

Nonsurgical management of periapical lesion by the use of MTA based root canal sealer (MTAFillapex) - A Case Report

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Abstract:

Non-surgical treatment with proper infection control can promote healing of large periapical lesion. The success of root canal obturation is reached not only by the technique employed, but also by the type of the material chosen for treatment. Although endodontic obturation is mainly constituted by gutta-percha, endodontic sealers are used aiming to decrease the gap existing among gutta-percha points themselves and gutta-percha points and root canal walls. In this case report the patient reported that mild pain and discoloration of maxillary right central incisor. On vitality test there is no response heat and cold test. Periapical radiograph revealed widening of periodontal ligament space with loss of lamina dura and periapical radiolucency. Based on the complaint and the clinical and radiological examination, the treatment plan was root canal treatment with MTA based sealer (MTA fillapex). However a long term clinical and radiographical observation is necessary.

Key words: *Periapical lesion, Nonsurgical endodontic treatment, MTA fillapex.*

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Introduction:

Infections of the dental pulp occur as a consequence of caries, dental operative procedures and trauma, and involve a mixed, predominately Gram-negative, anaerobic bacterial flora.¹ These infections often cause total pulpal necrosis and subsequently stimulate an immune response in the periapical region. This is commonly referred to as a periapical lesion.² Most periapical lesions can be classified as dental granulomas, radicular cysts or abscess.³ The incidence of cysts within periapical lesions varies between 6 and 55%. The occurrence of periapical granuloma ranges between 9.3% and 87.1%, and of abscesses between 28.7%

and 70.07%. There is clinical evidence that as the periapical lesions increase in size, the proportion of the radicular cysts increases. However, some large lesions have been shown to be granulomas.^{3,4}

The ultimate goal of endodontic therapy should be to return the individual teeth to a state of health and function without surgical intervention. All inflammatory periapical lesions should be initially treated with conservative non-surgical procedures. Surgical intervention is recommended only after non-surgical techniques have failed. Besides surgery has many drawbacks, which limits its use in the management of periapical lesions. A high percentage of 94.4% of complete and partial healing of periapical lesions following nonsurgical endodontic therapy has also been reported.^{5,6}

In non-surgical endodontic treatment can promote healing of large periapical lesion by cleaning, shaping and three dimensional fluid tight obturation of root canal system. Root canal sealers are used to attain impervious seal between core materials and root canal wall. They can be group according to their basic components such as zinc oxide eugenol, calcium hydroxide, glass ionomer, resin, iodoform, silicon and recently MTA fillapex (MTA based) root canal sealer, and Biodentine sealer.^{2,4}

MTA fillapex has good physical characteristics and is biocompatible. It also provides a very good seal has excellent marginal adaptation and maintain a high pH for a long period of time. Several studies specify mineral trioxide aggregate (MTA) as an effective root canal sealers.

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Case Report:

A 45 years old male patient Mr. Abdul Alim came to the department of conservative dentistry and endodontics, BSMMU, with chief complaint of pain of maxillary right central incisor. He gave a history of trauma on that tooth 7 years ago.

On extra-oral examination no abnormalities were detected. Intra-oral examination revealed discoloration of maxillary right central incisor. On palpation, patient felt mild pain on root area of affected tooth. On percussion, dull percussion note was present. On vitality test there is no response heat and cold test. Periapical radiograph revealed periapical radiolucency and widening of periodontal ligament space with loss of lamina dura.

Diagnosis:

Considering the history, clinical and radiological examination it was diagnosed as chronic periapical periodontitis.

Treatment plan:

Conventional root canal treatment by the use of MTA based root canal sealer (MTA Fillapex) followed by permanent restoration and porcelain crown was planned.

Treatment Procedure:

After proper counseling, the consent of the patient was taken and mouth preparation was done. A straight line access cavity was prepared with maintain the standard protocol. Coronal necrosed tissue remnants was removed. After negotiation of the canal patency was checked (no-20K file) and the working length was determined by radiographic method. The working length was established 22mm. Biomechanical preparation of the canal was done with standardized technique upto 70 no. k file and irrigated with 2.5% sodium hypochlorite (NaOCl) and ethylenediamine tetra acetic acid (EDTA). The canal was dried with a sterile paper point. Calcium hydroxide $\text{Ca}(\text{OH})_2$ was placed in the canal for 7 days as an intracanal medicament using lentulospiral. The access opening was sealed well with glass ionomer filling material. Patient was advised to revisit after one week.

During recall visit repeated copious irrigation was done with normal saline followed by sodium hypochlorite to remove all the $\text{Ca}(\text{OH})_2$ paste properly.

Reclean the canal walls and remove the smear layer again with liquid EDTA and then use of 2% chlorhexidine. Canal was dry with sterile paper point. Manufacturer's instructions was followed for mixing the sealer. Fillapex was coated in canal walls using lentulospirals in a slow

speed hand piece. Obturation was performed with Gutta-percha cones and sealed by lateral compaction technique. The access cavity was filled with glass ionomer cement. The patient was advised for follow up 3, 6 and 12 months. Clinical and radiological examination was taken during every follow up. Radiograph was taken by using X-ray holder to maintain the angulation and position.

