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CASE REPORT

SINGLE VISIT APEXIFICATION WITH MTA- REPORT OF TWO CASES

Bonny Paul*, Kavita Dube, Abhishek Sharma, Abhilash Shankaran

Department of Conservative Dentistry and Endodontics, Hitkarini Dental College, Jabalpur

Corresponding Author: Dr Bonny paul, Hitkarini Dental College, Dumna Road, Jabalpur

Abstract

Objective: The objective of this paper is to report a case of single visit apexification with MTA and review the literature. Introduction: The aim of endodontic treatment is to seal a sizeable communication between the root canal system and the periradicular tissue and provide a barrier against which obturation material can be compacted. Trauma to an immature permanent tooth may result in cessation of root development and compromised apical closure requiring the use of alternative treatment protocols. Methodology: This article describes endodontic treatment of two cases with open apices. The use of MTA to create an apical barrier has been demonstrated.

Conclusion : The traditional apexification procedure consists of applying calcium hydroxide as an intracanal medication to induce an apical closure over a period of time, having several disadvantages such as variability of treatment time , difficulty of the patients recall management, delay in the treatment and increase in the risk of tooth fracture. The use of MTA represents a contemporary version of apexification, simplifying the procedure and restricting it to a single appointment.

Key words : Mineral trioxide aggregate ; MTA; apexification; single visit.

INTRODUCTION

Dental injuries are very common in children and adolescents. In general, these injuries take place before root formation is complete and may result in the inflammation or necrosis of the pulp tissue[1]. Loss of vital pulp in immature permanent teeth may result in cessation of root development and compromised apical closure[2]. Consequently the canal remains large with thin and fragile walls and the apex remains open. As root canal filling techniques require an apical constriction against which an obturating material can be placed, it is essential to create an artificial barrier or induce closure of apical foramen with calcified tissue[2,3]. The traditional apexification procedure consists of applying calcium hydroxide as an intracanal medication to induce an apical closure over a period of time[3]. Despite its efficacy , this dressing has several disadvantages, such as variability of treatment time, number of appointments and radiographs, difficulty in patient follow up, delayed treatment , reinfection[4] and possibility of increased tooth fracture[5,6] after calcium hydroxide use for an extended period.

A variety of artificial apical barrier materials have been suggested as an alternative to traditional calcium hydroxide apexification[7-10]. However among these, MTA is shown to be the most promising and most popular biomaterial owing to its several advantages comprising of single

visit placement[11], biocompatibility[12], excellent sealing properties[13] and low solubility[14]. The ability to set in presence of blood has favoured placement of MTA apical barrier adjacent to periapical tissue[15].

MTA has been used for a variety of clinical applications like pulp capping[16,17,18] , pulpotomy[19,20] , root end filling in immature permanent teeth, obturation of canal, repair of perforation and also to obtain coronal seal before bleaching.

This article describes endodontic treatment of two cases with open apices. The use of MTA to create an apical barrier has been demonstrated.

CASE REPORTS

Case 1:

A nine year old boy with a non contributory medical history reported to the Department of Conservative Dentistry & Endodontics, Hitkarini dental college and hospital, Jabalpur with pain in his upper left central incisor. Clinical examination revealed a fractured upper left central incisor. Radiographic examination revealed a poorly obturated canal with a periapical radiolucency and a wide open apex.(Fig 1) The coronal restoration was dislodged and the tooth was tender to vertical percussion. Dental history revealed that the patient had a fall one year back , fractured his tooth and underwent endodontic treatment elsewhere for the same. Medication was prescribed and it was decided to carry out endodontic retreatment of the same tooth. After isolating the tooth with a rubber dam the old obturation material was removed using Hedstrom files (Maillifer Dentsply). The canal length (Fig 2) was confirmed radiographically as the apex locator gave inconsistent readings. This measurement was verified by visualising the wet-dry line on a blunt paper point.The canal was instrumented with K flexo files (Maillifer Dentsply) and irrigated with saline and 2% chlorhexidine solution. An intracanal dressing of calcium hydroxide (Vitapex) was placed and the canal orifice was sealed with a temporary dressing (Cavit).

After two weeks the dressing was removed and it was decided to place an apical plug of MTA (Pro root MTA). MTA was mixed as per manufacturer's instruction and later on carried to the apical area using a carrier (fig 3). The MTA was condensed using the butt end of a 6% 30 no gutta percha cone (dentsply). After confirming the placement of MTA using a radiograph, the blunt end of a large paper point was moistened with water and left in the canal to promote setting (Fig 4). The dressing was removed after 2 days and the hardness of set MTA was checked. As the tooth was asymptomatic it was decided to carry out obturation. The canal width being very large, a rolled cone was prepared and a radiograph taken to confirm the fit. After drying the canal with paper points, the canal walls were coated with AH PLUS (Dentsply) sealer and subsequently the sealer coated master cone was placed in the canal. Subsequently accessory cones were placed using lateral condensation technique. A temporary dressing was given and a radiograph was taken to evaluate the obturation (Fig 5). After a week the patient was recalled back and a permanent restoration was given. Recall radiograph was recorded at 12 months post – op, which showed satisfactory healing (Fig 6).

