MANAGEMENT OF TRAUMATISED TOOTH WITH MINERAL TRIOXIDE AGGERATE (MTA) : A CASE REPORT

[1]Ankur Pareek, [2]Sunil Malhan, [3]Arvind Arora, [4]Gursandeep Kaur Sandhu, [5]Himanshu Sood
[1]PG Student Second year, Department of Conservative Dentistry & Endodontics,
Desh Bhagat Dental College & Hospital, Mandi Gobindgarh
[2]Professor & HOD, Department of Conservative Dentistry & Endodontics,
Desh Bhagat Dental College & Hospital, Mandi Gobindgarh

Corresponding Author:
Ankur Pareek,PG Student Second year, Department of Conservative Dentistry & Endodontics, Desh Bhagat Dental College & Hospital, Mandi Gobindgarh
Email id: raghav.ankur.pareek@gmail.comPhn. No.:9592903370

Abstract

Aims and objectives: The aim of study was to evaluate the impact of family background, income of parents and parental education on child's knowledge score regarding dental caries and oral health practices.

Materials & methods: The study was conducted in two schools of Mandi Gobindgarh. The target population of the study was the school children within the age group of 10 to 12 years

Based on the selection criteria 80 subjects (40 from urban school, 40 from rural school) were considered as the samples for the study. Data was collected to analyze knowledge score of school children and impact of different family characteristics on knowledge score of children.

Results and conclusions: The knowledge of school children regarding prevention of dental caries was in adequate. Majority of the respondents were belonging to Sikh religion (88.8%) and from nuclear family (77.5%). Majority of the mother were housewives (72.5%). Among Parents (38.8%) were illiterate. Urban school children had more knowledge on dental caries than rural school children. Children from Urban school showed 2.5% (poor), 27.5% (average), 65% (good) knowledge and children from Rural school showed 7.5% (poor), 27.5%(average), 0.0% (good). The Mean knowledge score was 57.04%.

It was found that area of residence, education of father and mother of child and income of parents have association with knowledge score of children for prevention of caries. There was no impact of type of family and number of children in a family on dental caries knowledge score of children.

Keywords: dental caries, enamel, family background, knowledge score.

Introduction

The primary objective in endodontic therapy is complete obturation of root canal space to prevent re infection. In teeth with incomplete root development caused by trauma, caries and other pulpal pathosis, the absence of natural constriction at the end of the root canal presents a challenge and makes control of filling materials difficult. The aim 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.[1]

MTA stands for Mineral Trioxide Aggregate. Over the past two decades, MTA has become one of the most widely studied endodontic materials.[2,3] The trioxide aggregate in MTA consists of calcium, aluminum and selenium. MTA has several desirable properties in terms of its biocompatiblity, bioactivity, hydrophilicity, radiopacity, sealing ability and low solubility. The most important of these properties in dentistry are its biocompatibility and sealing ability. High biocompatibility encourages optimal healing responses. This has been observed histologically with the formation of new cementum in periradicular tissues area and a low inflammatory response with bridge formation in the pulp space.[4,5] The seal achieved is due to its expansion and contraction properties being very similar to dentin which results in high resistance to marginal leakage and to bacterial migration into the root canal system. A stable barrier to bacterial and fluid leakage is one of the key factors which facilitates clinical success.

A very practical advantage of MTA is that it sets in the moist environment omnipresent in dentistry. Unlike many other dental materials, MTA sets in a moist environment. When in contact with moisture, it's main component, which is calcium oxide, converts into calcium hydroxide which many clinicians will be familiar with.[6] This conversion results in a high pH microenvironment which has beneficial antibacterial effects. Unlike calcium hydroxide, however, this material has very low solubility and maintains its physical integrity after placement.

MTA materials are derived from a Portland cement parent compound. Although these compounds are similar in some respects, Portland cement and MTA are not identical.[7] MTA products undergo additional processing and purification. MTA products when compared to Portland cements have a smaller mean particle size and contain fewer toxic heavy metals.[8]

Case report

A 35-year-old male reported with fractured upper right incisors to the department of Conservative Dentistry and Endodontics (Figure 1). The medical history was not contributory. No significant family history was revealed. Clinically, we found that there was blackish discoloration in relation to upper right central incisor #[11]. The incisors were slightly ten-

der to percussion. Grade 3 mobility was seen. On electric pulp testing, the upper right central incisor #11 was non-responsive. On the basis of clinical and radiographical findings, a diagnosis of traumatised permanent teeth with open apex was made with respect to upper right central incisor #11.

