

Endodontic Management of Permanent Maxillary Central Incisor with Open Apex- a Case Report

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Abstract: Teeth with open apices, such as those found in immature teeth, or those with apical root resorption, are clinical cases that have a difficult immediate resolution. The use of mineral trioxide aggregate (MTA) in dentistry allowed for the optimization of treatment time in these cases by allowing for the immediate placement of an apical plug and root canal filling. However, if MTA is extruded beyond the apex, some negative effects may occur. This case report describes one clinical case of apical plug placement in teeth with pulp necrosis and open apices. Due to dental trauma, the tooth had an immature apex. A 4 mm thick MTA apical plug was placed in the apical zone of the root, and the canal was immediately obturated with gutta-percha and endodontic sealer. Clinical and radiographic evidence of success was found in follow-up evaluations.

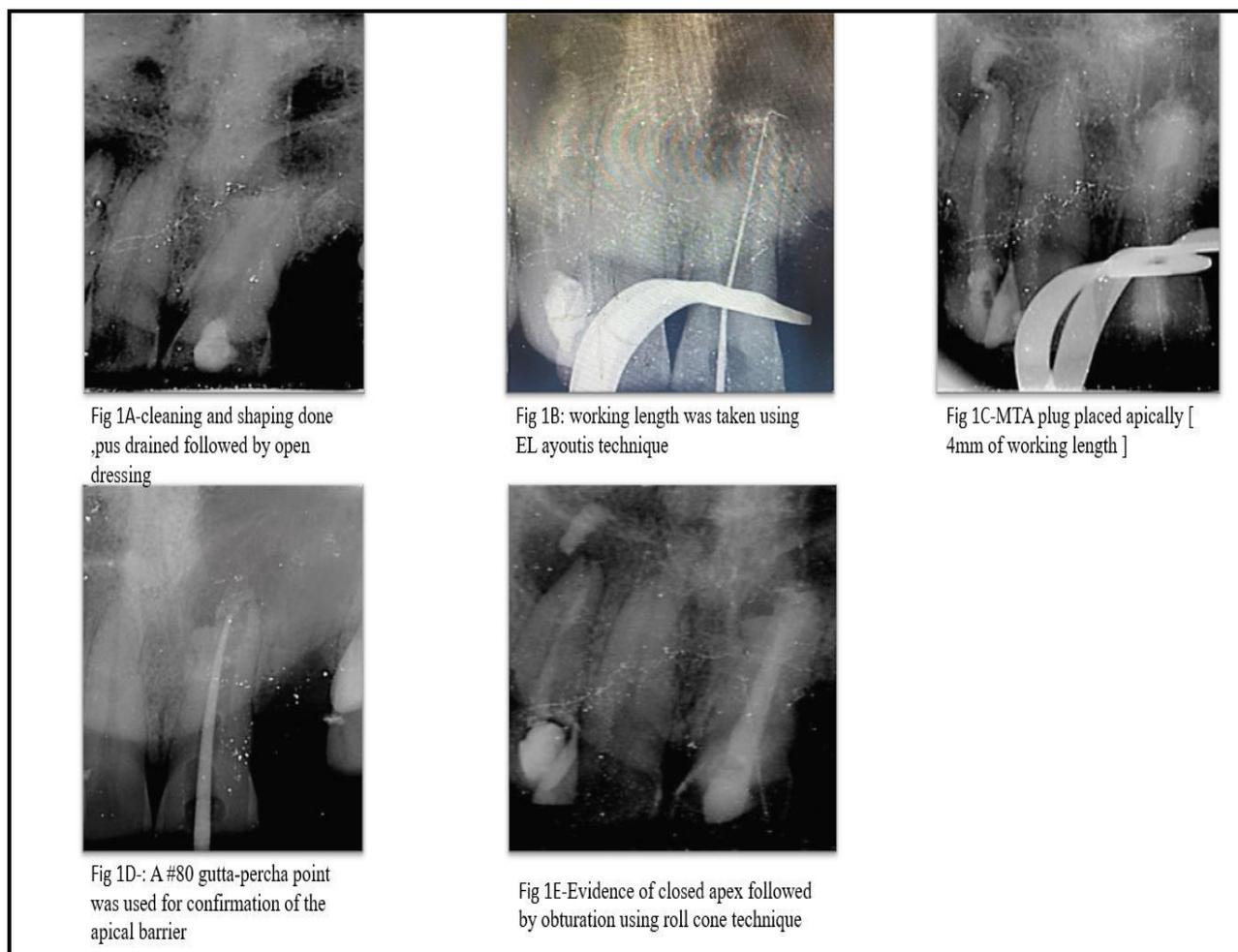
Key Words: Open Apex, Collagen, Endodontics, Mineral Trioxide Aggregate

