Case Report

Management of perforating internal inflammatory resorption in the distal root of mandibular first molar with mineral trioxide aggregate

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ABSTRACT

Internal inflammatory resorption if not detected in the early stages can result in perforation. Once diagnosed, root canal therapy must be initiated immediately, followed by repair of the perforation. This report presents a case of perforating internal inflammatory resorption in the distal root of a mandibular first molar. The canal was thoroughly debrided and calcium hydroxide was placed as an intracanal medicament. After 1 week, the perforation was repaired by complete mineral trioxide aggregate obturation of the distal canal. The biologic properties of MTA aid in sealing the perforation and periapical healing.

Key words: *Internal inflammatory resorption, perforation, mineral trioxide aggregate*

Internal inflammatory root resorption is a relatively rare occurrence and usually follows chronic inflammation of the pulp or trauma [1]. Damage to the odontoblast layer and predentin results in exposure of the underlying mineralized dentin to clastic cells which trigger the resorption process. Clinically, the pink tooth is usually associated with internal resorption. However, the tooth will appear "pink" only if the highly vascular granulation resorptive tissue is located in the coronal third of the root [2]. Radiographically, the lesion may appear as a round or pear shaped lesion with smooth margins with disruption of the root canal outline [3]. It could either be transient or progressive in nature [4]. Progressive or active resorption is due to the presence of vital apical pulp tissue which is the source of clastic cells. The nonvital pulp tissue coronal to the resorptive lesion acts as a stimulus for the clastic cells (Figure 1) [2].

Internal resorption is usually asymptomatic in nature. However, if progressive internal inflammatory resorption leads to perforation of the root, the patient may complain of pain or discomfort[4]. The management of a perforating internal resorptive defect would mandate a root canal therapy and repair of the perforation, if the tooth is salvageable [3]. Mineral trioxide aggregate (MTA) is biocompatible and has excellent sealing ability [5]. It has been used in the repair of perforating internal resorption defects [6-8]. However, the prognosis of teeth with perforations would also depend on the location of the perforation and accessibility [9]. This case report describes the management of a perforating internal inflammatory resorption located in the middle one third of the distal root of a mandibular molar with MTA.

CASE REPORT

A 26-year-old male patient reported to the department with chief complaint of continuous throbbing pain in the mandibular right posterior tooth. The pain increased on lying down. The patient's medical history was non-contributory. Dental history revealed restorations done in a private clinic about a year back. Intraoral clinical examination showed a temporary restoration on the tooth

46. There was no colour change in the rest of the clinical crown. The tooth was sensitive to percussion and did not respond to both electric and thermal pulp testing. The preoperative radiograph displayed the close approximation of the restoration to the pulp. The distal root revealed ballooning out of the canal walls in the middle one third of the root, suggestive of internal root resorption. Widening of the periodontal ligament space was evident in relation to both the mesial and distal roots (Figure 2). The diagnosis was symptomatic irreversible pulpitis with apical periodontitis and internal inflammatory resorption of distal root. Following administration of local anesthesia and rubber dam application, access cavity preparation was done for tooth 46. The coronal pulp was nonvital. Two mesial canals and one distal canal were located with an endodontic explorer. The pulp tissue in the mesial canals was nonvital while profuse bleeding was evident on insertion of a no.15 K-file (Dentsply/ Maillefer, Ballaigues, Switzerland) in middle one third of the distal canal. Exploration of the radiolucency in the middle one third of the distal root with a precurved no.15 K-file displayed perforation of the root indicating a perforating internal resorption defect (Figure 3).

Figure 1: Schematic representation of active internal inflammatory resorption, Figure 2: Preoperative radiograph showing ballooning of root canal walls of the distal root, Figure 3: Radiograph demonstrating the perforation due to internal inflammatory resorption

Figure 4: Radiograph after compaction of MTA in the distal canal and repair of the perforation, Figure 5: Radiograph after obturation of mesial canals with gutta percha, Figure 6: Recall radiograph taken after 1 year