Figure 1:Intraoral image showing fractured upper right central incisor #11.

An intraoral periapical radiograph was taken which showed incomplete root formation with wide open apices in right upper central incisor. No other periapical pathology was seen. Electric pulp testing was carried out which showed that the upper right central incisor #11 was non-re-

sponsive. (Figure 2)

Figure 2: Preoperative X ray

In the first appointment, root canal therapy with apexification using Mineral Trioxide was planned in relation to upper right central incisor #11 The tooth was isolated under a rubber dam and an access cavity was prepared. (Figure 3)

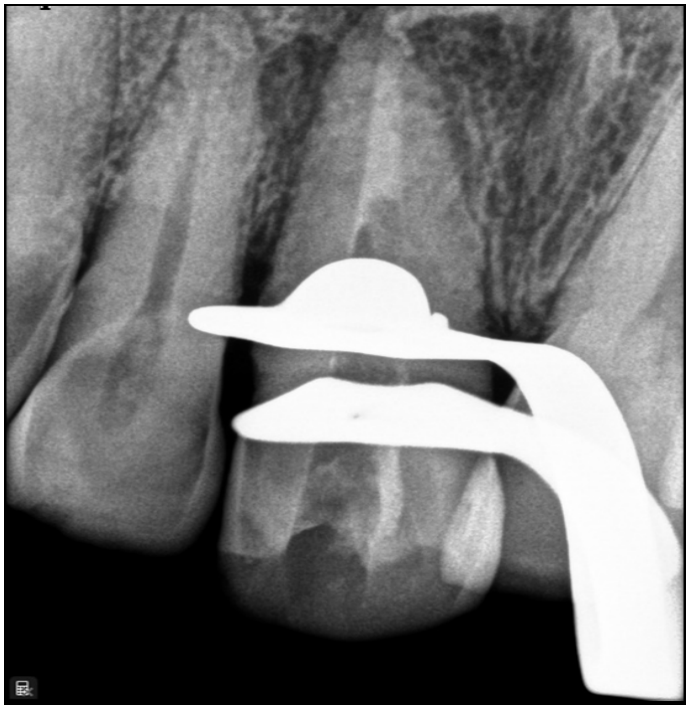

Figure 3: Mineral trioxide aggregate apical plug placed in relation to upper right central incisor #11.

MTA was mixed to the manufacturer's instructions and carried to the canal with an MTA Carrier. Apical plug of about 4 mm of MTA was placed and confirmed radiographically (Figure 3). A sterile cotton pellet moistened with sterile water was placed over the canal orifice and the access cavity was sealed with Cavit (3 M ESPE, Seefeld, Germany). After 72 h, the hard set of MTA was confirmed and the remainder of the root canal was obturated gutta-percha (Figure 4). In the same visit, the access cavity was restored with GIC.

Figure 4: Obturated #11

After 2 weeks, the patient was recalled for his aesthetic rehabilitation. As there was discoloration of the central incisor 11(Figure 5). crown preparation was done wrt 11 and zirconia crown was fabricated and cemented.

Figure 5: Crown preparation wrt upper right central incisor #11. Patient was recalled after 3 months for follow up and results were satisfactory with reduced mobility.

Discussion

Dental injuries are very common in children. A serious complication of these traumas is pulp necrosis whose prevalence varies with the type of traumatism from 1% to 6% for crown fractures to nearly 100% for intrusions. Pulp necrosis of permanent immature teeth implies the interruption of root formation and apical closure. It is then necessary to implement a therapy, called apexification to induce a hard calcific barrier at the apical end of the root, to achieve definitive root canal filling.[3]

The completion of root development and closure of the apex occurs up to 3 years after eruption of the tooth. The treatment of pulpal injury during this period provides a significant challenge for the clinician.

A variety of materials have been proposed for induction of apical barrier formation. Calcium hydroxide (Ca(OH)2) has become the material of choice for apexification; it is bactericidal with an alkaline pH that may be responsible for stimulating apical calcification.[9]

Despite its popularity for the apexification procedure, Ca(OH)2 therapy has some inherent disadvantages, including variability of treatment time, unpredictability of apical closure, difficulty in patient follow-up and delayed treatment.[10] Also, it has some tissue altering and dissolving effects. Therefore, the search continues for procedures and materials that may allow for more natural continued apical closure in teeth with immature apices.