INTRODUCTION

Open apices complicate root canal treatment because they promote the extravasation of irrigating solution and/or sealer into periradicular tissues, which can impair the apical healing process¹. Immature apices of early-necrotized teeth or inflammatory apical root resorption are the primary etiological factors for this occurrence². As a result, some techniques, such as chemical or thermal adaptation of the gutta-percha in the radicular apical third and/or apexification with long-term intracanal calcium hydroxide dressing, have been recommended to allow safe root canal filling. However, these methods have numerous technical issues and necessitate multiple treatment clinical sessions³. Apical adaptation of gutta-percha with heat or chemical agents such as xylene or chloroform does not provide adequate root canal modelling and leaves gaps between the dentinal wall and gutta-percha. This allows root canal sealer to be extruded beyond the apex and/or apical microbial infiltration⁴. Furthermore, these chemical substances have the potential to be irritating and cytotoxic to periradicular tissue⁵. Although calcium hydroxide intracanal dressing is recommended for treatment of these cases, long-term intracanal use may reduce the resistance of root walls to fracture in the future^{3,6,7}. Other issues include the need for multiple treatment sessions, the risk of root canal contamination caused by microbial coronal leakage, and the possibility of an irregular shape of the apical foramen and a porous apical barrier^{3,8,9}. To treat teeth with open apices quickly and avoid the potential side effects of long-term intracanal calcium hydroxide use, an apical with freeze-dried bone, tricalcium phosphate, dehydrated dentin matrix, or, Calcium silicate-based cements (CSC), such as mineral trioxide aggregate (MTA) and Biodentine, have recently been proposed¹⁰⁻¹⁴. MTA is one of the most recommended CSCs for use as an apical barrier (apical plug) due to its excellent biological and physicochemical properties^{15,16}. However, it has some drawbacks, including due to their long final setting time and inducing an intense local inflammatory reaction if accidentally pushed into the apical periodontal tissues, they have low resistance to solubilization. To avoid these complications, it has been proposed to use an additional apical matrix with collagen membrane prior to the placement of the apical barrier with MTA^{13,14}. Therefore, this report presents open apex teeth with lesion treated with calcium hydroxide and MTA apical barrier prior to root canal filling

Case Report

A 34-year-old, male patient requested dental treatment of the maxillary left central incisor, two years after dental trauma due to car accident, resulted in non-vital discolored tooth. The tooth had initially received coronal access, there was an evidence of pus discharge. The type of open apices was blunderbuss Xray was taken and it reveals presence of periapical lesion with open apices in relation to maxillary left central incisor [Figure 1A] Root canal irrigation was performed with 10 mL of saline, and as a final irrigation protocol, the root canal was flushed with 5 mL of 17% EDTA for 3 min and finished with 10 mL of 3% sodium hypochlorite gel and 10 mL of saline, which was later aspirated and dried with absorbent paper points. Patient sent with open dressing. In sequence of 24 hours, calcium hydroxide intracanal dressing was maintained, for 72 h Two weeks later patient arrived at hospital. Healing of lesion was evident. Working length was taken using El ayoutis technique.[Figure 1B] After this period, a new sequence of irrigation was performed with 5 mL of 17% EDTA, 10 mL of 3% sodium hypochlorite gel and 10 mL of saline. MTA was mixed according to the manufacturer instructions and apical barrier was placed, in approximately 4 mm thickness in the apical third of the root canal with a special device for inserting material. A new radiography was taken to verify the homogeneity of the apical plug [Figure 1C] A #80 gutta-percha point was used for confirmation of the apical barrier [Figure 1D] The root canal was filled with gutta-percha points and zinc oxide-based sealer, by lateral condensation technique. The coronal access was provisionally restored with glass ionomer. The patient was instructed to follow the restorative procedures. [Figure 1E] After 1 month, a new clinical and radiographic control was performed. There were no clinical signs of abnormality in the alveolar mucosa, and the treated tooth showed no sensitivity in vertical and or horizontal percussion. The radiographic assessment indicated local anatomical normality and total regression of the initial radiolucent lesion.



DISCUSSION

In the cases presented, the use of MTA as an apical barrier allowed the treatment of open apex teeth in a single treatment session, reducing the risk of root canal contamination and/or radicular fracture and maximising endodontic treatment time^{7,8,18,19}. Despite the fact that the MTA cement's satisfactory physicochemical and biological properties are well-known². Thus, the use of an apical barrier made of a biocompatible material prior to MTA placement is an intriguing treatment strategy for preventing material extrusion beyond the radicular apex^{13,14}. Because of its excellent biological properties and resorbability, the collagen membrane is used in periodontal guided tissue regeneration²⁰. Nonetheless, among the main disadvantages of collagen membranes are the amount to be used, the material cost, and the difficulty of handling. MTA cement has osteogenic activity and is well tolerated by bone tissue^{21,22,23}. MTA cement allows the root canal filling in single session, with safety and non-invasive procedures

CONCLUSION

This case report demonstrated that treatment of open-apex in maxillary central incisor with an apical matrix- MTA apical plug that was condensed to create an artificial barrier at the apex of the tooth (apexification) which resulted in a favorable prognosis.

CONFLICT OF INTEREST

Conflict of interest declared none.

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