Treatment of a Large Cystlike Inflammatory Periapical Lesion Associated with Mature Necrotic Teeth Using Regenerative Endodontic Therapy

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Abstract

Introduction: Regenerative endodontic therapy is currently used to treat immature permanent teeth with necrotic pulp and/or apical periodontitis. However, mature teeth with necrotic pulp and apical periodontitis have also been treated using regenerative endodontic therapy. The treatment resulted in resolution of apical periodontitis, regression of clinical signs and symptoms but no apparent thickening of the canal walls, and/or continued root development. A recent study in an animal model showed that the tissues formed in the canals of mature teeth with apical periodontitis after regenerative endodontic therapy were cementumlike, bonelike, and periodontal ligament–like tissue with numerous blood vessels. These tissues are similar to the tissues observed in immature permanent teeth with apical periodontitis after regenerative endodontic therapy. **Methods:** A 23-year-old woman had a history of traumatic injury to her upper anterior teeth when she was 8 years old. Subsequently, #8 developed pulp necrosis and an acute apical abscess and #7 symptomatic apical periodontitis. The apex of #8 was slightly open, and the apex of #7 was completely formed. Instead of nonsurgical root canal therapy, regenerative endodontic therapy was attempted, including complete chemomechanical debridement on #8 and #7. This was based on the premise that filling of disinfected root canals with the host's biological vital tissue might be better than filling with foreign materials. **Results:** After regenerative endodontic therapy of #8 and #7, there was radiographic evidence of periapical osseous healing and regression of clinical signs and symptoms. The pulp cavity of #8 decreased in size, and the apex closed. The pulp cavity of #7 appeared to be obliterated by mineralized tissue. These indicated ingrowth of new vital tissue into the chemomechanically debrided canals. **Conclusions:** Regenerative endodontic therapy of mature teeth with apical periodontitis and apical abscess can result in the regression of clinical signs and/or symptoms and healing of apical periodontitis but no apparent thickening of the canal walls or continued root development. Filling of the disinfected canals with the host's vital tissue may be better than with foreign materials because vital tissue has innate and adaptive immune defense mechanisms. *(J Endod 2014;40:2081–2086)*

Key Words

Apical periodontitis, mature teeth, necrotic pulp, regenerative endodontic therapy, root canal therapy, vital tissue

Regenerative endodontic therapy has been suggested as treatment of immature permanent teeth with necrotic pulp and/or apical periodontitis. It has the potential to restore tooth vitality, increase thickening of the canal walls, and/or encourage continued root development (1). Regenerative endodontic therapy has been performed on mature permanent posterior teeth and anterior teeth with necrotic pulp and/or apical periodontitis in humans (2, 3) and animals (4). The treatment resulted in the resolution of apical periodontitis and regression of clinical signs and symptoms but no apparent thickening of the canal walls or continued root development. An outcome can be considered success of endodontic therapy, i.e., resolution of periapical lesion and regression of clinical signs and/or symptoms.

The purpose of this case report was to describe treatment using regenerative endodontic procedures of a large cystlike inflammatory periapical lesion associated with 2 traumatized maxillary permanent anterior teeth with infected necrotic pulps and apical periodontitis in an adult patient. The rationale of performing regenerative endodontic therapy was based on the premise that filling of the disinfected root canals with the host's vital tissue might be as good as or better than that with foreign material such as gutta-percha because vital tissue has innate and adaptive immune defense mechanisms. In addition, most vital tissues are capable of perceiving external stimuli because of sensory innervation.

Case Report

A 23-year-old woman presented to the faculty practice clinic at Faculty of Dentistry, University of Benghazi with the chief complaint of pain and swelling in the maxillary right anterior region. The patient gave a history of trauma to her maxillary anterior teeth when she was 8 years old. She did not seek dental treatment at the time of trauma. During the past 15 years, she had several episodes of pain and

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swelling; however, she did not go for any dental treatments. The patient did not have any significant medical history contradictory to nonsurgical root canal therapy.

Clinical Examination

Extraoral Examination. Neither facial discoloration nor extraoral swelling or sinus tract was noted. There were no palpable lymph nodes in the head and neck.

Intraoral Examination. The patient's oral hygiene was acceptable. The crowns of all maxillary anterior teeth were intact. Well-circumscribed swelling measuring approximately 2 × 2 cm in diameter was located on the palatal surface involving the periapical areas of teeth #8 and #7 (Fig. 1). The swelling was tender to palpation and slightly fluctuant. No sinus tract was observed. Tooth #8 was discolored and displaced labially (Fig. 1). It was tender to percussion and periapical palpation on the labial surface. The tooth did not respond to either thermal or electric pulp tests (EPTs). Tooth #7 was slightly tender to percussion and palpation but not discolored. It responded erratically and inconclusively to thermal and EPT. Periodontal probing of #8 and #7 was within normal limits (3–4 mm in pocket depth).