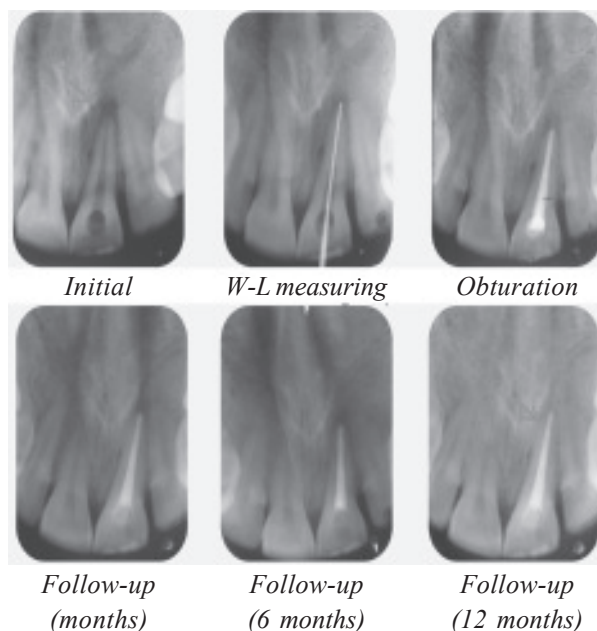


Fig.-1: Obturation of 21 no. tooth with MTA fillapex

Discussion:

Invasion of microorganisms into the pulp is responsible for the pathogenesis and necrosis of the vital pulp tissue. After the pulp becomes necrotic or nonvital, bacterial growth can be sustained within the canal. When the bacterial toxins from this infection extend into the periodontal ligament space, the tooth may become symptomatic to percussion or exhibit spontaneous pain. Radiographic changes may occur, ranging from a thickening of the periodontal ligament space to the appearance of a periapical radiolucent lesion.^{3,4}

A hermetic 3-dimensional filling must avoid leakage from the oral cavity and/or periapical tissues, thereby reducing periapical inflammation.⁷ This filling is currently achieved using a combination of endodontic sealer and gutta-percha. Gutta-percha is widely used because of its good physical and biological properties, but the lack of adhesiveness and flow makes the association with endodontic sealers necessary.^{6,8}

An ideal endodontic sealer should flow along the entire canal wall surface, fill all voids and gaps between the core

root filling material and dentin, and adhere to both dentin and gutta-percha. Inadequate filling can result in fluid movements into the filling defects favoring a periapical chronic inflammatory reaction and compromising the treatment success. Root canal ramifications, such as lateral, secondary and accessory canals can establish connection between the main root canal and periodontal ligament, as well as the apical foramen.^{9,10,11} Several authors described that localized periodontal problems might be associated with necrotic and infected root canal ramifications highlighting the importance of the capacity of the endodontic sealer to flow into these irregularities.^{12,13}

In 1999 study by Holland et al compared glassionomer root canal sealer with MTA as a sealer and concluded that MTA induces closure of main canal foramen by new cementum formation with absence of inflammatory cell after 6 months. In 2007 Holland et al examined influence of the extend of obturation on apical and periapical tissue after filling root canal with MTA and concluded that it can be used as root canal sealer. A MTA endodontic sealer (MTA fillapex, Angelus, Brazil) was recently created. According to the manufacturer, its composition after mixture is basically MTA, salicylate resin, natural resin, bismuth and silica. MTA fillapex is first paste form MTA based salicylate resin root canal sealer. Half of MTA Fillapex paste formula contains 13.2% MTA. In this MTA known for its biocompatibility, yields an impressive, hermetic seal in which MTA particles expand. The other half of MTA fillapex paste formula contains biologically compatible salicylate resin (1,3 butylene glycol disalicylate resin) which is tissue friendly and therefore a better choice over epoxy-based resins, which have mutagenic and more cytotoxic effects. MTA fillapex has antimicrobial activity against *S. aureus*, *E. coli*, *C. albicans* and *E. faecalis* by its high alkaline pH. It provide effective seal against dentin and cementum and promotes biologic repair and regeneration of periodontal ligament. They also exhibit a higher adhesiveness to dentin than conventional zinc oxide eugenol based cements and sealing ability similar to epoxy resin based cements.^{1,5,8}

Calcium hydroxide containing sealer, which stimulates apical foramen closure by mineralized tissue deposition, thus determining the biological sealing. Besides the biological characteristics, the use of the calcium hydroxide-containing root canal sealer Sealapex has been questioned regarding its predisposition to solubility and subsequent effect on the root canal seal and periradicular healing.

