

MTA PULPOTOMY ASSOCIATED APEXOGENESIS OF HUMAN PERMANENT MOLAR WITH IRREVERSIBLE PULPITIS: A CASE REPORT

Nabi Shahnaz¹, Masoodi Ajaz², Amin Khalid³, Farooq Riyaz⁴

1.Post Graduate Scholar, Deptt Of Conservative Dentistry And Endodontics ,Govt Dental College And Hospital Srinagar

2.Registrar, Deptt Of Conservative Dentistry And Endodontics , Govt Dental College And Hospital Srinagar

3.Registrar, Deptt Of Conservative Dentistry And Endodontics , Govt Dental College And Hospital Srinagar

4.Professor And Head, Deptt Of Conservative Dentistry And Endodontics , Govt Dental College And Hospital Srinagar

ABSTRACT:

Primary goal of all restorative treatment is to maintain pulp vitality so that normal root development or apexogenesis can occur. If pulpal exposure occurs, then a pulpotomy procedure aims to preserve pulp vitality to allow for normal root development. Recently, an alternative material called mineral trioxide aggregate (MTA) has demonstrated the ability to induce hard-tissue formation in pulpal tissue. Therefore this case report describes a case of a young permanent molar with incomplete root formation treated with MTA pulpotomy.

Key words: pulpotomy, apexogenesis, MTA.



INTRODUCTION:

Dental caries is one of the greatest challenges to the integrity of the developing tooth. It can cause the dental pulp to undergo irreversible damage, causing necrosis of the pulpal tissues, which can result in the arrest of normal root development. Abnormal root development will have an impact on the long-term prognosis for tooth retention [1,2]. The primary goal of treatment, therefore, should be to maintain pulp vitality so that normal root development can occur. By maintaining pulp vitality, apexogenesis can occur [3,4]. This is the preferred treatment because it promotes healing by regeneration rather than repair.

CASE DETAIL:

A 14 year male reported to the department of conservative dentistry and endodontics. Patient gave a history of pain in lower right posterior region. Pain was spontaneous in onset and continuous. It was aggravated by taking hot or cold liquids. Clinical examination revealed deep carious lesion involving right mandibular 2nd molar, Percussion testing was negative. Absence of periodontal pocket and mobility. Absence of lymphadenopathy. Thermal pulp tests were performed using endofrost (Coltene Whaledent) and it was positive. Tooth was isolated and cold water was sprayed by means of 3 way syringe and patient exhibited continuous pain. Radiographic Examination (fig 1) showed broad coronal

radiolucent area approximating the pulp chamber. Also revealed incomplete development of root apex. Absence of periapical pathosis, furcation radiolucencies. Absence of internal or external resorption. After complete clinical and radiographic assessment a diagnosis of irreversible pulpitis was made and treatment plan of pulpotomy was decided. After profound anesthesia tooth was isolated (fig 2) with rubber dam (Hygienic Coltene Whaldent). Remaining caries was removed with a round bur. Access was established with a no.2 endo access bur (DENTSPLY Maileffer Switzerland). Coronal pulpotomy was performed with a sharp spoon excavator (fig 3). Homeostasis was achieved by irrigating the cavity with sterile normal saline and application of small pieces of sterile cotton pellets. The blood clot-free pulpal wound was covered with an approximately 2-mm thick layer of MTA (ProRoot, Dentsply, Tulsa, OK, USA)(fig 4). According to the manufacturer's recommendations, MTA powder was mixed with saline in a 3:1 ratio and then placed over the pulpal wound with a plastic instrument. MTA was then covered with a wet cotton pellet and sealed with reinforced zinc oxide eugenol cement (Kalzinol DeTrey, Konstanz, Germany).immediate postoperative radiograph was taken(fig 5). Patient was recalled the next day. He reported no painful symptoms. Temporary was removed and the cavity was restored with GIC (3m ESPE).Patient was recalled after three weeks (fig 6) for clinical and radiographic examination. After one year

follow up patient showed absence of any symptoms. Radiographic examination revealed complete root formation with closure of root apices (fig 7). No periapical radiolucency was present.

DISCUSSION:

Pulpotomy is a vital pulp therapy in which a portion of vital coronal pulp tissue is removed surgically and the remaining radicular dental pulp is covered with a suitable material that protects the pulp from further injury and permits and promotes healing [5].Several materials have been advocated to induce dentin bridge formation via the dentinogenic potential of pulpal cells. In 1929, Hess reported a technique of pulpotomy using calcium hydroxide (CH) [6]. Stanley strongly advocated CH for vital pulp therapy [7]. This material has been used for the protection of exposed dental pulp up to the present time. Many *in vivo* and *in vitro* studies have reported excellent physiochemical and biological properties of mineral trioxide aggregate (MTA) that is, good sealing ability [8], hydroxyapatite formation [9] and favourable biocompatibility [10]. This material has demonstrated the ability to induce hard tissue formation in cases of pulp capping [11], pulpotomy [12], in animals. Histologic evaluation after pulp capping demonstrated that MTA produces a thicker dentinal bridge, less inflammation, less hyperemia and less pulpal necrosis in animals and humans compared with CH [11]. The nature of dentinal bridge formed under capping materials, however, is not completely known. Therefore for the

