Retreatment of a Resected Tooth Associated with a Large Periradicular Lesion by Using a Triple Antibiotic Paste and Mineral Trioxide Aggregate: A Case Report with a Thirty-month Follow-up

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Abstract

Introduction: Trauma to the teeth and supporting structures is a frequent problem among children. Endodontic treatment is necessary for 41.3% of traumatized teeth. Two of the most important criteria for successful endodontic treatment are the elimination of microorganisms and apical sealing. A combination of antibiotic drugs (metranidozole, ciprofloxacin, and minocycline) is used to eliminate target bacteria, which are possible sources of endodontic lesions. For cases in which apical sealing is difficult, specific materials to plug the apical region have been advocated. Mineral trioxide aggregate (MTA) has become the material of choice because it is biocompatible and has bacteriostatic action. **Methods:** This case report describes the nonsurgical retreatment of a traumatized tooth that had already undergone unsuccessful apical resection associated with a large periradicular lesion. A combination of antibiotic drugs was used as an intracanal medicament, and MTA was used to obtain a hermetic seal of the lateral tooth that had undergone unsuccessful apical resection. **Results:** On follow up, the tooth was clinically and radiographically asymptomatic for 30 months. **Conclusions:** The results of this case show that MTA and triple antibiotic paste can be used clinically in the treatment of an unsuccessfully resected tooth associated with a large periradicular lesion. *(J Endod 2009;35:1603–1606)*

Key Words

Large periradicular lesion, MTA, retreatment, triple antibiotic paste

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There is often trauma to children's teeth and supporting structures (1). Disruption of the pulp blood supply that leads to pulpal necrosis is very common among traumatized teeth (2). Necrotic pulp is a suitable environment for microorganisms to release their toxins into the periradicular region, leading to an inflammatory reaction and periradicular lesion (3). A periradicular lesion is defined as a host response against microorganisms and their products that invade the root canal system (4). The most important principle of treating periradicular lesions is to eliminate the bacteria. In some lesions, conservative treatments cannot eliminate the bacteria, so surgical treatment might be required for the total elimination of infected tissues in the apical region (5).

Two of the most important criteria for successful endodontic treatment are the elimination of microorganisms and the apical plug (6). The combination of antibiotic drugs (metranidozole, ciprofloxacin, and minocycline) described by Takushige et al (7) is used for oral infectious lesions such as dentinal, pulpal, and periradicular lesions. The aim of using this paste is to eliminate target bacteria, which are possible sources of endodontic lesions (8).

The apical plug is the other important aspect of successful endodontic treatment. To prevent reinfection, the root canal system must be sufficiently filled. Satisfactory root fillings have been defined as an adequate seal, good apical seal, and absence of voids (9). For cases in which apical sealing is difficult, specific materials to plug the apical region have been advocated. Mineral trioxide aggregate (MTA) has become the material of choice because it is biocompatible and has bacteriostatic action (10). MTA is a suitable material for many endodontic applications such as pulp capping, repair of root perforation, root-end fillings, and apexification (11, 12).

The following case report describes the nonsurgical endodontic retreatment of a traumatized tooth that had apical resection; it was associated with a large periradicular lesion and was treated with a triple antibiotic paste for disinfection and MTA as an apical plug.

Case Report

A 12-year-old boy was referred to the Department of Pediatric Dentistry in the Dental Faculty of Karadeniz Technical University because of a swelling in his left mandibular region. His medical status was noncontributory. According to his questionnaire, 3 years earlier he had fallen off his bicycle and broken his mandibular left lateral tooth. At that time, a root canal treatment and apical resection were performed on this tooth at another clinic. Two years later, the symptoms returned.

In the intraoral examination, an intraoral fistula was located in the mandibular left lateral region; in radiographic examination, panoramic and periapical radiographs were analyzed. A large radiolucent lesion with a well-defined margin around the mandibular left lateral tooth's radicular region was seen (Figs. 1*A* and 2*A*). The electronic pulp test on the mandibular left canine was negative. After evaluating all the data, a root canal retreatment of the left mandibular lateral tooth and left mandibular canine tooth was planned. A rubber dam was applied, and the access cavities were prepared. The root canal filling material was removed by using Gates-Glidden and K-files. The drainage of pus was noted. This procedure was repeated until no gutta-percha, sealer,