Fig 1- PREOP RADIOGRAPH

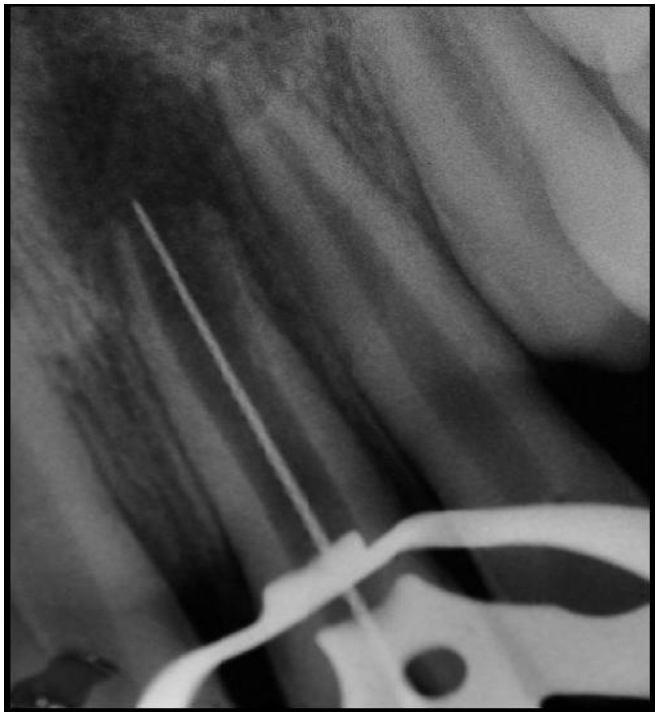

fIG 2- Working length radiograph

Fig 3- MTA CARRIER

Fig 4 - MTA placement

Fig 5- post operative radiograph

fig 6 - 12 months follow up

Case 2: A 12 years male patient, reported with chief complaint of pus discharge in mandibular right posterior region since 2 months. Clinical examination revealed discolored mandibular right second premolar (Fig 7). Tooth showed no response to vitality tests. No contributory history was elicited from the patient. Radiographic examination revealed a large canal with an open apex and an apical radiolucency. (Fig 8) Access was prepared under rubber dam isolation followed by working length determination. The canal was instrumented with # 60 k file (Maillifer Dentsply) and irrigated with saline and 2% chlorhexidine solution. An intracanal dressing of calcium hydroxide (Vitapex) was placed and the canal orifice was sealed with a temporary dressing (Cavit). After two weeks the dressing was removed,the canal was dry. An apical plug of MTA was placed as described above. In subsequent appointment root canal was back filled with thermoplasticized gutta-percha (E &Q plus) (Fig 9).

