



PERIAPICAL RESPONSE OF OVER OBTURATED GUTTA PERCHA OVER TEN YEARS AND ACCIDENTAL MTA EXTRUSION OUT OF A BLUNDER BUSS CANAL: A CASE REPORT.

Dental Science

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ABSTRACT

An open root apex, especially Blunder buss canals are challenging situation during endodontic treatment of a tooth. In such cases a hard calcific apical barrier is required, to prevent the over obturation and leakage of the obturating materials periapically. Mineral Trioxide Aggregate is widely accepted in endodontics for its various advantages including its use as an apical plug in apexification procedures. Orthograde placement of MTA is a challenging procedure in terms of length control and apical displacement of the plug or extrusion may occur sometimes. This case report is based on the retreatment of over obturated immature maxillary central incisor with gutta percha and sealer for ten years at some private clinic. This tooth was taken for retreatment. Accidental apical extrusion of MTA occurred during obturation of the same teeth with guttaflow, this article includes the follow of the same case. Patient was asymptomatic even after 2 years.

KEYWORDS

MTA, Gutta Percha, Guttaflow, Blunder-Buss Canal, Apexification, Retreatment

INTRODUCTION:

The root apex has an important role in endodontic practice². Obturation overextensions or ghost packs that are scarcely visible or nonexistent occurs due to mismanagement of the apical one-third during canal preparation¹⁵. Inflammatory apical root resorption, incompletely formed root apex, faulty working length and instrumentation through the apical foramen may leads overfilled root canals¹⁶ due to difficulty in obtaining an apical stop. This results in lower success rate of only 76%, although in general, 85-95% success has been reported for root canal treatment.¹⁷ The factors such as persistent root canal infection, reinfection resulting from apical transportation of bacteria during over instrumentation and foreign body reaction elicited by the overfilled GP itself are treatment failures following overfilled gutta-percha (GP)¹⁸.

When tooth erupts only 2/3rd of the root has been formed³. Immature root will have an open apex, Blunder Buss Canal formation occurs due to trauma or caries exposure during root development, the pulp undergoes necrosis, dentin formation ceases and root growth is arrested⁴. Main problems faced with open apex are, due to large apical diameter and smaller coronal canal diameter debridement is difficult, Lack of apical stop makes obturation difficult and the thin root canal walls become prone to fracture⁴.

Apexification is defined as 'a method to induce a calcified barrier in a root with an open apex or the continued apical development of an incomplete root in teeth with necrotic pulp' (American Association of Endodontists 2003)¹¹. A variety of artificial apical barrier materials have been suggested as an alternative to conventional calcium hydroxide apexification⁵. Among these, mineral trioxide aggregate (MTA) appears to be the most popular biomaterial owing to some of its several advantages comprising: placement in a single visit, biocompatibility, and excellent sealing properties, low solubility and the ability to set in the presence of blood, are favourable for placement of MTA apical barriers adjacent to periapical tissues.⁵

The advantages of this material are multiple: (i) reduction in treatment time, (ii) possibility to restore the tooth with a minimal delay, and thus to prevent the fracture of the root and (iii) it also avoids changes in the mechanical properties of dentine because of the prolonged use of calcium hydroxide⁶. Because the wide apical foramen requires a large volume of filling material that may extrude into the periradicular tissue initiating the foreign-body reactions, so obtaining an optimal apical seal in immature apices of a tooth is a challenge¹. MTA placement from an orthograde direction have been reported by several authors despite of these difficulties in delivering and filling the canal. Apical extrusion of the material occurs due to the lack of an apical stop or seat, special placement techniques, manual,¹² ultrasonic¹³ or ultrasonic-assisted hand delivery for MTA¹⁴ have been used and suggested to minimize extrusion of the material.

This case report is based on the Endodontic retreatment of over obturated immature maxillary central incisor with gutta percha and sealer for ten years, which undergone apical extrusion of MTA into the

periapical area during obturation with Guttaflow. Patient has no pain in two years of follow ups. Although direct overfilling is not recommended but the follow ups shows that direct contact of MTA with periapical tissues did not had any negative effect on healing¹. Extrusion of MTA in periapical lesion lacks long term observations and this case has observation over two year period.

CASE REPORT:

A healthy 20 year old patient reported to Department Of Conservative Dentistry And Endodontics, Daswani Dental College And Research Centre, Kota with a chief complaint of pain in anterior tooth which was broken ten year ago. Central incisor was diagnosed with complicated Ellis Class III fracture. The patient had undergone RCT in same central incisor 10 years ago at some private clinic. The tooth was tender on percussion and swelling on labial aspect of 21.



Fig1: Preoperative Photograph showing complicated crown fracture in 21

Radiograph reveals the over-obturation and gutta percha extending beyond the apex with a large radiolucency involving the central and lateral incisors of left side. The apex of 21 was wide open and the lateral incisor 22 seemed calcified due to external resorption. A circular radio lucency was associated with 21 and 22.



