Case Report

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Mineral Trioxide Aggregate as an Apical Plug Material in Tooth with Open Apex: A Case Report

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Abstract

The conventional method of apexification with calcium hydroxide has certain disadvantages such as very long period of treatment, tooth fracture and an incomplete calcification of the bridge. Mineral trioxide aggregate (MTA) as an apical sealing material has gained importance as an alternative treatment for open apices. We report a case of complete healing of a periapical abscess after placement of MTA apical plug, after the root canals were debrided and rinsed with sodium hypochlorite. The remaining portion of the root canal was obturated using lateral condensation technique, and a crown was placed. After 6 months of follow-up complete healing of the periapical lesion was noticed this was evident radiologically. This case report suggests that use of MTA as an apical sealing material is a significant alternative to the conventional methods of apexification.

Key words: Apexification, Mineral trioxide aggregate cement, Periapical abscess, Tooth apex

INTRODUCTION

Mineral trioxide aggregate (MTA) has few potential uses in endodontics as a root canal filling material. The other uses of MTA in dentistry are regeneration of periradicular tissues such as bone, cementum, and periodontal ligament.[1] MTA has an excellent sealing ability, the reason for this is the material is a hydraulic cement that sets even in the presence of moisture.[1,2]

The main goal of treatment of teeth with pulpal necrosis is achieving an apical seal. In the past, this apical seal was achieved by creating a barrier with hard tissue, a procedure known as apexification. The major disadvantages of apexification procedure using calcium hydroxide are the thin walls of the root, which may fracture and although the barrier is calcified it is actually porous and may contain a small amount of soft tissue.[3]

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As an alternative to traditional apexification using calcium hydroxide, a number of materials have been proposed in the literature. Among these materials, MTA is most popular for this procedure. MTA is composed of fine hydrophilic particles of tricalcium silicate, silicate oxide, and tricalcium oxide. When mixed with sterile water it forms a colloidal gel and its setting time is 3-4 h in the presence of moisture.[4] MTA has less leakage, better antibacterial properties, high marginal adaptation and short setting time (4 h), a pH of 12.5 and is more biocompatible.[4,5]

Therefore, the present case report highlights the non-surgical management of a non-vital tooth with an open apex associated with a peripapical lesion using MTA apical plug technique.

CASE REPORT

A 16-year-old female patient was referred to the department of endodontics, Mamata Dental College and Hospital with a chief complaint of pain in the upper right front tooth region. The patients dental history revealed that she had suffered a trauma to the right maxillary cental incisior 5 years back, for which she did not undergo any treatment. The right maxillary central incisor was discolored and was tender

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on percussion. On doing the pulp vitality test, there was a negative response to cold, heat and electric pulp testing. On radiographic examination of the associated tooth, a large canal with associated peripaical lesion was noticed in relation to right maxillary central incisor (Figure 1).

Access opening was done, and working length was determined. Pus was extruded from the root canal immediately after the access opening was made. Working length was determined (Figure 2) and biomechanical preparation was then done and canal was debrided using 2.5% sodium hypochlorite and saline.

The canal was dried using paper points, and MTA was placed using MTA carrier in the apical portion of the canal (Figure 3).

Remaining portion of the canal was filled with gutta-percha using lateral condensation technique and crown was placed (Figure 4).

The patient was then followed up for a period of 6 months at an interval of 1 month. The periapical lesion healed slowly and after a period of 6 months complete healing of the lesion was noticed (Figure 5).

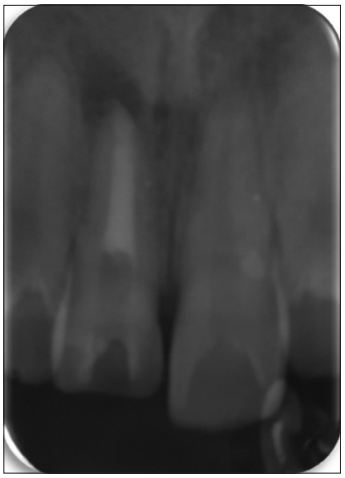

Figure 3: Mineral trioxide aggregate placed in the tooth

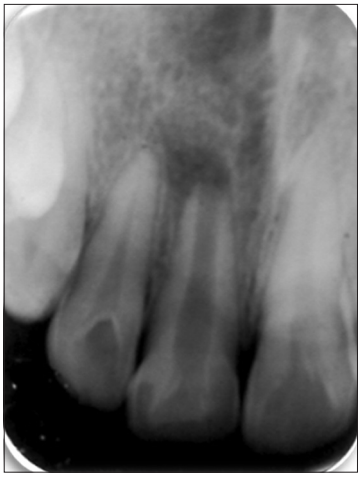

Figure 1: Intra oral periapical radiograph showing periapical lesion in relation to right maxillary central incisor

