

Case Report

Treatment of perforating internal root resorption with MTA: a case report

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Abstract: Endodontic treatment of teeth with perforating internal root resorption represents a clinical challenge. In most cases, extraction of the tooth and subsequent replacement with an osseointegrated implant is indicated. Presented herein is a case report of a maxillary lateral incisor with advanced perforating internal root resorption in the middle third of the root and the presence of a sinus tract. Mineral Trioxide Aggregate (MTA) was used with the aid of a surgical microscope in order to fill the resorption area after conventional root canal therapy of the apical segment. At the follow-up after 11 years and 8 months, the patient was clinically asymptomatic and the sinus tract had disappeared. The radiographic examination and computerized tomography indicated periodontal bone repair. (*J Oral Sci* 54, 127-131, 2012)

Keywords: implant; MTA; perforating internal root resorption.

Introduction

Internal root resorption in permanent teeth is a complex

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interaction of inflammatory and resorbing cells, resulting in the formation of multinucleated giant cells and resorption of dental hard tissues (1). Traumatic injury, infection and orthodontic treatment have been suggested as etiological factors for internal resorption (2).

Clinically, the condition is usually asymptomatic and detected by routine radiographic examination which reveals a round-to-oval radiolucent enlargement of the pulp space (1,2). The margins are smooth and clearly defined with distortion of the original root canal outline. The treatment of this condition should be initiated as soon as possible to prevent further loss of hard tissue or an eventual root perforation (2).

In advanced stages, it is often very difficult to distinguish external from internal root resorption (1,2) and aiming at a more predictable outcome some clinicians suggest extraction of the tooth and implant treatment (3). However, maintenance of the tooth, especially in the anterior region, is of utmost importance for the patient from socioeconomic and especially psychological standpoints (3,4).

Therapeutically, the biomaterial employed can influence the prognosis of the nonsurgical endodontic treatment done for extensive internal root resorption (5). MTA is most commonly used in these cases because of its sealing ability, biocompatibility and potential induction of osteogenesis and cementogenesis and also it can be used in a humid environment, (5,6). Another study using an experimental immature tooth model, demonstrated



Fig. 1 The sinus tract.



Fig. 2 Radiographic examination suggested perforating internal root resorption.



Fig. 3 Root canal with calcium hydroxide dressing.



Fig. 4 Extrusion of calcium hydroxide dressing through the sinus tract.



Fig. 5 Buccal mucosa with no sinus tract.

that the MTA also increased the fracture resistance of bovine incisors when submitted to different reinforcement treatments (7).

Surgical microscopes, as well as computerized tomography, are important technological resources used in the endodontic clinic and they greatly improve the diagnosis, clinical procedures, and post-treatment follow-up (1).

This article describes a case of perforating internal resorption, which initially had a poor prognosis, but evolved favorably after application of MTA with the aid of a surgical microscope and follow-up for more than a decade.

Case Report

A 32-year-old female patient attended the endodontic clinic at Pontifical Catholic University, Belo Horizonte, MG, Brazil, complaining of recurrent pain and inflammation in the buccal region of the maxillary right lateral incisor. The tooth had been traumatized in a bicycle accident during childhood, which was followed by root canal treatment. A sinus tract was observed upon clinical examination (Fig. 1). Radiographic examination revealed faulty endodontic treatment, with inadequate shaping and filling. The presence of a radiolucent image was also noted in the middle third of the root internally, in addition to a circumscribed bone rarefaction at the same level, suggesting perforating internal root resorption (Fig. 2).

During the first session, after placement of a rubber dam, the root canal filling was removed with the aid



Fig. 6 Apical root canal filling.

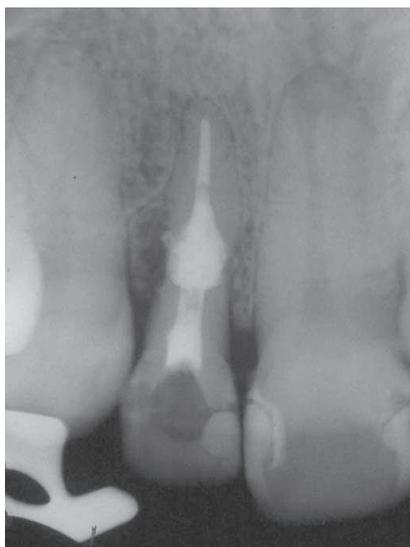


Fig. 7 MTA inserted into the resorption area.



Fig. 8 Radiographic examination after 11 years and 8 months revealed bone formation lateral to the resorption area.

