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Management of Anterior Tooth with Open Apex Using MTA – A Case Report

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Abstract:*Management of tooth with open apex poses a special challenge and requires a special treatment plan to manage the situation. This case report presents theclinical procedure used to produce a hard barrier using MTA in the open apex followed by three dimensional fluid tight obturation both apically and coronally. This paper also presents the advantages of using MTA over the traditional use of calcium hydroxide to manage the open apex cases.*

Key Word:*Management, Anterior tooth, Open apex, MTA, Case report.*

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I. Introduction

Root canal treatment of tooth is one of the most effective, less invasive treatment modality when both radicular and coronal pulp is involved.Essential steps in root canal treatment include cleaning, shaping and 3-D obturation of root canal systems. But sometimes these steps become challenging when root canal treatment is needed in a case of immature tooth with open apex. This group of patients with an immature open apex requires a specially tailored treatment plan, different from other patients and commonly endodontic treatment is completed after induction of apical closure by apexification procedures, often requiring much more time to complete depending on degree of apical maturity.

This longer time frame of treatment not only decreases the predictability of treatment outcome but also decreases the acceptability of treatment by the patients. Now a day's another treatment option becoming popular day by day is the formation of apical plug by MTA followed by obturation of the remaining root canal space. This treatment option can be completed within short period of time with greater outcome and good patient acceptance.

MTA is a powder composed of thin hydrophilic particles that agglutinates in the presence of humidity, forming a colloidal gel on setting[1] with a pH of 12.5, low compressive strength, low solubility, greater radio opacity than dentine.[2, 3,4]

MTA induces the apical closure withoutpromoting an inflammatory reaction.[5, 6]and also fasten the endodontic procedures.[7]

This case report emphasizes management of non-vital tooth with open apex and without radiographic periapical lesion using MTA.

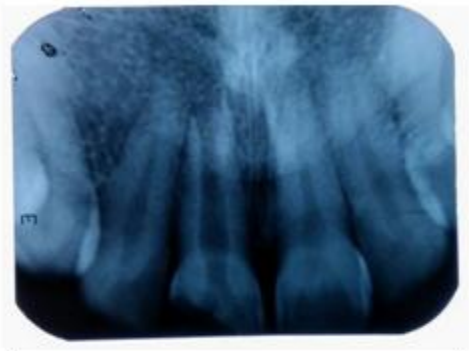
II. Case Report

A 32 year old male patient reported in the Department of Dentistry, SSKM IPGME&R Hospital,Kolkata,India with complain of discoloration of one anterior tooth and feeling of pain during eating with occasional foul smell in the upper anterior region. History revealed that he experienced trauma in anterior maxillary region 17 years back and one anterior tooth gradually discolored but left untreated.

Clinical Examination revealed discolored fractured upper left central incisor without any other symptomsand patient had no significant past medical history.

PRE-OPERATIVE CLINICAL IMAGE

Radiographic Examination revealed fractures of crown involved the pulp chamber andopen apex of root without any periapical radiolucency.



PRE-OPERATIVE RADIOGRAPH

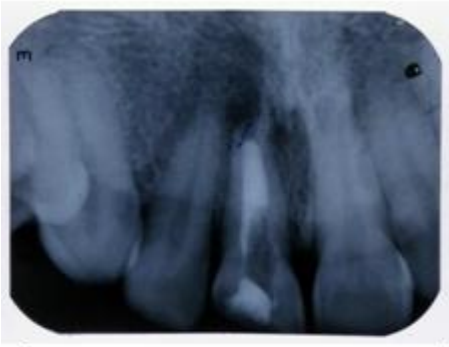
III. Management

On the 1st day the affected tooth wasisolated by cotton as patient was allergic to latex, then access cavity was prepared by round (No. 2) and tapered fissure diamond abrasive point.Approximate working length was estimated from radiograph and superficial filing was done by 100 k file. Canal was irrigated copiously by normal saline &chlorohexidine2% solution respectively and closed dressing given. Patient was prescribed oral medications and discharged.

WORKING LENGTH RADIOGRAPH

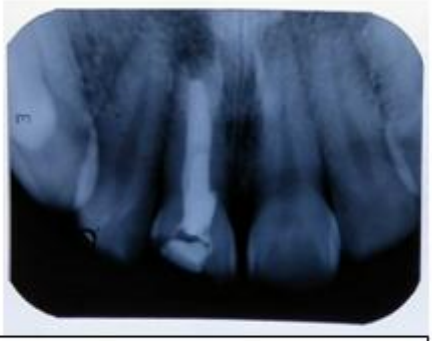
Patient was recalled after one week, working length was establishedradiographically (20mm#140 k file), root canal was irrigated again and closed dressing with water soluble calcium hydroxide within root canal was given. Patient was discharged with advice of further continuation of medication for another 5 days.

