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CASE REPORT

Nonsurgical Management of a Central Incisor with severe Internal Resorption and an Immature Apex

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ABSTRACT

Resorption is a pathologic process that always confuses the dentists with its varied etiologic factors and clinical presentations. Resorption can be classified into internal and external. Internal resorption lesions are notoriously difficult to manage because of their irregular and aberrant root canal anatomy. Immature apexes also possess a similar clinical challenge because of the absence of an apical stop. This article describes the nonsurgical management of a central incisor with severe internal resorption and an immature apex utilizing single-step mineral trioxide aggregate apexification along with injectable gutta-percha obturation.

Keywords: Calcium hydroxide, Injectable gutta-percha obturation, Internal root resorption, Mineral trioxide aggregate, Open apex.

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INTRODUCTION

The glossary of the American Association of Endodontics defines resorption as a condition associated with either a physiologic or a pathologic process resulting in loss of dentin, cementum, or bone.[1] While physiologic resorption is seen as a part of exfoliation of deciduous teeth,[2,3] pathologic resorption can occur following traumatic injuries, orthodontic tooth movement, or chronic infections of the pulp or periodontal structures.[1]

Root resorption is classified based on location as either internal or external.[3] While external resorption commonly affects the external root surface, internal resorption affects the internal surface of the root canal. Internal resorption may be further classified as internal inflammatory resorption and internal replacement resorption.[1] Internal root resorption in permanent teeth is a complex interaction of inflammatory and resorbing cells, resulting in the formation of multinucleated giant cells and the resorption of dental hard tissues.[4] Internal resorption if untreated can proceed to perforate into the periodontal ligament space and finally lead to the loss of the tooth.[5] Maintenance of the tooth, especially in the anterior region, is of utmost importance to the patient from both socioeconomic and psychological standpoints.[6,7] Incomplete apical development can occur as a sequalae of trauma or root canal infection during the stage of root development. It poses a challenge to the dentist for carrying out root canal treatment (RCT) due to the absence of a well-defined apical matrix.

Mineral trioxide aggregate (MTA) is commonly used for apexification procedures because of its sealing ability, biocompatibility, potential for induction of hard tissue formation, and ability to set in a moist environment.[8,9] Injectable gutta-percha obturation techniques are usually preferred for obturation of aberrant root canal anatomies due to its ability to flow into and fill all the defects and spaces. This article describes a nonsurgical management of an anterior tooth with severe internal resorption and an open apex with a single-step MTA apexification and thermoplasticized gutta-percha obturation.

CASE REPORT

A 26-year-old male came to the Department of Conservative Dentistry and Endodontics, Sri Sankara Dental College, Varkala, Thiruvananthapuram, India, with a complaint of recurrent pain in relation to maxillary right central incisor since 1 month. The patient reported that his tooth had been traumatized in an accident during childhood but had no recollection of the exact age at which it occurred. On clinical examination, the maxillary right central incisor was seen to be slightly discolored but did not show evidence of any fracture. Periapical radiograph revealed a well-delineated ballooned out enlargement of the pulp space in the cervical and apical third of the root canal (Fig. 1). After the clinical and radiographic examination had been completed, a diagnosis of internal resorption with an immature apex was made. A three-stage treatment was planned.