Zinc oxide eugenol sets because of a combination of physical and chemical reaction, yielding hardening of the mixture is due to formation of zinc eugenolate the presence of free eugenol tend to weaken the set and increased the cytotoxicity. Practically all ZOE sealer cements are cytotoxic and invoke an inflammatory response in connective tissues. Recently introduced Biodentine root canal sealer have no long lasting antibacterial action and fast setting may lead to cracks inside the hardened biodentine.^{4,17,18}

Clinical practice suggests that fluid and blood contamination in the apical region of root canal and dentin wetness (water into dentinal tubules) may be expected in teeth with apical resorption or immature apices and after poor root canal shaping. So this humid environment and residual moisture may affect the sealing of conventional hydrophobic root canal sealers and the effect bonding to a wet substrate such as root dentine remains a challenge. Otherwise MTA fillapex is not sensitive to moisture and blood contamination.^{5,14,15}

So consideration of all sealers, MTA fillapex sealer was used in this case and follow up was taken after 3, 6 and 12 month. There was no sign and symptom on clinical examination. Radiograph showing complete healing of periapical lesion.

Conclusion:

It is generally accepted that after complete debridement and disinfection, total obliteration of the root canal system will be performed with biocompatible materials. In this respect, the choice of a sealer will influence the outcome of endodontic therapy. MTA Fillapex could be used as root canal sealer with high biocompatibility compared with other sealers. In addition more scientific studies on MTA Fillapex are therefore absolutely necessary.

References:

1. Sundqvist, G., (1994). Taxonomy, ecology and pathogenicity of the root canal flora. *Journal of Oral Surg Oral Med Oral Pathol*, 78, 522-530.
2. Sydney GB, Ferreira M, Deonizio MDA, Leonardi DP, Batista(2009) A. Análise do perfil de escoamento de seiscimentos endodônticos. *RGO*. 57(1):7-11
3. Torabinejad, M. and Walton, R.E., (2002). Periradicular lesion. In: J.I. Ingle and L.K. Blackland, ed. *Endodontics*. 5th ed. Hamilton Ontario, Canada : B.C. Decker, 175-201
4. Bhaskar, S.N., 1966. Periapical lesion- types, incidence and clinical features. *Journal of Oral Surgery Oral Medicine Oral Pathology*, 21, 657-670

5. Bogen G, Kuttler S 2009. Mineral trioxide aggregate obturation: A review and case series. *J Endod* 35:777-90.
6. Camps J, Pommel L, Bukiet F, About I (2004). Influence of the powder/liquid ratio on the properties of zinc oxide-eugenol-based root canal sealers. *Dent Mater*. 20:915-23.
7. De Almeida WA, Leonardo MR, TanomaruFilho M, Silva LA (2000) Evaluation of apical sealing of three endodontic sealers. *IntEndod J*. 33:25-7.
8. Duarte MAH, Ordinola-Zapata R, Bernardes RA, Bramante CM, Bernardineli N, Garcia RB et al (2010) Influence of calcium hydroxide association on the physical properties of AH Plus. *J Endod*.;36(6):1048-50.
9. Gomes-Filho JE, Watanabe S, Bernabé PF, de Moraes Costa MT (2009). A mineral trioxide aggregate sealer stimulated mineralization. *J Endod*. 35:256-60.
10. Holland R, de Souza V, Nery MJ, OtoboniFilho JA, Bernabé PF, Dezan E., Júnior (1999) Reaction of dogs' teeth to root canal filling with mineral trioxide aggregate or a glass ionomer sealer. *J Endod*. 25:728-30.
11. Hoshino, E., Kurihara, N.A., Satol, U.H., Sato, M., Kotak, et.al., (1996). In vitro antibacterial susceptibility of bacteria taken from infected root dentine to a mixture of Ciprofloxacin, Metronidazole, Minoclicin in situ. *International Endodontic Journal*, 29 ,125-130.
12. Lee SJ, Monsef M, Torabinejad M (1999). Sealing ability of a mineral trioxide aggregate for repair of lateral root perforations. *J Endod*. 19:541-4.
13. Mickel AK, Wright ER (1999) Growth inhibition of *Streptococcus anginosus* (milleri) by three calcium hydroxide sealers and one zinc oxide-eugenol sealer. *J Endod*. ;25:34-7
14. Moraes SH, Zytkevitz E, Ribeiro JC, Heck AR, Aragão EM (1989). Cimentosendodônticos: tempo de presa e escoamento de dois cimentos obturadores de canais radiculares. *RGO*. Nov-Dec;37(6):455-9.
15. Nair, P.N.R., (1998). New perspective on radicular cyst: do they heal? *International Endodontic Journal*
16. Negm MM, Lilley JD. A(1985) study of the viscosity and working time of resin-based root canal sealers. *J Endod*. Oct;11(10):442-5.
17. Saatchi, M., (2007). Healing of large periapical lesion: A non surgical endodontic treatment approach. *Australian Endodontic Journal*, 33, 136-140.
18. Simon J.H.S., (1980). Incidence of periradicular cyst in relation to the root canal. *Journal of Endodontics*, 6, 845-84