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CASE REPORT

Internal and external resorption in a lower molar with an associated endodontic-periodontic lesion: A case report

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Abstract

This article describes a unique case in which both internal and external inflammatory resorption and endodontic-periodontic lesions were present at the same time in the patient's left mandibular first molar. Based on clinical and radiographic findings, it was determined that the nature of this case was a pulpal infection-induced inflammatory resorption and furcation lesion. After root canal therapy, the furcation lesion and external inflammatory resorption were completely resolved. This case indicates that the correct diagnosis of the stimulating factor for tooth resorption and determination of the primary origin of endodontic-periodontic lesions are critical for clinical management and success.

Introduction

Establishing an accurate clinical diagnosis and identifying the etiological factors in tooth resorption are the keys to success in an effective treatment and case management (1,2). Classifications of tooth or root resorptions have been presented by many researchers and clinicians (2–10). Recently tooth resorption has been categorised into three groups: trauma-induced, infection-induced and hyperplastic invasive tooth resorptions (2). Pulp infections are a common cause for inflammatory resorption (5–8). Root canal therapy is the recommended treatment for pulp infection-induced inflammatory resorption (2,5,8).

This case report shows the unique clinical and radiographic appearance of the presence of both internal and external inflammatory resorptions and a furcation lesion. The purpose of this case report is to describe these unusual findings and the successful management of this case using non-surgical root canal therapy.

Case report

Diagnosis

A 49-year-old Caucasian woman was referred by a general dentist to the University of Connecticut endodontic clinic for the diagnosis and possible root canal treatment of tooth #36 (left mandibular first molar). Her chief complaint was that she had been experiencing pain while biting on her lower back tooth for a week. There was no history of trauma to this area nor was there a history of orthodontic treatment

The patient's medical history was reviewed; she had controlled glaucoma, hypertension, seasonal allergies and asthma. She was taking several medications: (i) Advair (oral inhalation containing fluticasone propionate, 250 μg) and salmeterol (50 μg, bid) for long-term treatment to prevent wheezing and trouble breathing caused by asthma; (ii) Medrol (4 mg, qd) for a decreasing immune response to glaucoma and asthma; (iii) Singulair (5 mg, qd) for asthma prevention; (iv) Clarinex (5 mg, qd) for seasonal allergy relief; (v) Zestoretic (10 mg, qd) for high blood pressure treatment; and (vi) Flonase (two sprays in the each nostril qd) to reduce swelling and inflammation of the nasal passages. There were no known drug allergies and the patient had no contraindications to dental treatment. The American Society of Anesthesiologists Physical Status Scale was Class II.

Clinical examination revealed no lymphadenopathy of the submandibular and neck areas. The perioral soft tissue appeared normal. No popping/clicking or deviation

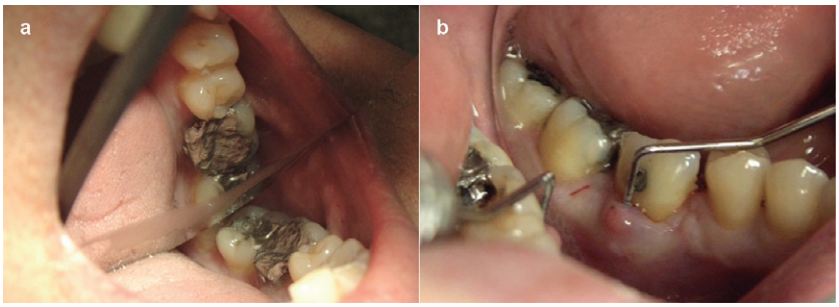

Figure 1 Intra-oral clinical photos. (a) Tooth #36 (left mandibular first molar) with a large MODBL amalgam. (b) 8 mm probing depth in the centre of buccal.

Table 1 Endodontic clinical evaluation summary

Tooth #	35	36	37
Percussion	–	+	–
Palpation	–	+	–
Endo ice	+	–	+
EPT	+	–	+

+, response; –, no response; EPT, electric pulp test.

on opening the temporomandibular joint was observed. The intra-oral examination showed that the soft tissues appeared satisfactory in colour and texture. Her oral hygiene was fair. The patient had several missing teeth and extensive dental treatment. She wanted to save the teeth she had left. A large MODBL amalgam restoration with acceptable margins was present on tooth #36 (Fig. 1a). A localised, firm swelling (2×3 mm) was present on the buccal aspect associated with tooth #36, which was tender to palpation. The probing depth of tooth #36 was 8 mm in the centre of the buccal (Fig. 1b) and 3 mm on the mesial, distal and lingual. By using a Nabers furcation probe, the cul-de-sac furcal defect was explored. The probing depth around teeth #35, #37 and #38 measured 2 to 3 mm around the circumference of the teeth. No bleeding was observed upon probing. No draining sinus tract could be detected. The endodontic clinical evaluations are summarised in Table 1.

