

Endodontic management of perforating internal resorption in a mandibular molar using sandwich technique

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ABSTRACT

Internal inflammatory root resorption is an uncommon pathology that can progress to the periradicular vicinity. It is frequently asymptomatic and only discovered during a radiological screening. Appropriate and timely diagnosis is extremely crucial in tackling these cases. A perforating internal resorptive cavity in the distal root of the mandibular first molar was successfully managed using a sandwich concept of sectional apical obturation with gutta-percha and Bioceramic sealer followed by the placement of mineral trioxide aggregate in the resorptive cavity.

Keywords: Bioceramic sealer, internal resorption, mandibular first molar, mineral trioxide aggregate

INTRODUCTION

Internal inflammatory root resorption (IRR) is an infrequent resorptive pathology that originates in the root canal and progresses to the periradicular tissues.^[1] A complicated relationship exists between inflammatory and resorbing cells that create granulomatous tissues and giant cells that resorb dentin.^[2] Although the evidence is inconclusive, the most usually related causes are trauma, chronic bacterial invasion, and restorative or orthodontic intervention.^[3] It is most typically observed in the cervical region although it has also been documented in other locations of the root canal.^[4]

Diagnostically, IRR is frequently asymptomatic and is initially identified on radiographic imaging, when it appears as a round-to-oval radiolucent enlargement of the pulp space, with smooth, well-defined boundaries and root canal space distortion.^[5,6] The correct diagnosis is essential in the management of this ailment.^[7] The condition begins inside the root canal with the deterioration of vital pulp

and, if not treated promptly, progresses to the root surface, damaging adjacent periradicular tissues.^[2] It is habitually hard to distinguish it from external root resorption once it reaches the external tooth surface.^[8] Cone-beam computed tomography (CBCT) is critical in determining the degree, distribution, and location of a lesion.^[9] However, due to a variety of factors such as financial constraints or lack of availability, CBCT is not always viable in all circumstances. Magnification also aids in exploring and treating the lesion clinically.^[10]

The biomaterial employed to treat these lesions has a significant impact on the outcome of such teeth. Bioactive materials are favored above conventional perforation repair materials.^[8] Furthermore, the smaller the clinical perforation size, the more predictable the tooth's prognosis.^[11] In such situations, mineral trioxide aggregate (MTA) is the

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most usually employed material.^[12] It exhibits outstanding qualities such as sealability, biocompatibility, radiopacity, antibacterial actions, moisture resistance, and bioactivity.^[13] As a consequence, MTA is a suitable material that aids in sealing the perforation site and regeneration of the exterior damaged tissues, as well as the stimulation of osteogenesis and cementogenesis.^[14,15]

CASE REPORT

A private general dentist referred a 25-year-old male patient to Oman Dental College's Endodontology Clinic for an assessment concerning tooth #46. The patient had no prior medical history. The patient had seen the referring dentist a week before, and the dentist had initiated an endodontic access cavity since the patient had been in a lot of discomforts with tooth #46 for a few days. The referring dentist identified a lesion on the initial periapical radiograph and sent the patient to our department for additional examination and treatment completion by a specialist.

A roughly oval radiolucency was detected at the middle and apical third interface of the root canal in the distal root of tooth 46, as well as a radiolucent lesion at the same level in the alveolar bone. A periapical radiolucency associated with the mesial root was also seen [Figure 1a]. After explaining the advantages, the patient was advised CBCT scanning but failed to give us any consent for the same. Both he and his parents were skeptical due to radiation. Hence, we had to opt CBCT out.

The radiographic findings identified it as perforating internal resorption, and root canal therapy was undertaken. The patient's consent was obtained. A rubber dam was placed to isolate the tooth, and the therapy was initiated under a dental operating microscope (OPMI Pico Dental Microscope: Zeiss, Oberkochen, Germany). When the temporary material was removed and access to the pulp chamber was gained, bleeding from the distal canal was encountered [Figure 1b].

