Endodontic Treatment of a Large Cyst-Like Periradicular Lesion Using a Combination of Antibiotic Drugs: A Case Report

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Abstract

This case report describes the endodontic treatment of a large cyst-like periradicular lesion using a combination of antibiotic drugs. A 15-yr-old boy with a large cyst-like lesion from the apices of his teeth 29 to 31. Conservative root canal treatment was performed (tooth #30). During treatment procedure, 2.5% sodium hypochlorite solution was used for irrigation and a combination of antibiotic drugs was used for the intracanal dressing. Periapical healing was observed 3-month after initial treatment and continued at the 7-month review.

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Most periradicular lesions (>90%) can be classified as dental granuloma, radicular cyst, or abscess (1). It is generally accepted that periradicular lesions cannot be differentially diagnosed as either radicular cysts or apical granulomas based on radiographic evidence alone. Natkin et al. (2) analyzed the data of various studies relating radiographic lesion size to histology. They stated that with a radiographic lesion size of 200 mm^2 or larger, the incidence of cysts was almost 100%. If the lesion is separate from the apex and with an intact epithelial lining (apical true cyst, 3), it may have developed into a self-perpetuating entity that may not heal when treated nonsurgically. On other occasions, a large periradicular lesion may have a direct communication with the root canal system (apical pocket cyst, 3) and respond favorably to nonsurgical treatment (4). Some clinical studies have confirmed that simple nonsurgical treatment with proper infection control can promote healing of large lesions (5, 6). When this treatment is not successful in resolving the periradicular pathosis, additional treatment options should be considered. Surgery may occasionally be required. Surgical treatment of persistent extensive periradicular lesions most often involves curettage and apical resection. However, simpler approaches such as marsupialization or tube decompression may be alternatives for large cystic lesions (4).

In recent years, The Cariology Research Unit of the Niigata University has developed the concept of 'Lesion sterilization and tissue repair LSTR' therapy (7, 8) that employs the use of a combination of antibacterial drugs for disinfection of oral infectious lesions, including dentinal, pulpal, and periradicular lesions. Repair of damaged tissues can be expected if lesions are disinfected (9). In studies (10–12), oral lesions have been analyzed under strict anaerobic conditions to understand the target bacteria in endodontic treatment. In addition, bacteria in dental plaque (13), tongue plaque (14), denture plaque (15), saliva (16), periodontal pockets (17), and osteomyelitis (18) have also been analyzed with the strict anaerobic procedures because they were possible sources of bacteria in endodontic lesions. According to these studies antibacterial drugs were selected. Metronidazole was the first choice because it has a wide bactericidal spectrum against anaerobes (19), which were common in oral sites. However, some bacteria in lesions were resistant to metronidazole and, thus, two other antibacterial drugs, e.g., ciprofloxacin and minocycline, should be mixed with metronidazole (20) in an effort to eliminate all the bacteria. Finally, extensive in vitro and in situ studies have been conducted showing the mixed drugs to be effective against oral bacteria (9, 21, 22).

The following case report describes the endodontic treatment of a large cyst-like periradicular lesion using a combination of antibiotic drugs.

Case Reports

A 15-yr-old boy was referred to the Department of Endodontics in the Dental Faculty of Cumhuriyet University for treatment of the right mandibular first molar. The past medical history of the patient was noncontributory. No previous endodontic therapy had been performed on any of the teeth. On extraoral examination, there was a bone expansion on the right area of the mandibula. On intraoral examination, there was a hard swelling of the vestibule cortex in the concerning region covered with normal mucosa. The teeth (teeth 29–31) were slightly tender to percussion with probing and exhibited normal mobility. Electronic pulp testing (Electric pulp tester, Parkell, Farmingdale, NY) and cold application (ice stick) were negative for tooth #30 and positive

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Figure 1. Preoperative panoramic radiogarph showing the a large cyst-like periradicular lesion in right mandibula.



Figure 2. Radiograph 2-month after the antibiotic paste was placed.



Figure 3. Five-month review.



Figure 4. Seven-month review. Healing of periradicular lesion is evident.

for the other two teeth. A panoramic radiograph (Fig. 1) showed a well-circumscribed radiolucent lesion located above the mandibular canal and extending from the apices of teeth 29 to 31. The lesion was approximately 3.5 cm in maximum diameter. Besides, there was a profound caries in tooth #30. Based on these findings, the patient was diagnosed as having a large cyst-like periradicular lesion (radicular cyst) of the right mandibular first molar tooth.