The periapical radiograph showed that tooth #36 had an irregularly shaped radiolucency at the area of furcation (Fig. 2a). The diameter of the lesion was approximately 8 mm. Root resorption was observed at the mesial aspect of the distal root and was connected to the furcation. The root resorption was approximately 4 mm long and 2 mm wide (Fig. 2a). The bitewing radiograph of tooth #36 showed internal resorption of approximately 3 mm in diameter in the mesial side of the pulp chamber (Fig. 2b).

Based on the clinical and radiographic information, the pulp diagnosis of tooth #36 was pulp necrosis, and the apical diagnosis was acute apical abscess. The recommended emergency treatment was root canal debridement, and the definitive treatment was non-surgical root canal treatment of tooth #36.

Treatment

The endodontic evaluation and treatment plan and the alternatives (e.g. no treatment or extraction) were discussed with the patient. The patient agreed to the proposed treatment, and informed consent was obtained. Seventy-two milligrams of 2% Lidocaine and 1:100 000 Epinephrine (0.036 mg) were administered for inferior alveolar nerve block and infiltration into the mucosa buccal to tooth #36. The tooth was isolated with a rubber dam. The amalgam was removed, and access was prepared. An internal resorption cavity was noted on the mesial aspect of the pulp chamber, which is above the orifice of the mesial canals. The distal canals were found by refining the access to the distal aspect of the pulp chamber. The constricted canals were negotiated with stainless steel hand files size #06 and RC Prep (Premier Products Company, Plymouth Meeting, PA, USA). The working length was determined using a stainless steel hand file (size #15), along with an electronic apex locator (Root ZX, J. Morita, Irvine, CA, USA), and confirmed with a periapical radiograph (Fig. 2c). As bleeding was encountered when instruments penetrated beyond the external resorption in the distal canals, instrumentation was restricted to the resorption level. The canals were cleaned and shaped using a rotary NiTi file (Endo Sequence, Brasseler, Savannah, GA, USA). The largest instruments used at the apex were: mesial buccal canal at size #30, mesial lingual canal at size #30, distal buccal canal at size #40 and distal lingual canal at size #50. Copious irrigation of 0.5% NaOCl was conducted between instruments. The canals were dried with premeasured medium and coarse paper points. A calcium hydroxide ($Ca(OH)_2$) slurry was applied as an interappointment canal medicament. Cavit (3M ESPE, Saint

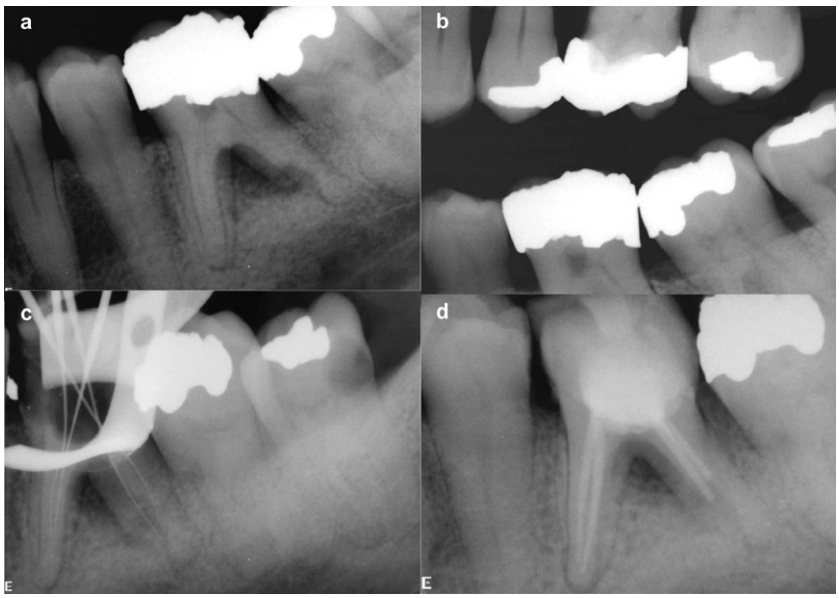

Figure 2 (a) Periapical and (b) bitewing radiograph before root canal treatment. (c) Working length radiograph. (d) Radiograph of immediately after root canal filling.

Paul, MN, USA) and Fuji IX (GC America, Alsip, IL, USA) were used to temporarily seal the coronal access. The occlusion was examined and adjusted.