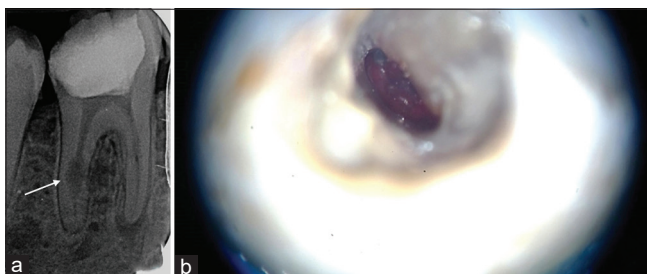


Figure 1: (a) Preoperative radiograph showing internal perforation defect (white arrow) along with the presence of periradicular lesion at the site of internal perforation. (b) Magnified image of the bleeding from the perforation site inside the distal canal

Anesthesia was administered accordingly. The canal was dried, and granulation tissue could be seen upon drying. After crown down preparation with ProTaper SX and irrigation with 2.5% sodium hypochlorite, the presence of the root canal through the granulation tissue could be observed. Working length was determined electronically (Root ZX mini; J. Morita, USA) in the mesial canal and adjusted radiographically in the distal canal [Figure 2a]. The inflamed granulation tissue could be seen clearly under magnification. Calcium hydroxide (UltraCal XS; Ultradent Products Inc., South Jordan, UT, USA) was placed as a temporary dressing as granulation tissue could not be eradicated.

The patient was recalled after 1 week. The granulation tissue was removed, and communication with the external root surface was evident and localized. Rotary endodontic files (ProTaper Gold; Maillefer Dentsply, Ballaigues, Switzerland) were carefully used for mechanical instruments. The canals were cleaned and shaped till F2 up to the entire working length. Care was taken not to perform overzealous instrumentation in the root canals and not to touch the tissue surrounding the perforation site; otherwise, it would have induced bleeding. Once the mechanical instrumentation was complete, the part of the canal apical to the resorptive defect was obturated with the corresponding gutta-percha and Bioceramic sealer (TotalFill, FKG, Switzerland) [Figure 2b]. The obturation was verified on the radiograph [Figure 2c].

The resorptive defect sealed with white MTA (Produits Dentaires, Vevey, Switzerland) was gently condensed into the resorption cavity using an MTA carrier (Micro Apical Placement System, Produits Dentaires, Vevey, Switzerland) and root canal pluggers (Maillefer Dentsply) [Figure 3a]. The access cavity was plugged with a moist cotton pellet, and the tooth temporized with glass ionomer cement filling (Ketac-Fill; 3M Espe, Seefeld, Germany). After checking the set of MTA in the final visit, the distal canal was backfilled with thermoplasticized gutta-percha.

The mesial canals were obturated with gutta-percha and Bioceramic sealer (TotalFill, FKG, Switzerland) using a single cone obturation technique [Figure 3b]. The obturation was verified on the radiograph [Figure 3c]. The access cavity was restored with glass ionomer filling (Ketac-Fil), and the patient was sent back to the referring dentist for a postendodontic full-coverage restoration. 12-month recall showed symptomless tooth, with no tenderness to percussion, and sound healthy gingiva with no periodontal pockets on probing. Evident healing of the lateral lesion could be seen with the distal root.

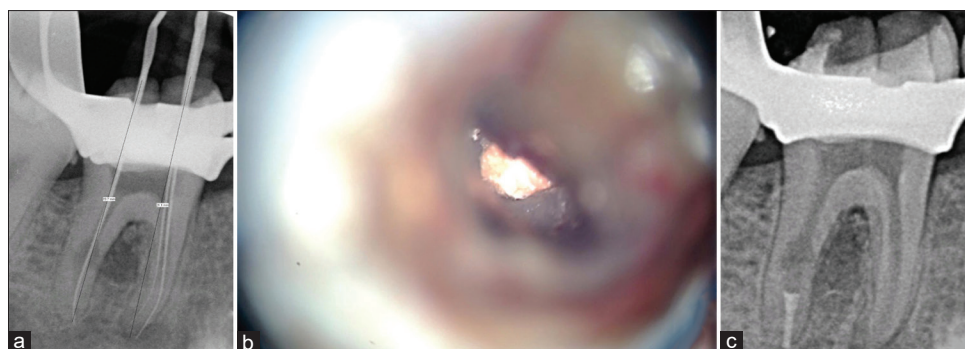


Figure 2: (a) Radiograph showing working length determination. (b) Magnified image of obturation of the apical part of the canal with GP. (c) Radiographic verification of the obturation of the apical part of the canal

