

Case Report

Treatment of Perforating Internal Root Resorption with MTA and Management of Discoloration Caused By MTA: A Case Report

Omid Dianat¹, Saeede Zadsirjan², Sana Jabbari³, Sajedeh Ghorbanzadeh^{3*}

¹Associated professor, Department of endodontic, Dental school of shahid beheshti university of medical sciences, Tehran, Iran.

²Assistant professor, Department of endodontic, Dental Faculty, Hamadan University of Medical Sciences, Hamadan, Iran.

³Postgraduate student, Department of endodontic, Dental school of shahid beheshti university of medical sciences, Tehran, Iran.

***Corresponding author**

Sajedeh Ghorbanzadeh

Email: s_sirjani@yahoo.com

Abstract: Root canal perforation due to root resorption is a challenging clinical circumstance to properly diagnose and treat, particularly when it occurs in anterior teeth. Extraction of the involved tooth and subsequent replacement with an osseointegrated implant is usually indicated in many cases. This study presents a case management of a maxillary central incisor with perforating internal root resorption in the coronal third of the root. The treatment plan consisted of endodontic treatment with Mineral Trioxide Aggregate, surgical operation, internal bleaching and coronal restoration.

Keywords: Internal inflammatory root resorption, Mineral Trioxide Aggregate, Tooth discoloration

INTRODUCTION

Internal root resorption is a particular group of pulp disease established by the loss of dentine as a result of the action of clastic cells stimulated by pulpal inflammation [1]. This type of resorptive defect is developed following necrosis of odontoblasts and is associated with chronic partial pulp inflammation and partial pulpal necrosis [2].

Internal inflammatory root resorption is usually seen following traumatic injuries, orthodontic tooth movement, or chronic infections of the pulp [3]. It is typically insidious process and is detected coincidentally during routine radiographic examinations [4]. Extensive tissue loss could be associated with internal root resorption and It is often unrestorable. In more complicated situations, some clinicians may advise extraction of the tooth and implant treatment, aiming at a more predictable outcome [5].

In view of the fact that maintenance of the tooth, especially in the anterior region, is of utmost importance for the patient from socioeconomic and especially psychological stand-points [5, 6], Root canal treatment remains the treatment of choice for internal root resorption since it removes the granulation tissue and blood supply of the clastic cells [7].

Marginal bone loss, the effect of disinfection procedures is improved by the use of calcium hydroxide as an interappointment dressing. Calcium hydroxide as an intracanal medicament also leads to control the bleeding, and necrotizes residual pulp tissue [8].

The material used for root canal filling needs to be flow able to seal the resorptive defect. When the root canal has been perforated, MTA is the material of choice to seal the perforation because of its advantageous properties such as biocompatibility, bioactivity, and well tolerance by periradicular tissues [8].

Surgical management should always be performed in a second intention, after orthograde treatment. Surgical approach is considered, when it is not feasible to get access directly to the lesion through the canal. In these cases, because of the shape of the lesion, surgical treatment allows to get direct access to the lesion and to carry out a mechanical cleaning of the resorbed defect [1].

Potential of discoloration as a known drawback of MTA has been reported in several studies [9, 10], that may be reversible with a simple walking bleach method [11].

CASE REPORT

A 30-year-old female patient attended the endodontic department of Shahid Beheshti Dental School, Tehran, Iran, with a chief complaint of pain in the mandibular right molar. Her medical history was non-contributory. Examination of the orthopantomogram radiograph revealed an internal resorption in the Maxillary right central incisor. The patient reported no pain or discomfort associated with her tooth.

A Periapical radiograph was taken for a more precise assessment. In the coronal third of the root internally, the presence of an oval radiolucency was noticeable. The radiolucency appeared to be continuous with the distal radicular surface, indicative of a perforating resorptive defect. After analysis of the clinical and radiographic data, endodontic treatment to access the perforation site was planned. The chance of preserving tooth was considered throughout a combination of root canal therapy and internal MTA repair.

During the first session, after placement of a rubber dam, the coronal access was achieved. Probing the coronal third of the canal space induced a profuse bleeding. The root canal was negotiated and patency was checked. Working length was determined using an apex locator (Root ZX, J. Morita MFG. Corporation, Kyoto, Japan) and confirmed by radiography. Protaperrotary file system (Dentsply-Maillefer, Ballaigues, Switzerland) and irrigation with 2.5% sodium hypochlorite were used to clean and shape the canal.

The canal was dried with paper points and Ca (OH)₂ paste was inserted in to the canal as an interappointment medicament to alkalinize the environment, remove remaining pulp tissue and control bleeding at the perforation site.

After 10 days, Ca (OH)₂ was flushed out the canal with 2.5% sodium hypochlorite solution, followed by final irrigation with 2 ml of EDTA 17% for 3^{min} and drying with absorbent paper points.