After 4 weeks, the patient returned to complete the root canal filling. Seventy-two milligrams of 2% Lidocaine and 0.036 mg of 1:100 000 Epinephrine were administered as an inferior alveolar nerve block to infiltrate into the mucosa buccal to tooth #36. The tooth was isolated with a rubber dam, and the temporary restoration was removed. Copious irrigation using 0.5% NaOCl was conducted, and the canals were dried. Master cones were then fitted to the canals, which were filled with gutta-percha points and AH 26 sealer (Dentsply, Konstanz, Germany) using a vertical compaction technique. Excess gutta-percha points were removed with a System B heated instrument (SybronEndo, Orange, CA, USA). A final radiograph was taken (Fig. 2d). Cavit and Fuji IX were used for a temporary seal of the coronal access. The occlusion was examined and adjusted. Postoperative instructions were given to the patient, who was referred back to her general dentist for restoration of tooth #36 and continuation of her treatment plan. The patient was also advised to see her general dentist to treat the caries lesion on tooth #38 (Fig. 2c).

Post-operative follow-up

The patient was asymptomatic at the 3-month recall. She reported that tooth #36 was restored soon after the completion of the root canal treatment. Both the percussion and palpation responses on tooth #36 were negative. The probing depths were all less than 3 mm, and no mobility could be detected on tooth #19. A follow-up radiograph demonstrated significant osseous healing in the furcation and in the distal root resorption area (Fig. 3a).

At the 1-year recall, the patient reported being asymptomatic. Percussion and palpation were negative on tooth #36, and the probing depths were all less than 3 mm. The periapical radiograph showed complete osseous healing in the furcation and distal root resorption areas (Fig. 3b). The treatment was deemed successful. A restoration, which restored the open margin on the mesial and which protected the cusps, was recommended.

Discussion

This case, which includes internal resorption, external resorption and endodontic-periodontic lesions, is possibly unique. The presence of the internal resorption is most likely indirectly related to the presented endodontic-periodontic condition. The pulp may go through a dynamic change from pulpitis to necrosis. The internal resorption was caused by pulp inflammation at the early stage; the pulp then became necrotic which resulted in the endodontic-periodontic lesion and external resorption. Internal resorption is associated with inflammation in the dental pulp, which is conventionally treated by

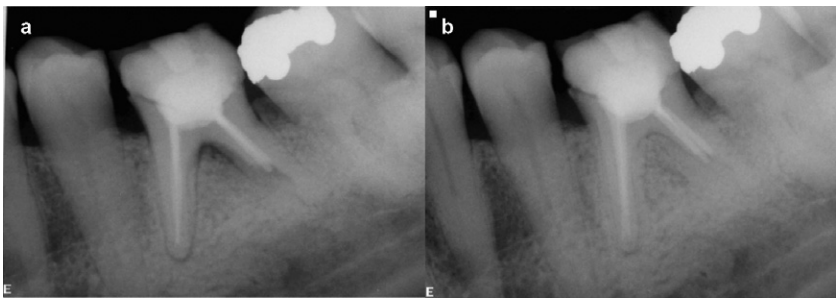

Figure 3 Follow-up radiographs. (a) 3 month. (b) 1 year.

extirpating the pulp tissue (4,5,7,8). In this case, the pulp had become necrotic, so the resorption would have ceased when vital tissue was no longer present. Management of the internal resorption in this case was simple and did not require extra procedures, as the resorption was still confined inside the pulp chamber. If the internal resorption had been found inside the canal, the cleaning and filling of the resorption area would have been more challenging (2,4).

There are several options for the management of external root resorption. Non-surgical root canal treatment using calcium hydroxide slurry for inter-appointment medication followed by the vertical compaction of warm gutta-percha obturation is a simple and effective treatment modality for arresting the resorptive process in inflammatory external root resorption (11). This case used this treatment modality. Historical alternatives include the use of Ledermix (2), which has anti-inflammatory and antibacterial effects (12,13). For root resorption at the apical area, the current options include using mineral trioxide aggregate (MTA) to fill the apical end (14). MTA was considered as an option in this case. However, it was not used, because the master cone was a good fit in the canal from the orifice to the resorption level, and the master cone length could be easily controlled. MTA is more difficult to control when placing deep in the root canal due to its handling property. Special attention was given to several points while handling this case. First, multiple radiographs were used to establish the working length carefully. Appropriate cleaning and shaping of the distal root canal was performed to the level of the resorption site. Second, copious irrigation of the necrotic tissue and microorganism removal in the root canal were performed with 0.5% NaOCl. In this case 0.5% NaOCl was used because studies show that 0.5% NaOCl is effective for antibacterial action and there is no difference between the antibacterial effect of 0.5% and 5% NaOCl (15–17). Third, calcium hydroxide slurry was used to eliminate the microorganisms from the intra-canal environment. Fourth, the overfilling of the root canal space in the opened resorption area was avoided by using the proper size of gutta percha. The tooth could have been left with calcium hydroxide for a longer period of time to wait until the resorption had healed. However, the additional visit(s) may have made patient compliance more difficult.

