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Research Article

ONE STAGE APEXIFICATION TECHNIQUE: CASE REPORT

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ABSTRACT

Aim: To present a case in which clinical and radiographic signs of healing were obtained after apical plugging of an immature open apex with MTA. Case: A tooth was subjected to radiographic examination revealing an open apex and a periapical radioluscency. The canal was cleaned using intracanal instruments and 5.25% of NaOCl irrigation. To obtain canal disinfection, slurry of calcium hydroxide mixed with sterile saline was temporized in the canal. The patient was asked to return after two weeks for the MTA apical plug placement. The tooth was opened, instrumented and irrigated. Around 4 mm of MTA plug was compacted apically and allowed to set. Thereafter, the remainder of canal system was filled with thermoplasticised gutta- percha. A corono-radicular composite restoration sealed the access. A six-month follow up demonstrated clinically asymptomatic and adequately functional tooth, with radiographic signs of healing.

INTRODUCTION

Development of root continues 3-4 years after eruption of tooth [1].Traumatic and carious exposure of the pulp during this time period can lead to cessation of root end development due to damage to hertwig's epithelial root sheath and necrosis of pulp that leads to necrotic immature tooth with blunderbuss canal anatomy [2]. This morphology may also occur in mature teeth and fully formed root in conditions like severe periapical inflammation and extensive resorption after endodontic treatment. The treatment of teeth with blunderbuss anaotomy poses difficulty in treatment because of size of canal and presents with unique enodontic and restorative challenges Because of the lack of an apical costriction, an alternative to standard root canal treatment, apexification or root-end-closure, has been advocated (Seltzer 1988).

The procedural term apexification refers to that method of treatment aimed at inducing apical repair as a hard tissue barrier across an open apex. This technique usually refers to endodontic management of the pulpless permanent tooth with an open or even 'blunderbuss' apex. The procedure requires the chemomechanical debridement of the canal followed by placement of an intracanal medicament to assist or stimulate apical healing and formation of an apical barrier. The most common material used in apexification is calcium hydroxide [4] Recently, mineral trioxide aggregate (MTA) developed by Mahmud Torabinejad in 1993, has been proposed as a potential material to create an apical plug.

MTA (Pro Root MTA; Dentsply Tulsa dental, Tulsa, UK) is a powder containing fine hydrophilic particles, which need moisture for complete setting. MTA sets in presence of moisture in less than 4 h and has a pH of 12.5. Composition of MTA includes tricalcium silicate being the major component, tricalcium aluminate, tricalcium oxide and silicate oxide.[5]

Case 1

A11-year-old male patient with non-contributory medical history was referred presented to the Department of Pedodontics and Preventive Dentistry, PGIDS, Rohtak for treatment of fractured maxillary right central incisor tooth. There was a history of trauma to maxillary right central incisor 6 months ago. Clinical examination revealed Ellis Class III fracture with respect to 11. A radiolucent lesion around the apex of the maxillary right central incisor along with incomplete root formation was detected by intraoral periapical radiograph. The concerned tooth showed no response to both electrical and thermal test.

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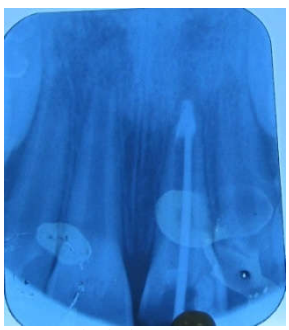
Pre operative clinical view showing ellies classIIIfracture

Preoperative radiograph showing periapical bone loss and indicating an open apex

Proper aseptic precautions were carried out, and access opening was done using high-speed handpiece (NSK). Necrotic pulp and other organic debris were extirpated using barbed broach under copious irrigation using normal saline. The working length was determined using apex locator and confirmed radiographically, and the root canal was instrumented using K-type hand files. The canal was irrigated, dried, and short term canal dressing with calcium hydroxide powder mixed with saline was placed for a period of two weeks for disinfection. The patient was recalled, calcium hydroxide dressing of tooth was removed. Irrigation was performed using 3% sodium hypochlorite, 17% EDTA followed by normal saline. The canal was dried, and MTA (Pro Root MTA; Dentsply Tulsa dental, Tulsa, UK) was placed in the apical region of the canal as per manufacturers' instructions and guidelines.

MTA was mixed with distilled water to the sandy consistency and was placed with MTA carrier in the apical portion of the canal. Hand pluggers were used to condense the increments till thickness of 3-4 mm. After placement, a lentulospiral was used to get a homogenous well sealed apical plug A wet cotton was inserted into the canal, and the access cavity was sealed. In subsequent appointment, tooth was subsequently obturated using thermoplasticised gutta-percha, permanent restoration was done with composite and patient was evaluated subsequently.



Apical plug of MTA

Postoperative view showing permanent composite restoration

Case 2

A 8 year female reported to the department of paedodontics and preventive dentistry, PGIDS, Rohtak with pain and swelling in the lower right first molar since 7 days. Root canal treatment was planned but it was not feasible due to distal open apex. Biomechanical preparation was done and apical matrix was creating using collacote into periapical area. Subsequently Pro root MTA was mixed according to manufactures instruction and inserted into distal root with a fine tipped MTA carrier and compacted till it attained 5mm thickness.

Open apex in distal root

5mm apical barrier of MTA

DISCUSSION

Apexification treatment is supposed to create an environment to permit deposition of cementum, bone and periodontal ligament to continue its function of root development. The goal of this treatment is to obtain apical barrier to prevent passage of toxins and bacteria to periapical area. Technically this barrier assist in compaction of root canal material. Calcium hydroxide was most commonly used till the advent of Mineral Trioxide Oxide. The most common drawback in the classic apexification technique using calcium hydroxide is the lengthy duration of the therapy, ranging from 3 to 21 months.[5] Other disadvantages include unpredictability of apical closure, difficulty in patient follow-up, susceptibility to coronal microleakage and weakening of the root structure by neutralizing, denaturating or dissolving the acidic components of the dentin.[5] Once canal

disinfection with calcium hydroxide is done, obturation can be performed in one appointment using MTA apical plug technique [5,6]. One visit apexification had been defined as the non surgical condensation of biocompatible material into apical end of root canal. The rationale is to establish an apical stop that would enable the root canal to be filled immediately.

In comparison with other potential apical barriers like tricalcium phosphate, dentin plugs, calcium phosphate cement, MTA shows excellent sealing ability, proper marginal adaptation with good biocompatibility and a setting time of about 4 h.[7] From practical point of view, studies have shown the use of MTA in the root canals containing moisture.[8,9]This property is important in nonvital teeth with necrotic pulps and inflamed periapical lesions. The clinical cases treated in this report by using MTA exhibited apical closure and healing during subsequent follow-ups. MTA induces apical hard tissue formation with less inflammation than other test materials[. 10,11]

CONCLUSION

The novel approach of apexification using MTA lessens the treatment duration between first appointment and final restoration. There is less chance of root fracture in immature teeth with thin roots because the material immediately bonds with the roots and strengthen it.

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