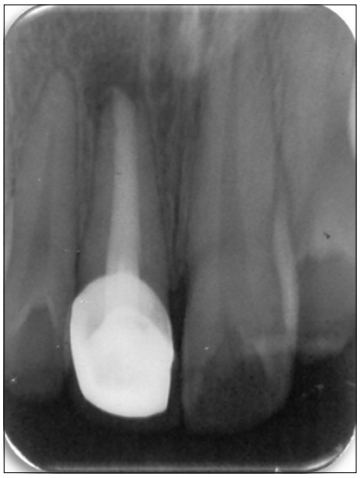

Figure 4: Root canal is obturated and crown placed

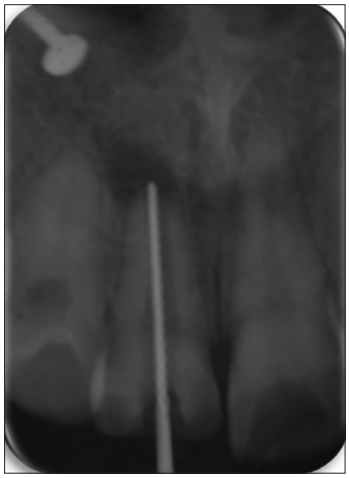

Figure 2: Working length determination

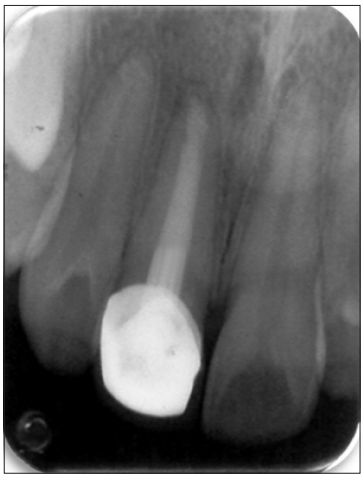

Figure 5: Complete healing of lesion after 6 months

DISCUSSION

The tissues of the periodontium when traumatized due to intrusion, luxation or exfoliation external resorption may occur. Early necrosis of the pulp, incomplete root formation or external resorption of the root due to trauma may result in blunted or shortened root with open apex.[6,7]

Apexification is the process of creating a barrier with hard tissue at the root end. Although, calcium hydroxide was used most commonly for the process of apexification, the time duration is too long ranging from 12 to 24 months.[8] Moreover, the barrier formed by apexification using calcium hydroxide is considered to be incomplete having a swiss cheese appearance and can allow apical microleakage leading to reinfection.[8] To overcome these disadvantages of using calcium hydroxide as apical sealing material, a "one visit apexification" using MTA was introduced.[9]

MTA is one of the most effective materials for sealing both iatrogenic and pathological communication between endodontic and periodontal spaces.[10-12] when used in contact with periradicular tissue, MTA has the ability to induce cementum like hard tissue. The rationale for this is MTA stimulates the production of interleukins and cytokines, thereby promoting hard tissue formation.[4] MTA plug in the apical portion of the root promotes apical repair and prevents root canal overfilling and increases the fracture resistance of immature teeth.[13]

Holland *et al.*[14] have conducted a study on periapical tissue response in dogs after root canal filling with MTA. They noticed biological closure of the apical foramen as well as the absence of the inflammation in the peripaical tissues after placement of MTA. The rationale for this response is due to cell adhesion and differentiation with consequent deposition of hard tissue by periapical tissue, which is in contact with MTA. These results are consistent with the present case, where complete healing of the periapical lesion was noticed in the duration of 6 months with narrowing of the open apex, and no recurrence was noticed thereafter.

Günes and Aydinbelge[4] in their report of cases on MTA apical plug method for treatment of non-vital immature permanent maxillary incisors have noticed radiological and clinical successful healing of the peripapical lesion after 1 year duration. In the present case report, complete healing of the periapical lesion was noticed in the duration of 6 months.

Ajwani and Saini[8] have reported a case of successful treatment of mutilated maxillary central incisor with an open apex using intracanal calcium hydroxide and MTA, followed by fiber post and core. In the present case after placing the MTA apical plug, the subsequent increments were obturated using lateral condensation technique. The present case also produced the similar results with no symptoms thereafter.

Ultrasonic instruments, a messing gun or amalgam carrier, manual pluggers, and K-files have been proposed for delivering the MTA apical plug.[15,16] As extrusion of the root filling material is a common problem in roots with an open apex, operator skills in delivering the material is a determining factor in the outcome of the treatment.

The present case report suggests that MTA apical plug technique permits suitable management of teeth with necrotic pulp, open apex, and periapical lesion.

CONCLUSION

Placement of an apical barrier using MTA is an alternative to conventional long-term calcium hydroxide therapy, which reduces the treatment time. Moreover, MTA apical plug can be considered very effective in stimulating regeneration of apical tissue in immature permanent teeth with open apices.

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