Based on the clinical findings, the cause of this case was pulp infection, which is the most frequent factor in initiating root resorption (5,8). Other factors causing external root resorption could be systemic abnormalities such as hypophosphatasia, hyperparathyroidism, Paget's disease and renal disease (18,19). Trauma and orthodontic treatment are also factors causing external resorption (8,20,21).

Besides tooth resorption, there were appearances of endodontic-periodontic lesions in this case. The deep pocket was observed only in the furcation area, and no calculus was detected. In the radiographs, the crestal bone levels were normal around the tooth, and only the furcation showed radiolucency. Accordingly, the classification of the endodontic-periodontic lesion in this case is a primary endodontic with a secondary periodontal lesion. The cause of this case was determined to be of endodontic origin, and no periodontal treatment was rendered. The presence of accessory canals is about 30% in the mandibular molar furcation region (22). Pulp infection causes furcation lesions through the accessory canal. The nature of this case was pulpal lesions with the appearance of periodontal pockets accompanied by drainage and swelling. After root canal treatment, the furcation lesion and periodontal pocket were completely resolved.

In summary, this report presents a case of pulp infection causing internal and external resorption and endodontic-periodontic lesion in one tooth. Only root canal therapy was needed for an endodontic infection-induced endodontic-periodontic lesion and inflammatory resorption. The correct diagnosis of the stimulating factor for tooth resorption and determination of the primary origin of endodontic-periodontic lesions are critical for clinical management and success.

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References

1. Frank AL. External-internal progressive resorption and its nonsurgical correction. J Endod 1981; 7: 473–6.
2. Heithersay GS. Management of tooth resorption. Aust Dent J 2007; 52 (1 Suppl): S105–21.
3. Armas JM, Savarrio L, Brocklebank LM. External apical root resorption: two case reports. Int Endod J 2008; 41: 997–1004.
4. Carrotte P. Endodontics: Part 9 Calcium hydroxide, root resorption, endo-perio lesions. Br Dent J 2004; 197: 735–43.
5. Fuss Z, Tsesis I, Lin S. Root resorption – diagnosis, classification and treatment choices based on stimulation factors. Dent Traumatol 2003; 19: 175–82.
6. Andreasen JO. External root resorption: its implication in dental traumatology, paedodontics, periodontics, orthodontics and endodontics. Int Endod J 1985; 18: 109–18.
7. Tronstad L. Root resorption – etiology, terminology and clinical manifestations. Endod Dent Traumatol 1988; 4: 241–52.
8. Bakland LK. Root resorption. Dent Clin North Am 1992; 36: 491–507.
9. Gunraj MN. Dental root resorption. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1999; 88: 647–53.
10. Ne RF, Witherspoon DE, Gutmann JL. Tooth resorption. Quintessence Int 1999; 30: 9–25.
11. Aqrabawi J, Jamani K. Severe external root resorption arrested by conventional endodontic treatment. Dent Update 2005; 32: 224–6.
12. Mohammadi Z, Abbott PV. On the local applications of antibiotics and antibiotic- based agents in endodontics and dental traumatology. Int Endod J 2009; 42: 555–67.
13. Bryson EC, Levin L, Banchs F, Abbott PV, Trope M. Effect of immediate intracanal placement of Ledermix Paste(R) on healing of replanted dog teeth after extended dry times. Dent Traumatol 2002; 18: 316–21.
14. Pace R, Giuliani V, Pagavino G. Mineral trioxide aggregate in the treatment of external invasive resorption: a case report. Int Endod J 2008; 41: 258–66.
15. Bystrom A, Sundqvist G. Bacteriologic evaluation of the effect of 0.5 percent sodium hypochlorite in endodontic therapy. Oral Surg Oral Med Oral Pathol 1983; 55: 307–12.
16. Bystrom A, Sundqvist G. The antibacterial action of sodium hypochlorite and EDTA in 60 cases of endodontic therapy. Int Endod J 1985; 18: 35–40.
17. Bystrom A, Claesson R, Sundqvist G. The antibacterial effect of camphorated paramonochlorophenol, camphorated phenol and calcium hydroxide in the treatment of infected root canals. Endod Dent Traumatol 1985; 1: 170–5.
18. Newman WG. Possible etiologic factors in external root resorption. Am J Orthod 1975; 67: 522–39.
19. Cholia SS, Wilson PH, Makdissi J. Multiple idiopathic external apical root resorption: report of four cases. Dentomaxillofac Radiol 2005; 34: 240–6.
20. Patel S, Kanagasingam S, Pitt Ford T. External cervical resorption: a review. J Endod 2009; 35: 616–25.
21. Heithersay GS. Clinical, radiologic, and histopathologic features of invasive cervical resorption. Quintessence Int 1999; 30: 27–37.
22. Gutmann JL. Prevalence, location, and patency of accessory canals in the furcation region of permanent molars. J Periodontol 1978; 49: 21–6.

