



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

International Journal of Current Research  
Vol. 10, Issue, 11, pp.75089-75092, November, 2018

DOI: <https://doi.org/10.24941/ijcr.32831.11.2018>

INTERNATIONAL JOURNAL  
OF CURRENT RESEARCH

## RESEARCH ARTICLE

### ENDODONTIC MANAGEMENT OF TOOTH WITH OPEN APEX – A CASE REPORT

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#### ARTICLE INFO

##### Article History:

Received 20<sup>th</sup> August, 2018

Received in revised form

07<sup>th</sup> September, 2018

Accepted 21<sup>st</sup> October, 2018

Published online 29<sup>th</sup> November, 2018

##### Key Words:

Distraction, Discrepancies, Osteotomies

#### ABSTRACT

MTA appears to be a valid option for apexification with its main advantage being, the speed at which the treatment can be completed. A major problem in performing endodontics in immature teeth with necrotic pulp and wide open apices is obtaining an optimal seal of the root-canal system. Mineral Trioxide Aggregate (MTA), has been proposed as a potential material to create an apical plug at the end of the root-canal system, thus preventing the extrusion of filling materials.

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**Citation:** Dr. Aditya Shinde, Dr. Trupti Naykodi, Dr. Lalita Gauri Mandke and Dr. Dhanashree Ingle. 2018. "Endodontic management of tooth with open apex – A case report.", *International Journal of Current Research*, 10, (11), 75089-75092.

## INTRODUCTION

The maxillary anterior teeth tend to undergo many impact injuries because of its position in the jaw. The apical 3-4 mm is most significant in endodontic practice. When the enamel and dentin reaches the cemento-enamel junction, there is formation of cervical loop from where the root development starts (1). At the time of tooth eruption, root development is only 62-80% i.e. 2/3rd of the root is formed. If due to trauma or caries exposure occurs, the pulp undergoes necrosis, dentin formation ceases and root growth is arrested (2). Thorough disinfection of the root canal with proper hermetic seal is important for the success of endodontics. In case of a blunderbuss, canal maintaining the proper apical barrier with the three dimensional seal becomes difficult (3). Calcium hydroxide was the material of choice to induce hard tissue formation at the apical end before placing the obturating material. However, calcium hydroxide shows certain limitations like the length of time needed to form apical barrier, the number of dressings needed for complete closure of apex, the role of infection

caused in the canal in between the appointments and the fracture resistance of the tooth (4). Mineral trioxide aggregate (MTA) was developed by Mahmoud Torabinejad at Loma Linda University in the year 1993 as root end filling material. MTA has the advantage over calcium hydroxide that it can be done in a single visit procedure (5).

**Case #1:** A 28 years female reported to the department complain of recurring intraoral swelling in relation to the upper front region since a few months. Patient gave history of trauma in the upper anterior region approximately 20 years back with recurring intraoral swelling in relation to the same. On examination, Discolouration was observed with relation to 11 with grade I mobility present. Pulp vitality test was performed in relation to 11,12,21,22 where in 11 showed no response. On radiographic examination there was presence of an open apex with a well-defined periapical radiolucency in relation to 11. Access opening was performed, followed by determination of working length using a #80 K file. Cleaning and shaping of the canal was done with #80 K file using circumferential filing technique. The preparation was performed very lightly (owing to the thin dentinal walls) along with copious irrigation using saline. The canal was dried using paper points, and a calcium hydroxide intracanal medicament was placed followed by a closed dressing.

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Figure 1. Pre-operative Image