After 2 weeks, patient was recalled, canal was filed again, irrigated with chlorhexidine 2% solution, dried and apical 5mm region was filled with MTA. Subsequently rest of the canal was given a moist cotton plug and the access was sealed with temporary restorative material.



RADIOGRAPH OF MTA PLUG

The next day remaining part of the root canal was obturated using custom madeguttapercha,where 6 guttapercha points of size F2 were warmed together and made into one thick custom made guttapercha then it was inserted within root canal to check the conformation and root canal was obturatedwith guttapercha based sealer (Guttaflow 2, Coltenewhaledent).

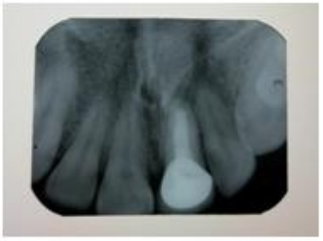


POST-OBTURATION RADIOGRAPH

After that both restoration of access cavity and core build up were done by light cure composite resin restorative material. Followed by tooth preparation was done for full coverage crown and impression was made.After 2 days porcelain fused to metal crown was cemented by Type 1 glass ionomer cement and patient was instructed for regular post procedural check-up.

IMAGE AFTER CROWN PREPARATION

AFTER COMPLETE REHABILITATION



IMMEDIATE POST-OPERATIVE

Patient was recalled after 2wks,3 months and 6 months respectively with IOPA radiograph. Radiographs revealed no pathological changes during that period.

POST OPERATIVE RADIOGRAPH-2 WEEKS

POST OPERATIVE RADIOGRAPH-3 MONTHS

POST OPERATIVE RADIORAPH-6MONTHS

IV. Discussion

Historically, when a dental pulp had undergone demise before full root formation, an apexification procedure was indicated and still it is the treatment of choice.[8]

Apexification is performed when there is clinical and radiographic evidence of pulp necrosis and the root, incompletely formed, has an apical diameter larger than the coronary diameter of the Canal.[9]

The traditional apexification procedure requires complete canal cleaning, shaping, removal of smear layer, and disinfection before the placement ofcalcium hydroxide (Ca[OH]2) to promote the formation of osteocementum or apical bridge formation. This technique is often referred to as the *Frank technique*.[10]The calcium hydroxide kills bacteria, dissolves tissue, and creates an environment conducive to hard-tissue formation.[11,12,13]and the material is to be changed in every 3 months, withintervals as long as 12 months. This later stages required to enhance the tissue response.[14]

The mean time to barrier formation in incisor teeth has been shown to be 34.2 weeks (range 13 to67 weeks),[15]but data on posterior teeth is unavailable. Recently this technique of changing the Ca(OH)2 has beenshown to be counterproductive to the formation of hard tissue, although it did seem to lessen inflammatory response.[16]The Ca(OH)2 apexification treatment requires compliance from the patient and many appointments over a period of time ranging from 3 to 24 months.[17]

So that this procedure having disadvantages like longer duration of the procedure and calcium hydroxide induced alteration of dentinal properties asitsintracanal presence over a long period may weaken the dentin.[18,19,20, 21,22]The fracture strength of immature teeth may be reduced by long-term calcium hydroxide treatment.[23]

But MTA shows difference from standard calcium hydroxide therapy for immature, non-vital, permanent teeth that have been traumatized and which require pulp therapy. Although MTA and calcium hydroxide both exhibit similar alkaline pH levels, MTA also shows excellent marginal adaptability and it is non-resorbable.[24]

MTA is highly biocompatible. It has cementogenic, dentinogenic and osteogenic potential. Moisture and blood contamination do not affect the sealing ability.[25]MTA has got a very good sealing ability, asthe material immediately bonds with the rootwall and creates a mono block. Its high PH.helps to destroy the surroundingmicroorganisms and its bio active in naturestimulates blastic cells to create favorableenvironment for healing.[26, 27,28]It alsopromotes cementum deposition on it.[29]

Moreover, due to its fast setting time, fewer follow-up appointments are required to carryout this treatment.Not only the selection of material, but alsothe thickness of apical MTA barrier hasplayed a key role in clinical success.[30]A 5mmthick apical MTA barrier has proven to besignificantly stronger with lesser leakagethan a 2 mm thick barrier.[31]These important physical and biological characteristics of MTA not only decrease the duration of treatment but also increase the success rate.

V. Conclusion

Management of open apex cases by biocompatible and bio-active material like MTA is a convenient approach and gaining popularity now a day. The better clinical results in lesser time can be achieved by using MTA than calcium hydroxide incase of treatment of tooth with open apex.

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