The canal space was filled with white MTA (MTA Angelus, Londrina, PR, Brazil) inserted by means of an MTA carrier and condensed with a size 40 gutta condenser (Denstply Maillefer) in order to remove air inclusions from the material. Then an immediate postoperative radiograph was taken,

confirming acceptable filling of the root canal and resorptive defect.

After application of MTA, a cotton pellet soaked in saline was placed to stimulate material setting, and the cavity was sealed with temporary restorative material. In the following session, 24 hours later, MTA setting was checked and the coronal opening on the palatal aspect was restored with composite.

In the 1 month follow-up session, clinical examination revealed a mild swelling in the bucculgingiva of the tooth and the patient reported mild pain, so an exploratory surgery was indicated to detect the origin of the discomfort.

A full thickness mucoperiosteal flap was performed. Elevation of the buccal flap revealed the resorption of the buccal cortex of the tooth. The excess MTA was penetrated into periodontal tissue resulting in to the pain and swelling. The additional MTA was removed and the MTA adjusted in the perforation area to achieve enhanced adaptation and improve the seal. The flap was sutured and the patient was recalled one week later for suture removal.

4 months after endodontic treatment (2 months after surgical repair), the patient was completely asymptomatic. Although the tooth remained functional; it was discolored to a gray tone. Therefore, internal bleaching was intended to improve the esthetic results. The composite restoration and MTA material in the pulp chamber were cautiously removed with a high-speed size 2 round stainless steel bur using water coolant. A mixture of sodium perborate and saline was placed in the access cavity to internally bleach the crown, and then the access cavity was sealed with intermediate restorative material for one week.

One week later the tooth was assessed, aesthetic result was acceptable, so the internal bleaching paste was removed. The access cavity was subsequently restored with composite.

The patient attended her recall appointment after 9 months with no sign or symptom. Clinical and radiographic examination didn't reveal any abnormal finding. The tooth and periodontal tissues were functional with no discomfort, pain and esthetic defect (Fig 1).



Fig-1: A-Preoperative radiography. B- Working length determination C- Postoperative radiography. D, E- MTA repair in surgery. F- Radiography after surgery . G- MTA discoloration H- After Bleaching k- follow up

DISCUSSION

Root perforation as a result of the extensive internal resorption makes the prognosis of endodontic treatment complicated due to weakening of the residual tooth structure and potential periodontal involvement [12, 13]. Nowadays, Many clinicians deal with the dilemma of whether to treat a tooth with a questionable prognosis endodontically or extract it and subsequently place an implant [6, 13]. This study shows the significance of maintaining the tooth for the patient, compared to placement of an implant.

Perforations caused by internal resorption may be asymptomatic. In this report, the patient did not report any pain or swelling at the first session, and presence of a root resorption was an incidental finding during radiological examination [14].

The aim of using calcium hydroxide dressing between sessions was dissolving remaining pulpal

debris, alkalizing the root canal environment and controlling bleeding. In the second appointment, the defect in the canal was filled with MTA to seal the perforation and fill the resorbed area. In the present case, MTA was preferred because of its acknowledged abilities as a repair material, along with its high sealing capability and mechanical strength [15].

One of the major reported shortcomings of MTA is tooth discoloration, and this may be an esthetic concern when applied on the anterior teeth. A number of hypotheses have been proposed for the origin of MTA tooth discoloration [10, 16, 17]. In our case, the cement discolored the tooth as same.

Several methods have been recommended on how to overcome the discoloration caused by MTA. Belobrov and Parashos [11] reported on a case in which the tooth was bleached by using sodium perborate mixed with saline to resolve discoloration that occurred

17 months after MTA pulp capping. In this study removing the discolored MTA material improved aesthetic outcome [11]. These results confirmed data from study by Jang *et al* [18]. Akbari *et al.* [19] stated that applying dentin bonding agent before MTA could prevent tooth discoloration. Thus, we can deduce that the use of bleaching agent combined with removing discolored MTA have the best aesthetic result.

Surgical endodontic approach is considered in cases with difficulty in access for conventional nonsurgical treatment or retreatment, or where access to the periapical area is essential to aid diagnosis [20]. In this case, exploratory surgery was suggested because of unknown reason of swelling after treatment. During the surgery, adjusting the MTA in the perforation area was done in order to achieve enhanced adaptation.

CONCLUSION

The use of biomaterials, such as MTA, in teeth with perforating internal root resorption have shown most favorable results, as established by clinical and radiographic examination after a follow-up of over 12 months and this might provide as an excellent alternative to implant placement.

Despite the hopeful biological and mechanical properties of MTA, considerable tooth discoloration may occur, highlighting the need for further research.

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