At the same appointment, root canal treatment was initiated on tooth #30. The access cavity was prepared, and a rubber dam was applied. A clear, straw-colored fluid was exuded from the canals. Aspiration of this fluid from inside root canals was made directly into a syringe with a 22-gauge needle. On microscopic examination of fluid sample, the presence of cholesterol crystals was determined. This finding was supported our initial diagnosis. Necrotic pulp tissue was extirpated and the working length was estimated as being 1 mm short of the radiographic apex. The canal was instrumented with size 15-40 K-files using a step-back technique. During the instrumentation, the canal was irrigated copiously with 2.5% sodium hypochlorite solution using a 27-gauge endodontic needle after each instrument. Drainage was performed until discharge through the canal ceased. The access cavity was sealed with zinc oxide-eugenol cement (Austenal, Harrow, UK) after drainage. This procedure was continued during 15 days. No intracanal medicament was applied to the canal until active drainage ceased.

When the drainage ceased, the root canal were finally instrumented and copious irrigation with 2.5% sodium hypochlorite solution under rubber dam isolation. After drying with sterile paper points, and a mixture of ciprofloxacin, metronidazole, and minocycline paste as described by Takushige et al. (9) was prepared into a creamy consistency and spun down the canal with a lentulo spiral instrument into the canal. The paste was further condensed using sterile cotton pellets before sealing the coronal access.

The patient was recalled after 2 months revealed significant healing (Fig. 2). The tooth had no symptoms, the bone expansion had stopped. At this appointment the tooth was reopened, the antibiotic paste removed. After irrigation with 2.5% sodium hypochlorite, the root canal was obturated with gutta-percha (Sure-Endo, Seoul, Korea) and AH 26 (Dentsply/DeTrey, Konstanz, Germany) using a lateral condensation technique. Access cavity was sealed with amalgam (Cavex, Holland).

The next two panoramic radiographs at 5 and 7 month revealed further bony healing (Fig. 3 and Fig. 4). In last control visit (7 month) radiograph showed that the radiolucent area was absent and that trabecular bone was forming. Clinical examination showed no sensitivity to percussion or palpation and the soft tissues were healthy.

Discussion

The definitive diagnosis of the type of periradicular lesion can only be made by a histological examination (6). However, a preliminary clinical diagnosis of a periradicular cyst is reasonable if all of the following conditions exist: (a) the periradicular lesion involves one or

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more teeth with necrotic pulps; (b) the lesion is greater than 200 mm^2 in size; (c) a straw-colored fluid is produced upon aspiration or on drainage through an access; and (d) the fluid contains cholesterol crystals (23). Additionally, the incidence of cysts has been shown to be 60 to 67% in lesions with a diameter of 10 to 20 mm (24, 25). Cholesterol crystals are encountered in 29 to 43% of dental cysts (26). They are more frequently encountered in radicular cysts than in apical granulomata. Crystals are identifiable under a microscope (6, 26). The treatment options available to manage large cysts range from nonsurgical root canal treatment and/or apical surgery to extraction. In some instances, nonsurgical treatment may be ineffective or difficult; those cases may be treated by surgery. In the present study, radiographs revealed that the involved teeth had large periradicular lesion with uniformly dense radiolecency and well-defined margins around the apices. Upon observing a radiographically large periradicular lesion and a straw-colored fluid containing cholesterol crystals, a presumptive diagnosis of a periradicular cyst can be made.

Matsumoto et al. (27) has demonstrated that the prognosis for the treatment of large periradicular lesions is not as good as that of small lesions. In contrast Strindberg (28) and Sjögren et al. (29) found no significant differences in healing frequency between lesions initially larger than 5 mm and those smaller than 5 mm. They have also stressed the importance of a long observation time for treated teeth with periradicular lesions. In a long time period clinical study, Çalşkan (6) have reported 42 nonsurgically treated teeth with large cyst-like lesions. There were 73.8% of all cases completely healed with nonsurgical treatment.

It was demonstrated in this case report that the use of a combination of antibiotic drugs in tooth with large cyst-like periradicular lesion gave excellent clinical results. Previous studies (9, 20–22) have clearly demonstrated that this combination is capable of eliminating bacteria from infected dental tissues.

Caution should be taken in general when dentists give local or systemic drugs. Although the volumes of the drugs applied in this therapy is small and there were no reports of side effects, care should be taken if patients are sensitive to chemicals or antibiotics.

Conclusions

Root canal treatment using a combination of antibiotic drugs as an antibacterial dressing was successful in healing large cyst-like periradicular lesions.

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