FIG 2: Pre Operative IOPA obturation beyond apex since 10 years in 21.

As patient was ignorant toward surgical management, a non surgical treatment was planned. Endodontic retreatment was necessary in 21 as the obturation was over extending and causing periapical tissue

irritation. After attaining rubber dam isolation and following anaesthesia, previous restoration was removed from the central incisor 21. Gutta percha was removed using H files with the help of RC solv. The canal was prepared using hand instruments, with 2% chlorhexidine gluconate, and ethylene diaminetetraacetic acid (EDTA) as irrigants. Working length was established with the help of apex locator and reconfirmed using digital radiography 1 mm short of radiographic apex. The dimension of master apical file could not be confirmed because the apical foramen measured greater than size 140. After thorough cleaning and irrigation triple antibiotic paste dressing was given and access was closed temporarily for one week. Endodontic treatment was also started in lateral incisor, which was narrow and calcified apically.

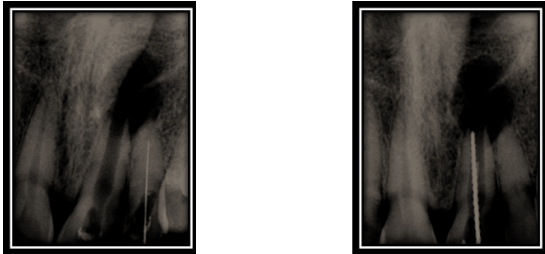


FIG 3: a) GP removed in 21 and Working length taken 21

The follow up were done twice at a gap of 2-3 days and after one month. The canal was thoroughly irrigated and triple antibiotic paste was placed in follow up. The teeth were asymptomatic after one month, devoid of any pus or pain. Patient was appointed for single visit apexification with MTA, dressing was eliminated by mechanical instrumentation and rinsed out of root canals by means of sterile water irrigation. The canals were dried using sterile paper points. MTA angelus prepared immediately compacted with a hand plunger to create an apical plug of 3 to 4 mm as described by the manufacturer. MTA was placed by orthograde direction in the canal apex with the help of MTA gun. The hand plungers were used to condense the MTA further. The procedure was done under a surgical microscope. Radiography was taken to check if any apical extension occurred. Obturation was completed in lateral incisor using gutta percha and AH PLUS sealer. The access was temporarily closed in both teeth.

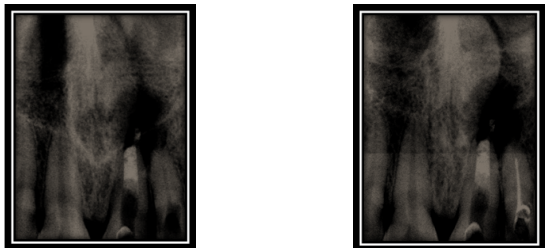


Fig 4: a) MTA plug in 21 b) Obturation in 22

After a week, obturation was done with Guttaflow in 21. GUTTAFLOW is composed of a unique mixture of finely ground gutta percha, RoekoSeal® root canal sealer, and nano-silver. This provides the dentist with a filling material and sealer combination that is easily dispensed and provides an excellent 3-dimensional filling of the root canal. After the obturation, Digital radiograph revealed apical extrusion of the MTA beyond apex. The tooth was temporarily sealed and taken under observation for one month.



Fig 5: Obturation in 21

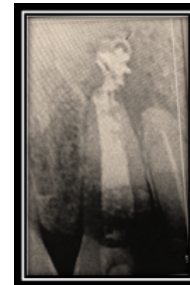
FOLLOW UPS

Follow ups were done to check the healing of the lesion and fate of the MTA extruded. Healing of the lesion was seen after a month, so no

periapical surgery was undertaken. There was no tissue response to MTA extrusion seen in this case. Also after one year patient was asymptomatic and there was no periapical response.



Fig 6: a) After one month



b) After 1 year



c) After two year

DISCUSSION: OVER OBTURATION IN AN BLUNDERBUSS CANAL

In this case the gutta percha was extending beyond the apex which was endodontically treated ten years after a complicated crown fracture due to trauma. When root canal is filled more than 2mm beyond the radiographic apex it is called over obturation or over filling, due to various reasons like Over instrumentation of the root canal, Inadequate determination of the working length, Incompletely formed root apex, Inflammatory apical root resorption, Improper use of reference points for measuring working length.¹⁹

The response of periradicular tissues to root canal filling materials depend on the interaction of the host immune response and properties of the materials. Over instrumentation often precedes overfilling which inevitably poses risk of forcing infected root canal contents into the periradicular tissues, thereby impairing the healing process. Studies have shown that overfilling may cause foreign giant cell reaction and may act as a foreign body which may support the formation of biofilms.¹⁹