present case MTA was selected as the material of choice for the procedure. Very few studies have been done regarding pulpotomies in irreversible pulpitis cases. Eghbal^[13], et al in 2009 reported 100 percent success rate in removal of symptoms and completion of root formation it is well known that the presence of microorganisms is a significant inhibiting factor for the healing of pulp exposures. Results from MTA vital pulp therapy experiments suggest that initiation of hard tissue formation occurs not only because of its controlling infection via high alkalinity which denatured bacterial proteins^[14], but also owing to release of calcium and hydroxyl ions^[9]. Hydroxyl ions react with bacterial DNA, inhibiting replication and also destroyed bacterial cellular membrane^[14]. In addition, when further bacterial

recontamination is prevented with a tight coronal seal, the exposed dental pulp has the capacity to maintain vitality and build a new dentinal bridge. In the present case success was achieved by sealing the pulp with MTA which maintained the vitality of radicular pulp and helped in continued root formation.

CONCLUSION:

The present case report showed that MTA is an effective vital pulp therapy agent for treating human permanent teeth with irreversible pulpitis, relieving associated pulpal symptoms and preserving pulp vitality. It is able to stimulate hard tissue bridge formation. It is suggested that MTA pulpotomy should become a possible alternative treatment in such teeth.

REFERENCES:

1. Robertson A, Andreasen FM, Andreasen JO, Noren JG. Long-term prognosis of crown fractured permanent incisors: the effect of stage of root development and associated luxation injury. *Int J Paediatr Dent* 2000;10(3):191-9.
2. Rabie G, Trope M, Tronstad L. Strengthening of immature teeth during long-term endodontic therapy. *Endod Dent Traumatol* 1986;2(1):43-7.
3. Shabahang S, Torabinejad M. Treatment of teeth with open apices using mineral trioxide aggregate. *Pract Periodontics Aesthet Dent* 2000;12:315-20; quiz 22.
4. Massler M. Preventive endodontics: vital pulp therapy. *Dent Clin North Am* 1967;11:663-73.
1. Bakland LK. Endodontic considerations in dental trauma. In: Ingle JI, Bakland LK, eds. *Endodontics*. Toronto: BC Decker Inc; 2002. pp. 795–844
5. Schroder U. Effects of calcium hydroxide-containing pulp-capping agents on pulp cell migration, proliferation, and differentiation. *J Dent Res* 1985; 64: 541–8.
6. Hess W. Pulp amputation as a method of treating root canals. *Dent Items Interest* 1929; 51: 596.
7. Stanley HR. Pulp capping: conserving the dental pulp can it

- be done? Is it worth it? *Oral Surg Oral Med Oral Pathol* 1989; 68: 628–39.
8. Torabinejad M, Higa RK, McKendry DJ, Pitt Ford IR. Dye leakage of four root end filling materials: effect of blood contamination. *J Endod* 1994; 20: 159–63.
 9. Sarkar NK, Caicedo R, Ritwik P, Moiseyeva R, Kawashima I. Physicochemical basis of the biologic properties of Mineral Trioxide Aggregate. *J Endod* 2005; 31: 97–100.
 10. Torabinejad M, Hong CU, Pitt Ford TR, Kettering JD. Cytotoxicity of four root end filling materials. *J Endod* 1995; 21: 489–92.
 11. Pitt Ford TR, Torabinejad M, Abedi HR, Bakland LK, Kariyawasan SP. Using mineral trioxide aggregate as a pulp-capping material. *J Am Dent Assoc* 1996; 127:1491–6.
 12. M. J. Eghbal *et al.* MTA Pulpotomy © 2009 The Authors 7 Journal compilation © 2009 Australian Society of Endodontology
 13. Dominguez MS, Witherspoon DE, Gutmann JL, Opperman LA. Histological and scanning electron microscopy assessment of various vital pulp-therapy materials. *J Endod* 2003; 29: 324–33.
 14. Siqueira JF Jr, Lopes HP. Mechanisms of antimicrobial activity of calcium hydroxide: a critical review. *Int Endod J* 1999; 32: 361–9.

FIGURES:



Fig 1 preoperative radiograph

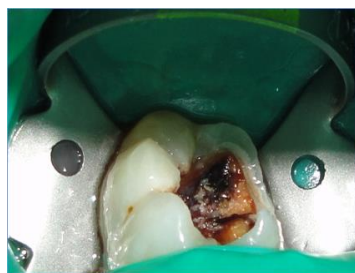


Fig 2 rubber dam isolation



Fig 3 caries removal



Fig 4 pulpotomy performed



Fig 5 MTA placed



Fig 6 immediate postoperative radiograph

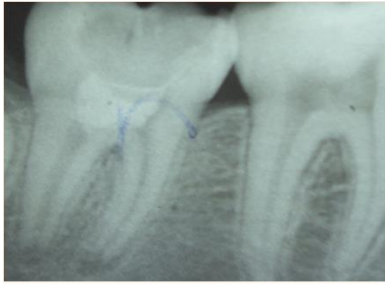


Fig 7. Post operative IOPA