Copious 5.25% sodium hypochlorite (NaOCl, Vensons India, Bangalore, India) irrigation was used to dissolve the granulation tissue and cleaning and shaping of the canal was carried out using hand K-files. The mesial canals were instrumented using ProTaper NiTi rotary instruments (Dentsply/ Maillefer, Ballaigues, Switzerland). Following sonic activation (Endoactivator, Dentsply Tulsa Dental Specialties) of NaOCl in the canals and drying with paper points, calcium hydroxide($Ca(OH)_2$), Ca-Excel, Ammdent, India) paste was placed as an intracanal medicament. After 1 week, $Ca(OH)_2$ was flushed out of the canal. Residual $Ca(OH)_2$ from the resorptive defect was removed out with the help of sonic activation and the canals were dried. MTA was mixed in a ratio of 3:1 and carried into the canal with the help of an amalgam carrier (Pulpdent, USA). The entire distal canal was filled with MTA (Angelus, Londrina, Brazil) without use of an internal matrix taking care to compact it well into the resorptive defect with pluggers (Dentsply/ Maillefer, Ballaigues, Switzerland). This was confirmed with a radiograph

(Figure 4). The mesial canals were obturated with gutta-percha (Dentsply/ Maillefer, Ballaigues, Switzerland) and AH plus sealer (Dentsply/DeTrey, Konstanz, Germany) (Figure 5). A moist cotton pellet was then placed over the distal canal orifice and the access cavity was temporized. After 48 hours, the MTA was checked for set and the access cavity was restored with composite resin (Tetri-N-Ceram, Ivoclar Vivadent, Liechtenstein). The patient was asymptomatic at a one year recall and the radiograph showed satisfactory sealing of the resorptive defect and adequate periapical healing (Figure 6).

DISCUSSION

Early detection of internal inflammatory resorption helps to prevent a subsequent root perforation [9]. Non perforating lesions are usually managed with thorough removal of the granulation tissue by root canal therapy. However, in case of a communication with the external root surface, the root canal therapy is followed by repair of the perforation [10]. In the present case, the internal resorption was progressive or active in nature as was evident by the vital apical pulp tissue present in the apical portion of the distal root. However, the tooth did not appear "pink" due to the apical location of the resorptive tissue. Root canal therapy cuts off the blood supply to the granulation tissue [2]. Due to location of the resorptive defect, sonic activation of NaOCl was carried out to aid in dissolution and removal of tissue from the area inaccessible to instrumentation.

The rationale for using calcium hydroxide before repair with MTA is two fold: (1) $Ca(OH)_2$ causes necrosis of any remaining granulation tissue present in the resorption niche (2) $Ca(OH)_2$ neutralizes the acidic environment present in the resorption site by inhibiting the activity of acid hydrolases [11]. It has been recommended to place $Ca(OH)_2$ as an intracanal medicament before placing MTA, as the acidic environment may affect the sealing ability and decrease the hardness of MTA [12]. MTA is a favourable material that releases calcium ions for cell attachment and proliferation, modulates cytokine production and provides a biologic seal by forming hydroxyapatite on its surface [13].

MTA can be used to repair perforating internal inflammatory resorption defects in three ways: (1) non-surgical hybrid techniques (2) surgical hybrid technique (3) complete canal obturation. Non-surgical hybrid technique involves obturation of the canal apical to the defect with gutta-percha followed by repair of the perforation and the resorption defect with MTA [6]. Another non-surgical hybrid technique involves repair of the perforation with MTA followed by complete canal obturation with gutta percha after the complete set of MTA [7]. Surgical hybrid technique encompasses warm vertical compaction of gutta percha in the root canal and the resorption defect followed by surgical repair with MTA. This technique is recommended when there is loss of bone adjacent to the defect indicating the extension of resorption to the external root surface [3].

Complete MTA obturation of the canal and the resorption defect has been advocated over partial canal obturation. However, the handling properties, lack of a good delivery system, difficulty in retreatment and cost limit the use of MTA as an obturation material routinely. However, it may be advantageous in complex cases due to its bioinductive properties [8]. In the present case, complete MTA obturation of the distal canal was carried out due to the location and inaccessibility of the resorption defect. The wide root canal space permitted adequate condensation of the MTA. The patient was asymptomatic and satisfactory healing was seen at a 1-year follow up. Triple antibiotic paste, used alone or in combination with calcium hydroxide has also shown success in the management of resorption lesions [14]. Various other bioceramic materials like Biodentine, Endosequence, Bioaggregate are also proven to be effective alternatives to MTA [15].

CONCLUSION

This case report describes the successful management of perforating internal inflammatory resorption in the distal root of mandibular first molar with complete MTA obturation. This method of repair can be used when access to the resorption defect is difficult to carry out a hybrid repair technique. MTA with its favourable biologic properties provides a good seal and demonstrates better healing.

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