The proposed procedure for the complete removal of an overextended root canal filling when associated with a root canal treatment failure includes the gutta-percha is softened with xylene first and removed to a distance of 2 to 3 mm short of the apex, the remaining gutta-percha, which is preserved as solid as possible, is removed by a Hedstrom file. The file is extended 0.5 to 1.0 mm beyond the apex, firmly engages the gutta-percha and is slowly removed.²⁰

MTA APEXIFICATION :

Mineral Trioxide Aggregate (MTA) as osteoconductive apical barrier has gained popularity with one visit apexification technique because MTA is relatively non cytotoxic and stimulates cementogenesis. It is bioactive by forming hydroxyapatite in presence of phosphate containing fluids because it generates a highly alkaline aqueous

environment by leaching of calcium and hydroxyl ions.²⁵ MTA set in the presence of moisture as the powder consists of fine hydrophilic particles. The hydration of the powder results in a colloidal gel with a pH of 12.5 that will set in approximately 3 hours.²⁶ It has a compressive strength equal to intermediate restorative material and Super-EBA but less than that of amalgam. It is commercially available as ProRoot MTA, and has been advocated for use in the immediate obturation of open root apex.²⁷ Shabahang et al examined hard tissue formation and inflammation histomorphologically after treating open apices in canine teeth with osteogenic protein-1, MTA and calcium hydroxide.²⁷ Authors have (Linsuwanont 2003, Andreasen et al. 2006) proposed a technique, by placing an apical plug of MTA in the last 5 mm of the canal, for apexification in one visit,^{7,9}. placement of a coronal restoration in the tooth immediately after obturation of the root canal system are thus possible, and are regarded as key elements for the long-term conservation of the treated tooth (Goldberg et al. 2002, Steinig et al. 2003).^{8,10} Torabinejad et al. also demonstrated that MTA implanted into the animal bone resulted in minimal inflammatory reactions with favorable bone healing with direct bone apposition. However, these results from these animal studies, although favorable, cannot justify the any deliberate placement of MTA into the periapical tissue obturation material preferably should be confined within the root canal system, because extrusion can reduce decreased the chance of success of endodontic treatment.²⁸

OBTURATION WITH GUTTAFLOW AND MTA EXTRUSION

Gutta Flow (Coltene Whaledent, Cuyahoga Falls, Ohio): Its eugenol free radiopaque form consisting of polydimethyl siloxane matrix filled with powdered guttapercha, silicon oil, paraffin oil, platinum dioxide and nano silver. It does not require compaction or heating of gutta percha.³²

In an effort to prevent extrusion, practicing the placement of the obturating material in artificial canals would be very helpful in developing clinical skills. A resorbable matrix has been suggested for the easy length control and for prevention of overfilling.²⁹ The use of calcium sulfate has been used as such an internal matrix.³⁰ Collaplug (Zimmer Dental, Warsaw, IN, USA) was also used as an apical matrix; however, it did not appear to prevent extrusion or improve the sealing ability of MTA.³¹

In this case, unfortunately, during obturation with Guttaflow a considerable amount of MTA was extruded into the apical lesion. MTA might be dislodged through the wide apical foramen or be pushed actively beyond apical foramen. MTA seems to have been compressed and moved down (to gravitational direction) from original location during obturation as Master cone act as condenser of gutta flow material, so it should be inserted slowly. As master cone is inserted in the root canal it will force the thixotropic material to flow which is desirable, as it help the material to reach fine anatomy within the canal. There was an unintentional extrusion of material into the periapical area, which perhaps occurred due to forceful injection without maintaining a proper distance from the MTA Plug.

The healing responses were remarkably favourable when considering that the prognosis of overfilling with common root canal filling materials is generally poor as it was seen in previous obturation of the tooth with Gutta Percha and sealer. For the present clinical observations, MTA favours the apexification and periapical healing even when a considerable amount of this material had inadvertently been extruded. While it is recognized that extrusion of MTA via an open apex is not a common mishap during the apexification procedure, the extruded material does not negatively affect the healing of the periapical tissues¹, as supported by follow-up observations of 12 months and 24 months. However, deliberate overfilling of MTA into the periapical lesion is not advocated in any clinical circumstance.

Also there are chances of extrusion of some gutta flow material beyond the apex. As there were no immediate post operative symptoms, and the patient was young and healthy, a 'wait and watch' approach was taken. Guttaflow has a good biocompatibility and acceptable tissue toxicity as shown by various histological²¹ and animal studies.³³

CONCLUSION:

MTA and Guttaflow are proved biocompatible and least Cytotoxic materials in several studies. Apical extrusion of obturating material is not desirable in any case. As clinical extrusion based randomised

trials are not ethical. So we have to rely on case reports to check fate of extrusion of these materials like MTA. In two year follow up with this case patient did not show any negative symptoms.

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