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ENDODONTIC MANAGEMENT OF TOOTH WITH OPEN APEX USING MTA AND AN APICAL BARRIER: A CASE REPORT

Endodontics

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ABSTRACT

The completion of root development and closure of the apex occurs up to 3 years after the eruption of the tooth. The treatment of pulpal injury during this period provides a significant challenge for the clinician. The importance of careful case assessment and accurate pulpal diagnosis in the treatment of immature teeth with pulpal injury cannot be overemphasized. The treatment of choice for necrotic teeth is apexification, which is induction of apical closure to produce more favorable conditions for conventional root canal filling. The most commonly advocated medicament is calcium hydroxide, although recently considerable interest has been expressed in the use of mineral trioxide aggregate (MTA). We report a case series wherein MTA and colla plug were used successfully for one step apexification in teeth with open apex.

KEYWORDS

Apexification, colla plug, Mineral trioxide aggregate, Thermoplastisized

INTRODUCTION

Teeth with open apex often pose a challenge to the dentist because of the lack of an apical seal for obturation and higher risk of over filling.[1] Management of immature root with a necrotic pulp and apical periodontitis is a challenging task. The infected root canal space cannot be disinfected with the standard protocol. Obturation of the root canal is difficult because of lack of apical barrier for containing the root filling material.[2] The purpose of the apexification therapy used in nonvital immature teeth is to induce the formation of a hard tissue barrier at the root apex or the completion of apical development.[3] This barrier facilitates the placement of an appropriate root canal sealant and filling material, whilst reducing the possibility of their extrusion into periapical tissues.[4]

Calcium hydroxide has been considered as the gold standard for apexification because of predictable efficient results and no adverse periapical reaction. Its efficacy has been demonstrated by several researchers through several clinical and long term studies with success rate ranging between 74–100 percent. However it has inherent limitations that include variability of treatment time ranging from 5.1–20.2 months, unpredictability of apical closure in relation to time, difficulty in patient returning for follow up, increased risk of tooth fracture and delayed treatment.[4]

Mineral trioxide aggregate is a promising alternative material for the apexification procedure and has been shown to be a very effective root-filling material for sealing immature root canals with open apices. It is also used as a root end-filling material and perforation repair material due to its good canal sealing property and biocompatibility. It facilitates the formation of dentinal bridges and cementum, and regeneration of the periodontal ligament. It has the ability to stimulate cytokine release from the bone cells, indicating that it actively promotes hard tissue formation and facilitates periradicular healing.[5]

This case report describes the management of an asymptomatic tooth with immature apex with calcium hydroxide used as an intracanal medicament and MTA used for apical barrier formation.

Case Report

A 24-year-old male patient had reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of a fractured and discolored tooth, with relation to 11 **(Figure1)**, with a history of trauma at the age of nine. The medical history was not significant. Clinical examination revealed grayish discoloration of tooth 11. The tooth did not demonstrate any abnormal mobility or sensitivity to percussion. The concerned tooth did not respond to vitality when using the heat and electric test. A detailed radiographic examination revealed a large open apex with associated per apical lesion in relation to the maxillary right central incisor.

Figure 1: Preoperative Clinical Picture

After discussing treatment options and taking into consideration the age of the patient and the need for limiting the restoration within the apex and formation of the lost bone structure, a non-surgical treatment with the colla plug was opted for. The access opening was prepared and the working length was determined **(Figure 2).**

Figure 2: Working Length radiograph

Biomechanical preparation was done using the conventional technique. Copious irrigation was done using 2.5% sodium hypochlorite (NaOCl) and saline alternately. Calcium hydroxide dressing was placed and the patient was recalled after 1 week. The root canal was found to be dry at subsequent appointments and the canal was debrided with 2.5% NaOCl followed by 17% Ethylenediaminetetr aacetic acid (EDTA), and a final rinse with normal saline. Using paper points the canal was dried and Colla Plug was cut into suitable piece, placed in the periapical region using hand plugger till the working length until a hard obstruction was gained **(Figure 3).**

Figure 3: Colla Plug

The MTA was placed in the canal using the MTA carrier. Subsequent increments were placed and condensed with hand pluggers till a thickness of 4 mm was attained **(Figure 4).** A wet cotton pellet was placed and the access was sealed with temporary cement. In the subsequent appointment the temporary cement was removed and obturation was done using AH plus sealer and thermoplastisized gutta-percha **(Figure 5).**

Figure 4: MTA Placed

Figure 5: Obturation Radiograph

DISCUSSION

Traumatic injuries to young permanent teeth result in pulpal inflammation or necrosis and subsequent incomplete development of dentinal wall and root apices. In such cases, maintaining the proper apical barrier with the three-dimensional seal becomes difficult. Endodontic treatment options for such teeth consist of apexification using root end filling material.[5]

Lemon advocated the use of a matrix when the diameter of the perforation is larger than 1 mm to prevent the extrusion of sealing material. Similarly, colla plug can be used for the predictable placement of MTA in apexification procedures. Use of colla plug provides a base against which the MTA can be packed. Various materials have been advocated to be used as a matrix, for example, calcium sulfate, hydroxyapatite, collagen, platelet-rich fibrin. However, the materials mentioned are either not cost-effective or technique sensitive. The common limitation shared by these materials is that once placed their position can't be adjusted as required.[2]

In MTA plug technique, root canals must be disinfected with temporary calcium hydroxide dressing before placing MTA for 1 week. This is because performing chemomechanical preparation alone is not effective for the complete elimination of microorganisms. Hence, we used calcium hydroxide dressing for 1 week. The clinician should not push MTA to the apical tissues for the treatment to be successful. Using surgical microscope is proposed for an appropriate placement of MTA. In these clinical cases, after calcium hydroxide medication, we placed MTA to the apical parts of the canals with hand plugger under radiographic evaluation.[3]

In our case, obturation was done using thermoplasticized gutta-percha. It helps in achieving a better seal and also prevents compaction forces on the thin dentinal walls, unlike the lateral condensation technique.[5] The clinical examination of these cases confirmed the suitability of this method and our results are similar to other cases where the MTA plug technique was used for the endodontic treatment of nonvital immature teeth with an open apex.[3]

CONCLUSION

During the last 20 years there have been many changes in the rationale governing the treatment of teeth with open apex. It is essential to have thorough understanding of the compatibility of the material, its physiological response, and the histological changes that takes place during and after the use of present available materials Recent material like MTA is a promising material and plays important role in healing and sealing of root canal and thus saving patient from psychological trauma of surgical procedures.

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