NON SURGICAL ENDODONTIC RETREATMENT OF MAXILLARY CENTRAL INCISOR HAVING BLUNDERBUSS APEX WITH MINERAL TRIOXIDE AGGREGATE (MTA).

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ABSTRACT

The teeth with immature apices pose a problem during obturation of root canal system. This article presents a case report of failed endodontic treatment in maxillary central incisor with open apex. The obturating material was removed from root canal system, root canal was cleaned, shaped and packed with calcium hydroxide and left for one week. In the second visit, root canal system was thoroughly irrigated with sodium hypochlorite and a 3-4 mm of MTA plug was placed at the apical terminus. The root canal system was sealed with thermoplasticized guttapercha. The access cavity was restored with coronal radicular composite restoration. Six months follow up demonstrated clinically asymptomatic and adequately functional tooth with radiographic signs of healing.

KEYWORDS : Apexification, MTA, blunderbuss apex.

INTRODUCTION

Most common causes of endodontic failures are inadequate cleaning and shaping and incomplete obturation[1]. Teeth with incompletely formed apices pose problems during obturation of root canals due to wide open apical foramina. Attention should be focused on maintenance of vitality in these teeth so that as much root length and dentin formation as possible can occur in the root. Vital pulp therapy techniques like pulp capping and pulpotomy have proved to be successful, since they aided by the tremendous blood supply present within the open apex. Determination of the extent of apical closure is many times more difficult to ascertain. Radiographic interpretation of apical closure is often misleading since dental radiograph is a two dimensional picture of a three dimensional object[2].

The use of calcium hydroxide for the apexification in the pulpless tooth was first reported by Kaiser and it was popularized by the work of Frank[3]. The calcium hydroxide can be used alone or it can be mixed with CMCP, metacresyl acetate, Cresanol (i.e. a mixture of CMCP and metacrsyl acetate), physiologic saline, Ringer's solution, distilled water and anesthetic solution. The canal would ideally be completely filled with the paste but not overfilled. The usual time required to achieve apexification is 6 to 24 months (average 1 year +/- 7 months[3]).

In the year 1975 Roberts and Brilliant reported the use of tricalcium phosphate as an apical barrier. The material was packed into the apical 2mm of the canal against which guttapercha was condensed (one appointment technique[4]).

MTA has been advocated as a material to serve as an apical barrier for root end induction. In the MTA apical barrier technique, a 3 – 4 mm plug of MTA is packed into the apical end of the canal. The canal is then obturated with guttapercha after a period of 4-6 hours[5]. Advantages are MTA favors apexification and periapical healing regardless of the prior use of calcium hydroxide paste. Other advantages are predictable apical closure, reduced treatment time and number of appointments and also radiographs.

Case report

A 24 year old male patient reported to the dental office with a complaint of swelling in relation to upper front tooth. He gave a history of previous root canal treatment in relation to maxillary central incisor two years ago. Detailed patient's history revealed childhood trauma to the upper front teeth. Vitality tests were performed to evaluate the pulpal status of adjacent teeth. Both the adjacent teeth responded normally to the cold stimulus and electric pulp tester. Radiographic examination revealed an immature root apex in relation to #21 with inadequately sealed root canal (Figure 1).

Retreatment of #21 was planned using MTA as apical barrier. After application of rubber dam, glass

ionomer restoration was removed from the access cavity and guttapercha was removed from the root canal using 'file braided technique' (Figure 2). Working length for the root canal was determined (Figure 3). The canal was cleaned, shaped and root canal was sealed with a fresh mix of $Ca(OH)_2$ cement. The access cavity was temporarily sealed with reinforced Zinc Oxide Eugenol cement.

The patient was recalled after one week. The seal of the access cavity restoration was intact. There was no percussion tenderness. The access cavity restoration was removed and the canal was irrigated with Sodium hypochlorite. MTA (ProRoot, Dentsply, Tulsa, OK) was mixed to a paste consistency according to manufacturer's recommendations, and packed into the apical third of the root canal with the help of MTA carrier (Messing Gun- Produits Dentaires, Vevey, Switzerland) (Figure 4). A moist cotton pellet was placed in the root canal to hasten the setting reaction of MTA and sealed with reinforced Zinc Oxide Eugenol cement.

The patient was recalled after 6 hours and the remainder of the canal was sealed with thermoplasticised guttapercha(Figure 5). Patient was recalled after 1 week and the access preparation was sealed with coronal radicular composite restoration (Figure 6). Four months follow up radiograph revealed partially healed periapical lesion. The tooth was asymptomatic and clinically functional.