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Fig. 1: Preoperative X-ray

Fig. 2: Working length X-ray

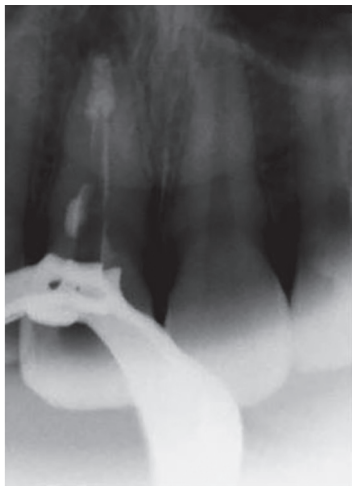

Fig. 3: After MTA placement

Fig. 4: Obturation using injectable gutta-percha

During the first session, after placement of rubber dam, access cavity preparation was done and canal was negotiated. Working length (WL) was determined (WL = 23 mm) (Fig. 2) and root canal system was debrided using stainless steel K-files to a master apical file size of 50 under normal saline and chlorhexidine irrigation. Biomechanical Preparation was performed by step-back technique. As this was an internal resorption case, we relied more on chemical disinfection than mechanical debridement. Sodium hypochlorite (NaOCl) was not used as irrigant here because of its cytotoxic features, and its apical extrusion due to open apex can cause tissue necrosis, hemolysis, marked cell injury in endothelial cells, and fibroblasts.[10] Chlorhexidine (0.2%) was used as an alternative irrigating solution to NaOCl, especially in cases of open apex because of its lower cytotoxicity.[11] Final irrigation was done with 17% ethylenediaminetetraacetic acid (EDTA). Canal was dried with paper points and calcium hydroxide applied as an intracanal medicament with one application per week for a 2-week period.

In the second stage after removal of intracanal medicament by copious irrigation and use of K-files, a 5 mm MTA apical plug (MTA Angelus) was placed in the apical region with the aid of a messing gun and hand pluggers in order to seal the immature apex (one-step apexification) and apical internal resorption defects. Periapical radiographs were then taken to determine the quality of the MTA seal (Fig. 3). After placement of MTA, a moist cotton pellet was placed in the canal to accelerate the setting of MTA and the cavity was sealed with temporary restoration material.

In the third stage, after 48 hours, the consistency of the plug was checked. Before root canal obturation, the canal was dried with absorbent paper points and obturation done using injectable gutta-percha technique. Following this, a periapical radiograph was taken and on examination the gutta-percha was seen to have flowed into and filled all the defects satisfactorily (Fig. 4). The coronal opening was restored with composite restoration (Fig. 5). In the follow-up after 6 months, the patient had no symptoms (Fig. 6).

Fig. 5: Postoperative X-ray

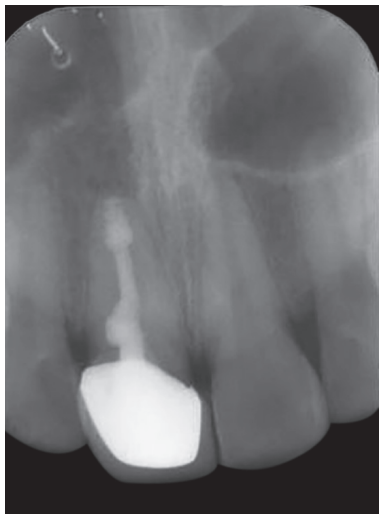

Fig. 6: After 6 months recall

DISCUSSION

In recent times, most patients are extremely concerned about esthetics, especially in the anterior region. Most patients prefer to maintain their natural teeth at any cost. Therefore, many dentists face the dilemma of whether to treat a tooth with a questionable prognosis endodontically or extract it and place an implant.[7,12] Here, we have presented such a case where a tooth with a questionable prognosis was managed satisfactorily by a nonsurgical approach.

An internal resorption usually results in an irregular root canal anatomy, i.e., difficult to clean and fill accurately. An open apex also creates difficulty in carrying out a satisfactory RCT due to the absence of an apical stop. As this was an internal resorption case with open apex, we relied more on chemical disinfection with saline, chlorhexidine, and EDTA than mechanical debridement as excessive shaping would have weakened the remaining dental structure. Calcium hydroxide dressing was provided for 2 weeks because MTA has a lower antimicrobial activity compared with that of calcium hydroxide, due to reduced ion diffusion of hydrated products over time.[13]

Mineral trioxide aggregate was used for apexification procedure in this case due to MTA apexification being a single-step procedure, while a calcium hydroxide apexification requires multiple appointments and a long duration. An MTA apexification also allows the obturation to be carried out in the next step, while the use of calcium hydroxide imposes an inordinate delay. Here we have used thermoplasticized gutta-percha obturation using Obtura II device, as only thermoplasticized gutta-percha in such cases is able to flow into and fill the irregular resorption defects and provide a satisfactory seal.

CONCLUSION

At the completion of treatment, we were able to fulfill all the goals we set out with, namely to maintain the tooth in an esthetically and functionally satisfactory condition while utilizing a nonsurgical conservative approach. The application of modern endodontic technologies allowed us to fulfill this aim, thus negating the need for extraction and expensive rehabilitation.

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