Radiographic Findings

A periapical radiograph showed a well-circumscribed osteolytic lesion measuring approximately 15 × 17 mm in diameter involving the entire apical root of #7 and the mesial aspect of the root of #6 and extending upward to the floor of the nasal cavity (Fig. 2*A*) In addition, a separate small ill-defined osteolytic lesion was associated with the root apex of #8 (Fig. 2*A*). The 2 osteolytic lesions appeared to merge. The root apex of #8 was slightly open, and the pulp cavity was relatively large and extended to the apex (Fig. 2*A*). Tooth #7 had a completely formed root, and the apex curved distally (Fig. 2*A*). The pulp cavity was narrow but could be seen extending to the apex on radiographs.

Cone-beam computed tomographic imaging in a coronal view indicated that a large osteolytic lesion involved the entire root of #7 and the mesial root surface of #6 and extended upward to the floor of the nasal cavity (Fig. 3*A*). In a sagittal view, the osteolytic lesion had perforated a large portion of the palatal cortical bone plate and a small portion of the buccal cortical bone plate (Fig. 3*B*).

Figure 1. Palatal swelling located at the apices of #8 and #7 (*arrow*), which was tender to palpation. Tooth #8 is discolored and displaced labially.

Diagnosis and Treatment Plan

Although the large periapical osteolytic lesion seemed to primarily involve #7, it responded inconsistently to pulp tests. Tooth #8 had a small periapical osteolytic lesion and did not respond to repeated pulp tests. The clinical diagnosis of #8 was an acute apical abscess because of apical swelling and pain, no response to pulp tests, labial displacement, discoloration of crown, and sensitivity to percussion. The treatment plan for #8 was to perform regenerative endodontic therapy. It was decided to continue to observe #7 because of an inconclusive diagnosis of the pulp-periapical tissue complex. The treatment plan for #8 was explained to the patient, and consent was obtained. The patient was scheduled for regenerative endodontic treatment.

Treatment Procedures

First Treatment Visit. Local anesthesia was not administered. Tooth #8 was isolated with a rubber dam. The crown of the involved tooth and the surrounding rubber dam were disinfected by swabbing the area with 30% hydrogen peroxide followed by Betadine (Tizaro Suppl Limited, London, UK). The canal was accessed through the lingual surface. A straw-colored fluid drained through the access cavity. The access cavity and canal were gently irrigated with 2.5% sodium hypochlorite (Clorox; Nobelwax Factories for Chemicals, Kaliobeya, Egypt). A #50 hand K-file was used to estimate the working length (WL) (1 mm short of the radiographic apex) radiographically. More exudate drained through the access cavity when the palatal swelling was pressed. The canal was sequentially instrumented to a #80 hand K-file to the WL and irrigated with copious amounts of sodium hypochlorite followed by sterile saline solution. The canal was dried with sterile paper points. Triple antibiotic paste consisting of metronidazole 500 mg (Flagyl, Amriya Pharm Ind, Alexandria, Egypt), ciprofloxacin 200 mg (Ciproflozazine, European Egyptian Pharm Ind), and minocycline100 mg (Minocin; Wyeth, Guangzhou, China) mixed with sterile saline solution to a creamy consistence was delivered into the canal using a Lentulo spiral into the apical portion of the canal. A sterile cotton pellet was placed into the canal below the cementoenamel junction (CEJ), and the access cavity was sealed with intermediate restorative material (IRM; Dentsply DeTrey, Konstanz, Germany).

Second Treatment Visit. One week after the first treatment visit, the tooth was asymptomatic, and the palatal swelling subsided. The IRM together with the cotton pellet was removed from the access cavity. Triple antibiotic paste was removed from the canal by irrigation with copious amounts of sodium hypochlorite. Some yellow straw-colored fluid continued to seep out of the access cavity. The canal was sequentially reinstrumented to a #100 hand K- file to the WL and irrigated with copious amounts of 2.5% sodium hypochlorite. The canal was dried and dressed with triple antibiotic paste again. The access cavity was closed with a cotton pellet and IRM.

Third Treatment Visit. Two weeks after the second treatment visit, #8 remained asymptomatic. However, the patient complained of slight pain and tenderness when biting on #7. The tooth did not respond to pulp tests with cold, heat, and EPT at this appointment. The clinical diagnosis of #7 was symptomatic apical periodontitis, and the tooth required treatment.

Local infiltration anesthesia with 3% mepivacaine without vasoconstrictor was administered. The access cavity of #8 was reopened. Triple antibiotic paste was removed from the canal by irrigating with 2.5% sodium hypochlorite solution followed by flushing with saline solution. The canal was dried. A #40 hand K-file was used to penetrate into the periapical tissues and provoke bleeding into the canal up to approximately 3 mm below the CEJ using a surgical microscope. After partial