Figure 2. Pre-operative RVG

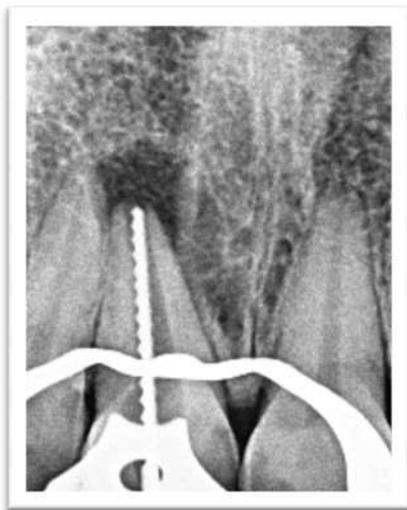


Figure 3. Working Length



Figure 4. MTA plug



Figure 5. Obturation



Figure 6. Follow up RVG after 6 months

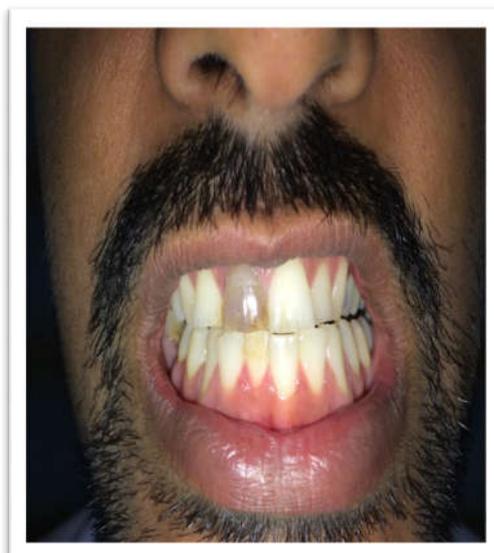


Figure 7. Intraoral image



Figure 8. Pre-operative RVG

The patient was recalled after 2 weeks. The intracanal dressing was removed, followed by thorough irrigation with saline. The canal was dried using paper points and cotton. Canal was dry, there was no drainage from the canal. MTA was used to form an apical seal. ProRoot MTA powder and liquid was dispensed on a mixing pad and manipulated using a spatula. The mix was carried into the canal using the butt end of #80 gutta percha point and condensed using hand pluggers, MTA apical plug of 4mm was confirmed on the RVG. The walls of the canal were cleaned to remove any excess MTA present, a moist cotton pellet was placed and the access cavity was sealed with temporary cement. In the next seating, a customized master cone was made using the roll cone technique and obturation was performed by the cold lateral condensation technique. The access cavity was sealed with temporary cement. In the 3 month follow-up, considerable periapical healing was seen.

**Case #2:** A 31 years old male patient reported to the department with chief complaint of pain in upper front region since a 4 months. Patient gave history of trauma of upper anterior region. On Examination: #11 – Discolored tooth ,pulp vitality test was negative. #11 – sensitive to percussion and palpation and failed to respond on thermal pulp testing. #11 and #13 was vital on thermal pulp testing.

On radiographic examination there was a resence of open apex with 21 and well defined peiapical radiolucency in relation to 12 and 11. Access opening was performed, followed by determination of working length using a #50 K file for 11 . Cleaning and shaping of the canal was done with #80 H file using circumferential filing technique for 11..The canal was dried using paper points, and a calcium hydroxide intracanal medicament was placed followed by a closed dressing.. After 1 weeks the canal was dry, patient was asymptomatic. The intracanal dressing was removed, followed with thorough irrigation with saline (11). MTA was used to form an apical seal in relation to 11.

Moist cotton kept at the orifice with close dressing. ProRoot MTA powder and liquid was dispensed on a mixing pad and manipulated using a spatula. The mix was carried into the canal using the butt end of #80 gutta percha point and condensed using hand pluggers, MTA apical plug of 4.5mm was confirmed on the RVG. Moist cotton plug placed at the orifice of 11. Patient was recalled after 2 days for the obturation. For #11 Obturation was performed 2 days after placement of MTA apical plug with thermal obturation (back flow technique). The access cavity was sealed with temporary cement. Patient was recalled after 3 months for follow up.



Figure 6. Working length



Figure 7. MTA plug



Figure 8. Obturation



Figure 9. Follow up RVG after 3 months

## DISCUSSION

The success in endodontics is dependent on obtaining a perfect seal at the apical portion. The endodontic treatment of nonvital immature anterior teeth after trauma remains complicated because of necrotic pulp tissue, large open apices, divergent root walls, thin dentinal walls, and frequent periapical lesion. The main aim of root end material is to seal the apical portion of the canal and to obtain hermetic seal between periodontium and the root canal system (6). The apical closure helps to compact the obturating material into the canal promising for one visit apexification. MTA as an apexification material forms a seal between the material and the tooth. During the maturation of MTA, there is formation of an appetite like interfacial which fills in the gap formed during the shrinkage phase and improves the fracture resistance of the root canal walls (6). MTA has an alkaline pH exhibit superior biocompatibility and cytotoxicity. MTA provides a favorable environment for the cementum deposition because of the presence of calcium and phosphorus ion which induces osteoblastic or cementoblastic activity and provides favorable environment for cementum deposition.

This novel procedure reduces the treatment time. Importance of this approach lies in thorough cleaning of root canal followed by apical seal with material that favors regeneration (6)

## Conclusion

The physical and biological properties of MTA, associated with appropriate instrumentation and obturation techniques, make this material an excellent option in the endodontic therapy of immature permanent teeth.

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