography

displayed healing and reestablishment of PDL and lamina dura. (Figure 1C)

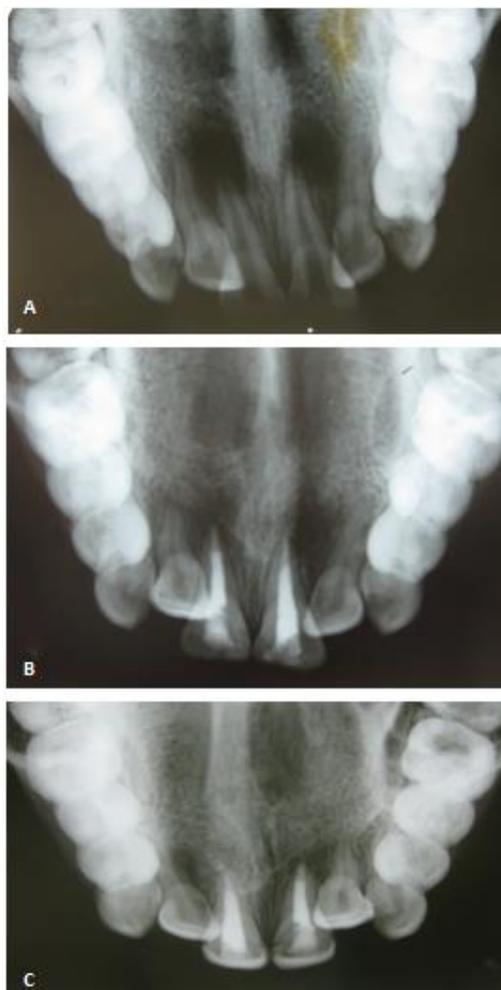


Fig-1: Occlusal radiographs. (A) Pre-operative, (B) Post-operative, (C) Recall after 1 year



Fig-2: Intraoral radiographs. (A) Pre-operative, (B) Working length determination with 11 and 21, (C) Calcium hydroxide dressing, (D) MTA apical plug with obturation 11 and 21.

DISCUSSION

The response to trauma can be varied. Some pulps remain apparently normal with no adverse effects, whereas others become necrotic. When treating nonvital teeth, a main issue is eliminating bacteria from the root canal system. As instruments cannot be used properly in teeth with open apices, cleaning and disinfection of the

root canal system rely on the chemical action of NaOCl as an irrigant and calcium hydroxide as an intracanal dressing [7-8]. In the case, 5.25% NaOCl was used 2mm short of apex to prevent extrusion of irrigant beyond apex. A 17% EDTA rinse was carried out before placement of the intracanal dressing to remove the smear layer and facilitate diffusion of calcium

hydroxide through the dentin and before obturation to ensure better removal of calcium hydroxide. Final irrigation was done with 0.12% chlorhexidine[8]

With the MTA apical plug technique, a one-step obturation after short canal disinfection with calcium hydroxide could be performed. In agreement with other studies, MTA appeared to show good sealing ability good marginal adaptation, a high degree of biocompatibility and a reasonable setting time. From a practical point of view, MTA can be used in the presence of moisture in the root canal. This property is important in teeth with necrotic pulps and inflamed periapical lesions because one of the problems found in these cases is the presence of exudate at the apex of the root[9].

The apical plug created with MTA can be interpreted as an artificial barrier to condense the subsequent root canal filling material, in order to prevent reinfection of the canal system[10]. Some authors have postulated that possible leakage of MTA could be influenced by the thickness of the apical plug. The thickness of the apical plug may have a significant impact only on displacement resistance. In the present case reports, the thickness of the MTA apical plug varied from 3 mm to 5 mm. The novel approach of apexification using MTA lessens the patient's treatment time between first appointment and final restoration. Importance of this approach lies in thorough cleaning of root canal followed by apical seal with a material that provides regeneration. In addition there is less chance of root fracture in immature teeth with thin roots because the material immediately bonds with the roots and strengthens it[11].

The clinical case reported here demonstrates 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.

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