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Management of Open Apex Using Two Different Materials for Apexification: A Report of 2 Cases.

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ABSTRACT:Immature tooth having necrosed pulp with periapical pathology is a major challenge and requires a well-organized treatment plan. Many materials have been introduced for apexification each having their own advantages and disadvantages. In this case series MTA and biodentine have been used as an apical plug for apexification.

KEYWORDS: Open apex, Apexification, MTA, Biodentine.

I. INTRODUCTION

Pulp involvement can occur in young permanent teeth due to trauma or caries, thus causing loss of pulp vitality resulting in short roots with very thin walls and open apex. Teeth with open apex require different treatment protocol and more than one year to complete the apical closure[1]. The management of non- vital tooth with open apex consists of creating an artificial barrier which can act as a stop for obturation. 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[2].

Mineral Trioxide Aggregate (MTA) and Biodentine are frequently being used for procedures. The aim of this case series is to present two cases of an open apex with periapical lesion which was managed by using MTA and biodentine as an apical plug followed by obturation with thermoplasticizedguttapercha.

II.CASE REPORTS

CASE 1: A 23-year-old female patient with the chief complaint of pain in her upper front tooth region for past two days. Patient gave history of dull throbbing pain since 6 months in the same region. Patient had history of trauma 13 years back. Clinical examination showed Ellis Class IV Fracture in permanent maxillary left central incisor (MLCI). Pulp vitality test showed no response. Radiographic examination showed blunderbuss canal and a periapical radiolucency in relation to MLCI. (Figure I A). A diagnosis of Ellis Class IV fracture with open apex and periapical pathology was made. Apexification was planned with MTA (Angelus, Brazil). In the first visit, Access opening was done under rubber dam and working length was determined by radiograph (Figure I B). Biomechanical preparation was done using K files using step back technique till 110k file. Irrigation was done using 3% NaOCl (Chemident, India) and saline (Jedux, India). Calcium Hydroxide was placed using a Lentulo spiral (Mani inc, Japan) andtooth was temporized. Patient was recalled after a week. In the second visit, access cavity was re-established, canal was irrigated following the same protocol and dried with sterile paper points. Colla plug was placed inside root canal 1mm beyond the working length as an internal matrix. MTA (Angelus, Brazil) was mixed with distilled water to a consistency of wet sand and placed in increments in the apical region of the canal using root canal plugger having a thickness of4mm and wet sterile cotton was placed in the canal above MTA (Figure I C). The tooth was given a temporary restoration. Patient was recalled after a week. On the recall visit, obturation was done using thermoplasticised gutta percha followed by post endodontic restoration with composite (Figure I D).

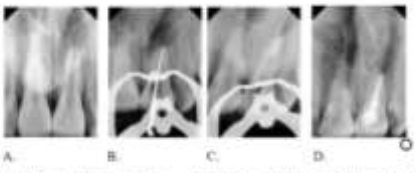

Figure I. (A) Pre-op. (B) Working length. (C) MTA plug. (D) Thermoplasticized obturation.

CASE 2: An 18-year-old female patient reported to the department with a chief complaint of pain in her upper front tooth region for past four days. Patient had history of trauma 10 years back.

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Clinical examination showed Ellis Class IV Fracture in maxillary right central incisor (MRCI). Pulp vitality test showed no response. Radiographic examination showed blunderbuss canal and a periapical radiolucency in MRCI (Figure II A). A diagnosis of Ellis Davis Class IV fracture with open apex and periapical pathology was made. Apexification was planned with Biodentin. In the first visit, Access opening was done under rubber dam and working length was determined by radiograph (Figure II B) and biomechanical preparation was done till 110k file. Calcium Hydroxide dressing was placed by a Lentulo spiral and tooth was temporized. Patient was recalled after a week. In the second visit, access cavity was re-established, canal was irrigated and dried with sterile paper points. Colla plug was placed inside root canal 1mm beyond the working length as an internal matrix. Biodentin (Septodont, France) was mixed according to the manufacturer's protocol and packed to a thickness of 4 mm in the apical third using a hand plugger. A sterile cotton pellet was placed in the canal and the tooth was temporized (Figure II C). Patient was recalled after a week. In the subsequent visit, obturation was done using thermoplasticized gutta percha followed by post endodontic restoration and PFM crown (Figure II D).

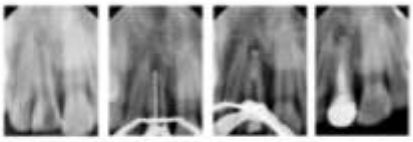

FIGURE II. (A) Pre-op. (B) Working length. (C) Biodentine plug. (D) Thermoplasticized obturation followed by PFM crown.

III.DISCUSSION:

Management of open apex with necrotic pulp can have multiple options such as apexification, or revascularization. Earlier, calcium hydroxide has been considered as an efficient material for this purpose.[3] This chemical has several disadvantages, so the use of this has been eliminated. Apexification procedures using MTA and biodentine can provide a favourable environmentwhich canpromote mineralised tissue barriers, root-end closure and potentially radicular elongation of immature teeth that exhibit pulpal necrosis and open apices[4-6].

MTA as an apexification material constitutes a primary monoblock. Appetite like interfacial deposits is formed during the maturation of MTA which results in filling the gap induced during material shrinkage phase and improves the frictional resistance of MTA to root canal walls. A total of 5 mm barrier is considerably stronger and shows less leakage than 2 mm barrier[7]. MTA has superior biocompatibility and less cytotoxicity due to its alkaline pH and presence of calcium and phosphate ions resulting in capacity to attract blastic cells and promote favorable conditions for cementum deposition[3]. Mineral Trioxide Aggregate is composed of bismuth oxide, tricalcium silicate, dicalcium silicate, dicalcium dialuminate, calcium sulphate etc. MTA has shown potential as a root end filling material[8].

Biodentine is a new bioactive dentin substitute cement. It is a calcium silicate based cement. The main component of powder is Tricalcium silicate (3CaO.Si02), Calcium carbonate (CaC03), Zirconium dioxide (Zr02). The liquid is the solution of CaC12 with water reducing agent[9]

Zanini et al [10] suggest that Biodentine is bioactive as it induces differentiation of odontoblast-like cells and increases murine pulp cell proliferation and biomineralization. Biodentine lacks cytotoxicity, and stimulates collagen fibers and forms fibroblast. It has a shorter setting time of 12 minutes, unlike MTA, which sets in 2 hours 45 minutes. Biodentine has a disadvantage that it cannot be used in the presence of moisture unlike MTA.

IV. CONCLUSION

Apexification procedure can be done using various materials which are available and requires foremost care while performing the procedure as tooth becomes prone to fracture. MTA and Biodentine can be used as a material for the apical plug along with thermoplasticized obturation in the open apex cases.

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