ENDODONTIC MANAGEMENT OF OPEN APEX USING BIODENTINE FOR INDUCING ARTIFICIAL APICAL PLUG

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ABSTRACT

Biodentine is calcium silicate based cement that exhibits physical and chemical properties similar to those described for certain Portland cement derivatives. This article describes the use of Biodentine as an apical barrier in apexification procedure. This case reports present root end apexification and successful healing with the use of Biodentine as an apical barrier matrix.

Keywords: Apexification, apical barrier, Biodentine, periradicular healing.

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INTRODUCTION

Traumatic injury to young permanent teeth are not rare, and mostly occurs before the root formation is complete, and often results in pulpal inflammation or necrosis. Management of an open apex is a difficult treatment approach to an endodontist as it assures a tight seal at apex against which successful endodontic management can be carried out. Apexification is a viable option for management of immature permanent tooth with open apex. It is defined as a method to induce a calcified barrier in a root with an open apex or continued apical development of an incompletely formed root in teeth with necrotic pulp tissue (1).

Kaiser proposed the use of calcium hydroxide for apical barrier formation in 1964. The long follow – up period with calcium hydroxide increases the risk of dentin brittleness. MTA is commonly used nowadays as a material of choice for apexification. MTA has its own advantages like excellent biocompatibility, sealing ability and cementogenic property. Disadvantages of MTA includes its handling properties and long time to set (Parirokh M et al 2010). Biodentine, a calcium silicate material introduced by Septodent in 2010. It acts as a substitute for MTA with a composition similar to MTA. Biodentine in comparison to MTA, it can be handled easily and needs much less time for setting

The present case report describes the nonsurgical management of symptomatic tooth with immature apices and periapical radiolucency using Biodentine matrix to promote periapical healing.

Case report

A 17-year-old male patient reported to Department of Conservative Dentistry and Endodontics, Rajas Dental College and hospital, with a chief complaint of pain and pus discharge in upper front teeth region since 1 month. The patient gave a history of fall 3 years back. He was asymptomatic until recently, he felt pain and had pus discharge. The pain increased in intensity since 1 month. The medical history of the patient was noncontributory.

The extraoral examination was normal. Intraoral examination revealed generalized dental fluorosis and Ellis class IV fracture in 12, and sinus opening was visible in relation to tooth 12. EPT and thermal tests of the involved tooth gave no response, whereas responses were obtained on the adjacent normal teeth. Mobility of the teeth was moderate, which showed slight tenderness to percussion. Thermal tests with heated Gutta-percha (GP) and pencil ice sticks gave a negative response. Radiographs revealed wide canals with open apex and periapical radioluceny. (figure 1)

Apexification was planned as a treatment option. Single visit apexification with biodentine was decided. The treatment plan was discussed with the patient and consent was taken. The tooth was anesthetized with 2 ml of 2%

Lignocaine containing 1:200,000 adrenaline ([Xylocaine, AstraZeneca Pharma Ind Ltd., Bangalore, India] and rubber dam was applied. An endodontic access was established using Endo Access bur [Dentsply Maillefer, Ballaigue, Switzerland]. Working length was performed followed by minimum instrumentation and circumferential filing was done with 80 K file (figure 2). Copious irrigation was performed with 3% sodium hypochlorite and normal saline. After cleaning and shaping working length was established by radiograph. Intracanal dressing with calcium hydroxide was given for 1 week and access cavity was temporized with Cavit.

On recall visit, the tooth was asymptomatic (figure 3). After removing the provisional restoration copious irrigation and circumferential filing was done to remove calcium hydroxide from the canal. The canal was completely dried with size 80 absorbent paper point. Suitable pluggers were selected to condense biodentine.

Biodentine (Septodont, St. Maur-des-Fossés, France) capsule was tapped on a hard surface to diffuse the powder (figure 4). After this, five drops of manufacturer's supplied liquid was dispensed into the capsule. The capsule was then placed in triturator for 30 s. After mixing, biodentine was placed at the apical region of 12 using amalgam carrier. The material was then condensed with suitable prefitted plugger until entire canal was filled with biodentine. Biodentine apical plug was assessed radiographically (figure 5). Apical barrier had been inadvertently extruded beyond the root apex and the entire canal was filled with biodentine. The tooth was given temporary restoration with cavit. The parents were informed about the extruded biodentine & its possible consequences, and were scheduled for 2 consecutive weekly recalls. On recall visit, the patient was asymptomatic and postendodontic restoration with composite resin was done.

The mean follow-up time was 6 months. Radiographic follow - up at 6 months showed healing of the periapical lesion and regeneration of the periradicular tissue, in the absence of clinical symptoms. Trabeculae formation and increase in bone density could be appreciated (figure 6).

Discussion:

According to American Association of Endodontics 2003, Apexification is defined as 'a method to induce a calcified barrier in a root with an open apex or the continued apical development of an incomplete root in teeth with necrotic pulp'. The objective of this procedure is to obtain an apical plug to prevent the passage of toxins and bacteria into periapical tissues from the root canal. barrier is required for compaction of root filling material.

Traditionally, calcium hydroxide apexification procedure was followed to induce permanent apical barrier. But its disadvantages includes long treatment

Figure 1 (Pre – operative view)

Figure 2

Figure 3

Figure 4

Figure 5 (Immediate post – operative view)

Figure 6 (Follow – up after 6 months)

period, unpredictability of an apical seal and risk of root fractures (Sheely EC et al 1997). In apexification procedure involving human immature permanent teeth with apical periodontitis, the creation of an apical plug is important for sealing and to prevent bacterial leakage (Holland GR 1984).

MTA as an apexification material has the ability of hard tissue induction with a high degree of structural integrity when used as the apical plug in open apex teeth. Studies have shown high clinical and radiographic success rates (Giuliani V et al 2002). But it has disadvantages like prolonged setting time and increased solubility.

Biodentine as a dent in substitute which can also be used as an endodontic repair material. An effective alternative to MTA, apexification with Biodentine requires significantly less time. This may reduce the treatment time between the patient's first appointment and the final restoration. Biodentine has superior biocompatibility and sealing ability and is less cytotoxic than other materials currently being used in pulp therapy.

In the present case, Calcium hydroxide was used as intracanal medicament for 7 days to make the canal dry and free from infection. Use of calcium hydroxide for such a short term does not adversely affect the fracture resistance of the tooth.

Conclusion:

Biodentine, a bioactive – biomimetic material, shows promising use for apexification, obturation and reinforcement in management of immature teeth with open apex while serving as a monoblock. However, in such cases, long term follow up is necessary to ensure and evaluate success.

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