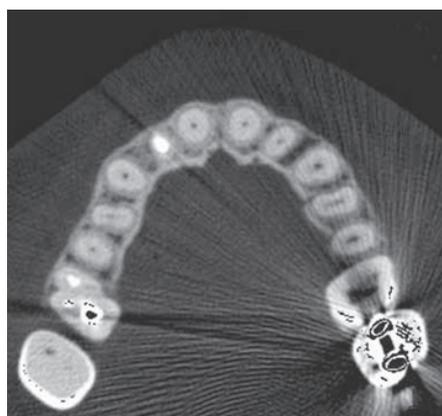


Fig. 9 Healing process was observed by normal ossification of the interdental bone septa adjacent to the tooth root on CT.

of eucalyptol and K-files, under a surgical microscope (DF Vasconcellos, Belo Horizonte, MG, Brazil) at a magnification of $16\times$. The canal was then gently irrigated with 2.5% sodium hypochlorite using a 27-gauge needle connected to a disposable 5-ml syringe with simultaneous aspiration in order to avoid accidental injection of hypochlorite into the periodontal tissues. After determination of the working length (WL) 1 mm short of the apex, chemo-mechanical preparation was performed with K-files up to #50 by the step-back technique followed by final irrigation with 17% EDTA solution (Biodinâmica Química e Farmacêutica Ltda, Ipirorã, Paraná, Brazil) for 3 min. Next, a calcium hydroxide paste with saline was applied for 30 days (Fig. 3). After coronal sealing with Cavit (3M ESPE, Seefeld, Germany), the rubber

dam was removed and extrusion of paste was observed through the sinus tract (Fig. 4).

The root canal dressing was changed 4 times in an 8-month period, by the end of which the sinus tract had disappeared (Fig. 5). Before root canal obturation, the calcium hydroxide paste was removed from the root canal using the working length file and the canal was irrigated with 2.5% sodium hypochlorite solution, followed by final irrigation with 2 ml of EDTA for 3 min and drying with absorbent paper points. With the aid of a calibration ruler, a medium point extending up to 1 mm from the WL was selected and then passively inserted into the root canal with a small amount of endodontic sealer (Pulp canal sealer, Kerr Sybron Dental Specialties, Glendora, CA, USA), taking care to avoid extrusion into the resorbed area. The point was partially removed using the System B (SybronEndo Corporation, Orange, CA, USA) with a Buchanam FM (fine medium) plugger (Analytic Endodontics, Redmond, WA, USA) in the touch mode at 200°C and full power at 10 s, leaving 4 mm of apical filling (Fig. 6). Subsequently, aided with the surgical microscope, MTA (Gray Pro Root Maillefer, Ballaigues, Switzerland) was inserted with slight pressure into the resorption area with the aid of an amalgam carrier and Schilder pluggers, after which a periapical radiograph was taken (Fig. 7). After placement 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 light-cured resin. In the follow-up after 11 years and 8 months, clinical examination revealed that the patient had no symptoms, the sinus tract had disappeared and the adjacent soft tissues had a normal configuration. The radiographic examination (Fig. 8) and the computerized tomography with axial volumetric acquisition showed periodontal bone repair characterized by normal ossification of the interdental bone septa adjacent to the tooth root (Fig. 9).

Discussion

Extensive internal resorption may complicate the prognosis of endodontic treatment due to weakening of the remaining dental structure and possible periodontal involvement (2,8). In modern dentistry, patients demand more than restoration of function; they are particular about the esthetics as well, especially in the anterior region. The patient's smile line, the periodontal biotype, the presence of the interproximal papilla, the positioning of the implant and soft tissue preservation are critical factors to be considered during implant placement (3,4). Many clinicians face the dilemma of whether to treat a tooth with a questionable prognosis endodontically or extract it and subsequently place an implant (4,8). The present study shows the psychological, aesthetic, functional and economic importance of maintaining the tooth for the patient, compared to placement of a prostheses or osseointegrated implants.

The surgical microscope is used for routine endodontic procedures because it enhances visibility and lighting. Another advantage is the improved visualization of root canal anatomy, which enables the operator to thoroughly examine the root canal system and clean and shape it more efficiently (9). In the present case, use of the microscope facilitated removal of the filling in the niches of resorption, determination of the extent of resorption, and sectioning of the apical segment of gutta-percha and assisted in correct insertion of the MTA.

In the present case, the inferior root canal filling most likely contributed to contamination of the canal. Therefore, adequate root canal cleaning and shaping was followed by application of calcium hydroxide because MTA had a lower antimicrobial activity compared to that of calcium hydroxide, possibly due to reduced ion diffusion of hydrated products over time (10).

Evidence of a long-term positive outcome supports the application of MTA for treatment of root perforation originating from internal/external resorption (2,5). Moreover, it can be concluded that the use of MTA in

situations where extensive dental destruction is found may lead to an increase in resistance (7).

CT provides a three-dimensional view, resulting in a superior diagnostic performance over conventional radiographic images. Failure of the conventional periapical radiographic examination to diagnose periapical lesions does not justify the routine use of CT examinations in endodontic therapy; however, the technique can be used if more information is needed for the management of bone formation (2).

During treatment planning, the decision to extract the tooth and place an implant rather than endodontically treating it must be carefully considered, since it may well be the final treatment option offered to the patient.

The use of biomaterials, such as MTA, in teeth with perforating internal root resorption gave optimal results, as demonstrated by clinical, radiographic, and CT examination after a follow-up of over 11 years and this might serve as an excellent alternative to implant placement.

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