The US Food and Drug Administration approved mineral trioxide aggregate (MTA) in 1998 as a therapeutic endodontic material for humans.11MTA has been shown to have superior sealing ability to amalgam, zinc oxide eugenol, intermediate restorative material (IRM) and super-ethoxybenzoic acid[12] MTA has also been shown to have superior characteristics as a direct pulp-capping agent when compared with Ca(OH)2 in animals and humans in the root canal, which would result in intracanal bone formation and arrest of root development.[13]

More recently, white ProRoot (white MTA) root canal repair material was introduced as an aesthetic improvement over the original material (grey MTA) for placement in anterior teeth. The major components of white MTA are tricalcium silicate, dicalcium silicate, tricalcium aluminate, calcium sulphate dehydrate and bismuth oxide. The cement's setting time is 3–4 h, and its compressive strength after setting is 70 MPa—comparable with that of IRM.[14]

MTA is a material which has less leakage, better antibacterial properties, high marginal adaptation, short setting time (4 h) and a pH of 12.5 and is more biocompatible. Scaffolding is provided for hard tissue formation by MTA. It stimulates the production of interleukins and cytokines release. Hence, it is capable of promoting hard tissue formation. Clinicians may restore the tooth after setting of MTA. Thus, the fracture resistance of teeth with thin dentinal walls increases. MTA can be used in teeth with pulp necrosis and inflamed periapical lesions because it may set in moist environments.[15]

In the MTA plug technique, root canals must be disinfected with temporary calcium hydroxide before placing MTA for 2 weeks. This is because performing chemo-mechanical preparation alone is not effective for complete elimination of microorganisms. Hence, we used calcium hydroxide, in this case, in between the appointments in the root canal for disinfection.

References

1. Anil Kumar G, Kavitha A. Single visit apexification with mineral trioxide aggregate. Indian J Dent Adv 2010;2:122–24

2. Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review--Part I: chemical, physical, and antibacterial properties. J Endod. 2010 Jan;36(1):16–27.

3. Torabinejad M, Parirokh M. Mineral trioxide aggregate: a comprehensive literature review--part II: leakage and biocompatibility investigations. J Endod. 2010;36(2):190–202.

4. Tawil PZ, Trope M, Curran AE, Caplan DJ, Kirakozova A, Duggan DJ, Teixeira FB. Periapical microsurgery: an in vivo evaluation of endodontic root-end filling materials. J Endod. 2009 Mar;35(3):357–62.

5. Faraco IM, Jr, Holland R. Response of the pulp of dogs to capping with mineral trioxide aggregate or a calcium hydroxide cement. Dent Traumatol. 2001 Aug;17(4):163–6.

6. Duarte MA, Demarchi AC, Yamashita JC, Kuga MC, de Fraga SC. Ph and calcium ion release of 2 root-end filling materials. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2003;95(3):345–347

7. Dammaschke T, Gerth HU, Züchner H, Schäfer E. Chemical and physical surface and bulk material characterization of white ProRoot MTA and two Portland cements. Dent Mater. 2005 Aug;21(8):731–8

8. Islam I, Chng HK, Yap AU. Comparison of the physical and mechanical properties of MTA and port-land cement. J Endod. 2006 Mar;32(3):193–7

9. Binnie WH, Mitchell DF. Induced calcification in the subdermal tissues of the rat. J Dent Res 1973;52:1087.

10. Shabahang S, Torabinejad M, Boyne PP, et al. A comparative study of root-end induction using osteogenic protein-1, calcium hydroxide, and mineral trioxide aggregate in dogs. J Endod 1999;25:1–5

11. Dentsply Endodontics Materials safety data sheet (MSDS): ProRoot MTA (mineral trioxide aggregate) root canal repair material. Tulsa: Dentsply Endodontics, 2001

12. Torabinejad M, Hong C, Pitt FT, et al. Cytotoxicity of four root-end filling materials. J Endod 1995;21:489–92

13. Faraco IM, Jr, Holland R. Response of the pulp of dogs to capping with mineral trioxide aggregate or a calcium hydroxide cement. Dent Traumatol 2001;17:163–7

14. Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. J Endod 1999;25:197–205

15. Gunes B, Aydinbelge HA. Mineral trioxide aggregate apical plug method for the treatment of non vital immature permanent maxillary incisors: three case reports. J Conserv Dent 2012;15