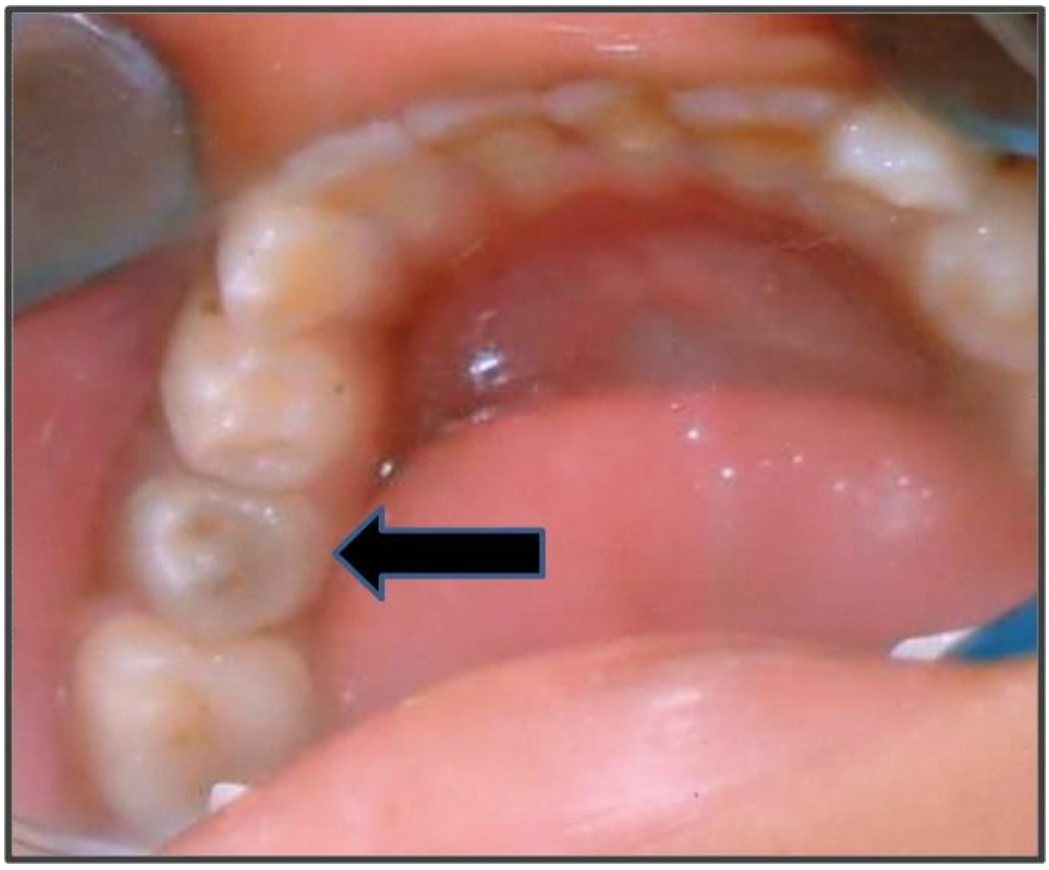

fig 7- Pre op photograph

Fig 8- preop radiograph

Fig 9-post op radiograph

DISCUSSION

The completion of root development and closure of the apex occurs upto three years after eruption of the tooth. Pulpal injury during this period poses a serious problem for the clinician. Previously techniques for management of open apex in non vital teeth were confined to obturation with custom made gutta percha cones and later on apical surgery or apexification with calcium hydroxide. However each has its own shortcomings. Single visit apexification using MTA has been proposed as an alternative to the long term calcium hydroxide in the above situation which enables immediate obturation of the root canal.

Coviello and Brilliant[7] evaluated clinical healing in single visit cases in which gutta percha was condensed against immediately placed barriers of tricalcium phosphate and calcium hydroxide. Their results were compared to multi visit calcium hydroxide apexification. After 9 months all treatment techniques were effective and showed equal clinical success. In an investigation on dog's teeth with immature apexes, Shabahang et al[21] induced periapical lesions and used osteogenic protein-1, MTA, or calcium hydroxide as apical barrriers. The teeth in the MTA group showed a higher incidence of apical closure and fewer inflammatory cells than other groups. Ham et al[22] used MTA or calcium hydroxide as root canal filling materials in an experiment on monkey's teeth with infected root canals and open apices. Their findings revealed that root canals filled MTA had the highest amount of hard tissue formation and the lowest level of inflammation after 90 days. Felippe et al[23] evaluated the influence of MTA on apexification and periapical healing of teeth in dogs with incomplete root formation and previously contaminated canals and to verify the necessity of employing calcium hydroxide paste before using MTA. Their results showed no significant differences in the formation of apical tissue barrier, bone and root resorption, and the presence of micro-organisms between the groups. In addition their findings determine that placing MTA without CH pre-treatment results in more complete apical barrier formation. Pradhan et al[24] in a comparative study on permanent maxillary incisors with CH or MTA assessed the formation of biologic apical barrier and demonstrated that the mean time for CH to form a hard tissue barrier is significantly longer than the time required for GMTA to induce a similar barrier. Another investigation[25] compared WMTA with CH for treatment of teeth with immature roots and observed them for twelve months. None of the WMTA cases exhibited signs of clinical or radiographic failure whereas two of fifteen teeth in the CH group had tenderness to percussion and persistent periapical inflammation. Pace et al[26] reported successful outcomes in 10 out of 11 teeth with necrotic pulps and open apexes after application of GMTA as an apical barrier after 24 months. In a prospective radiographic examination of 43 teeth with necrotic pulps and open apices, Simon et al[27] used either WMTA or GMTA as apical barriers and reported 81 % success for these cases. Sarris et al[28] used MTA as an apical plug in 17 incisors and followed them for a mean time of 12.53 ± 2.94 months . Of these 94.1% were assessed as being successful clinically, whereas 76.5% were reported to be successful radiographically. In two review articles Huang[29,30] advocated the use of MTA for pulp regenerative procedures. Clinical reports showed encouraging results after treatment of teeth with necrotic pulp and open apices by using this method for pulp regeneration. Villa et al[31] in their study suggested MTA for apexification

because it provides an adequate seal in the root canal and it appears to offer a biological active substrate that stimulates periodontal cell production.

CONCLUSION

It is necessary to offer our patients the best treatment solutions in complicated situations like tooth injuries. Calcium hydroxide has a high rate of success in immature permanent teeth, however it has its own short comings. The use of MTA represents a contemporary version of apexification, simplifying the procedure and restricting it to a single appointment.

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