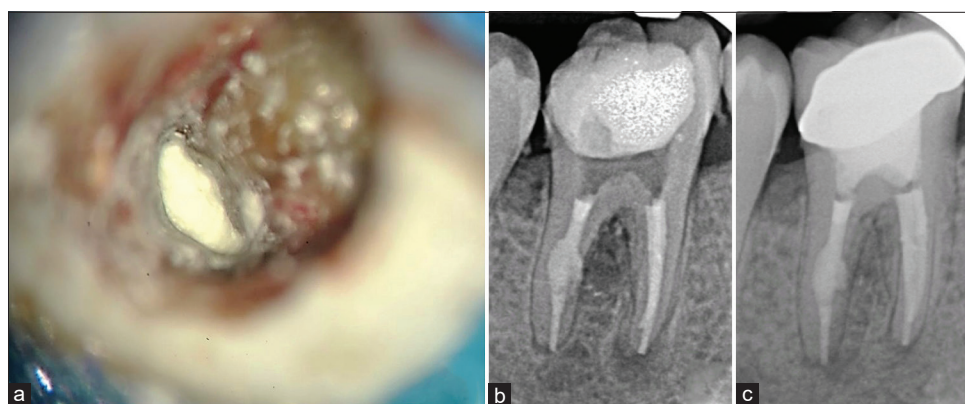


Figure 3: (a) Mineral trioxide aggregate placed and the perforation site sealed. (b) Radiograph showing complete obturation along with sealed perforation. (c) One year recall showing significant healing of the lateral lesion along with the sealed perforating internal resorption defect

DISCUSSION

MTA is a biocompatible material that can promote the formation of cementum surrounding the furcal perforation.^[16] MTA has also demonstrated encouraging results in therapeutic applications for mending perforations in the presence of moisture and preventing bacterial activity.^[17]

Internal resorption was determined as the lesion in this case. The diagnosis was verified upon accessing the mesial canal system based on the radiographic evaluation (clearly defined outlines, uniform density, and root canal walls appear to inflate out) and clinical (inability to probe the lesion via the periodontal ligament) aspects. A three-dimensional image of the CBCT was suggested, but the patient could not finance it. Granulation tissue could be seen filling the middle and apical junction of the root canal after opening the distal canal. Although the most internal resorptive lesions are symmetrically distributed, the site was eccentric in this case. Other scholars have also described this.^[7,18]

We chose to prepare the apical part of the distal canal up to ProTaper Gold F2. Furthermore, the successful use of calcium hydroxide in conjunction with mechanical equipment enabled

the removal of residual tissue after the calcium hydroxide paste had been in place for 1 week. The literature is replete with reference to these tissue-dissolving characteristics.^[11,19]

There are several capable of treating perforating internal resorptions. In certain circumstances, surgical treatment may be the only choice.^[12] Others have advised the use of calcium hydroxide for remineralization and the creation of a hard tissue matrix against which to condense the root-filling material.^[20] However, in this case, the use of MTA at the perforation site was preferred over surgical intervention or extended calcium hydroxide therapy. Apical obturation using gutta-percha created an apical barrier that prevented MTA from filling the canal's apical portion.

MTA effectively sealed the defect, allowing a conventional root canal-filling procedure to be used. MTA was carefully condensed to prevent it from extruding laterally in the periradicular region. The gutta-percha coronal obturation sandwiched MTA between two segments of gutta-percha (GP), establishing a solid apical and coronal seal. Furthermore, the good physiologic response to MTA and entire resolution of the alveolar bone lesion had happened by the time of a 1-year follow-up visit. MTA, in fact, increases the

proliferation of human osteoblasts by providing the cells with a physiologically active substrate.^[14]

Using a surgical operation microscope was demonstrated to be extremely beneficial in the management of nonsurgical perforation repair. The illumination and magnification aided in the accurate evaluation of the resorptive cavity and placement of the repair material. Furthermore, specifically engineered armamentariums, such as the Micro Apical Placement device with bioactive material MTA, aided in this operation.

CONCLUSION

The case presented here was successful both clinically and radiographically, with complete healing of the radiolucency in the alveolar bone and a continued absence of clinical symptoms. The tooth was asymptomatic after 1 year, and the patient was pleased with the treatment outcome.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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