Discussion

Endodontic management of the pulpless, permanent tooth with a wide, open blunderbuss apex has long presented a challenge to dentistry. The treatment options used to be surgical approach, apical closure technique and apical barrier technique. Thermal tests are more reliable for ascertaining vitality in immature pulpless teeth than radiographic methods and electric pulp vitality tests. The presence of acute or chronic pain, percussion sensitivity, mobility and discoloration of the crown should be considered in the diagnosis. 'Watch and wait approach' should be followed in case of doubtful cases of pulp exposure. The main challenge in performing root canal treatment in teeth with necrotic pulps and wide-open apices is to obtain an optimal apical seal. The wide foramen requires a large volume of filling material that may extrude from the root canal into the periapical tissues creating foreign-body responses and compromising the apical seal[2].

The reduction of contaminants within the canal by instrumentation and medication and reduction of the canal space with a temporary resorbable paste were more important than the actual dressing material used. The importance of apical seal was emphasized more than development of an apical barrier for obtaining a satisfactory result. A prospective clinical study showed a success rate of 100% for calcium hydroxide apexification, the mean time necessary for the formation of an apical barrier being 12.19 months[6]. Disadvantages are longer duration of the procedure and altered properties of dentin. 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[3]. The fracture strength of immature teeth may be reduced by long-term calcium hydroxide treatment[7].

A one-appointment procedure for obturating permanent teeth with nonvital pulps and open apices was evaluated clinically. During nine months of observation, the one-appointment treatment using tricalcium phosphate or calcium hydroxide as a substitute apical barrier was as effective as the conventional multi-appointment technique that seeks a natural apical barrier[8].

To avoid the risk of fracture, a technique of one visit apexification was proposed in which an apical plug of MTA was placed in the last 5mm of the canal[9]. Apexification in one visit by placing an apical plug of MTA is a predictable and reproducible clinical procedure[10]. Mineral trioxide aggregate is widely used in procedures ranging from pulp capping to furcal perforation repair[11]. MTA consists of 50–75% (wt) calcium oxide and 15–25% silicon dioxide. These two components together comprise 70–95% of the cement. When these raw materials are blended they produce tricalcium silicate, dicalcium silicate, tricalcium aluminate and tetra calcium aluminoferrite. On addition of water the cement hydrates to form silicate hydrate gel[12].

After cleaning and shaping of root canal system, an apical plug of 3-5 mm MTA is placed and sealed with a temporary restoration since it requires a time period of 3-4 hours for completion of setting reaction. The rest of the canal is sealed with thermoplasticized gutta-percha[13]. MTA is highly biocompatible. It has cementogenic, dentinogenic and osteogenic potential. Moisture and blood contamination do not affect the sealing ability

Fig.1.Preoperative radiograph

Fig.2. Radiograph after removal of Gutta percha

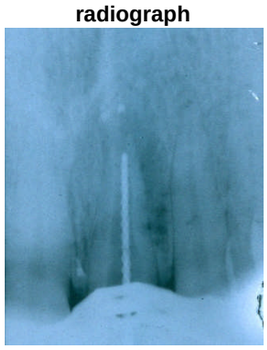

Fig.3.Working length radiograph

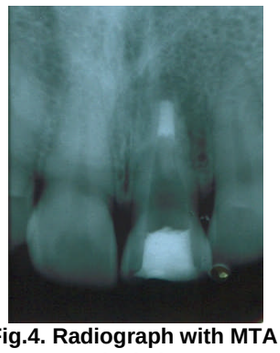

Fig.4. Radiograph with MTA apical plug

Fig.5. Obturated rootcanal

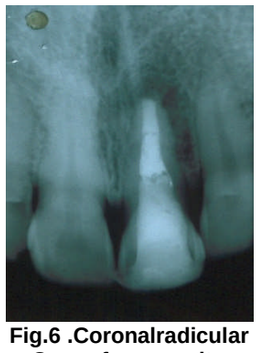

Fig.6 .Coronalradicular Core of composite

Fig.7.RC preparation for coronoradicular core

Main disadvantages are difficulty in manipulation and longer setting time. MTA proves to be an ideal sealing material for teeth with open apices.

summary

This article presents a case of endodontically failed maxillary central incisor with open apex which was successfully managed by using MTA as apical plug.

CONCLUSION

MTA has wider range of clinical applications of which, apexification is one among them. It has additional advantages like biocompatibility and good sealing ability.

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