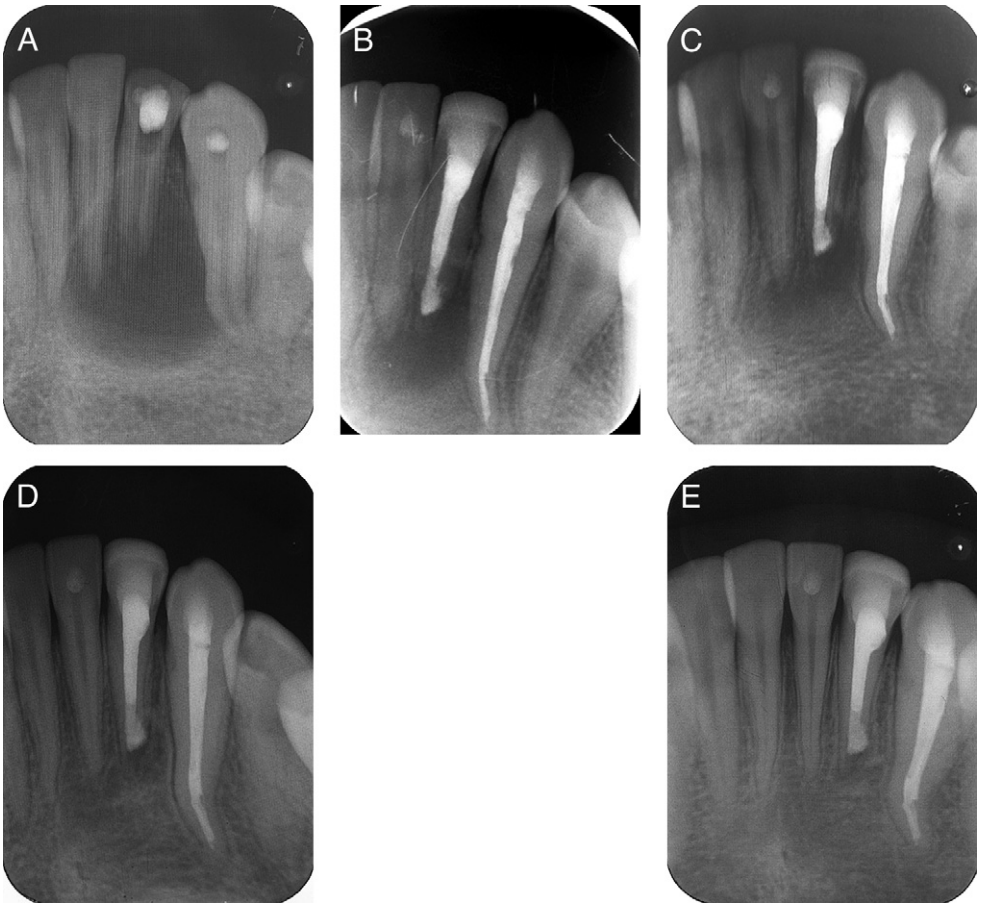


Figure 1. (*A*) Periapical radiograph after removing the root canal filling shows a large radiolucent lesion associated with the left mandibular canine and lateral tooth. (*B*) Periapical radiograph after treatment; (*C*) periapical radiograph 6 months after treatment; (*D*) periapical radiograph 1 year after treatment; (*E*) periapical radiograph 30 months after treatment.

or pus was present on the files and paper points. After ensuring the presence of a clean root canal wall, radiography was performed. The working lengths of the tooth canals were measured by inserting a #60 file for the lateral tooth and #10 file for the canine tooth (K-file; Maillefer, Ballaigues, Switzerland), and radiography was taken. The teeth were instrumented to ISO size 100 for the lateral and 35 for the canine tooth by using the step-back technique. During instrumentation, the canals were irrigated with 2.5% sodium hypochlorite by using 27-gauge endodontic needles after each instrument. The canals were dried with sterile paper points and then dressed with calcium hydroxide (Sultan, Englewood, NJ). Sterile cotton pellets were inserted into the access cavities before sealing them with temporary filling material. The calcium hydroxide dressing was changed every 2 weeks for a total of 3 times. Because the symptoms were not eliminated, the treatment procedure was changed. A triple antibiotic paste was selected for the intracanal dressing. A mixture of ciprofloxacin (Ciflosin; Deva, Istanbul, Turkey), metronidazole (Flagyl; Eczacibasi, Istanbul, Turkey), and minocycline (M9511; Sigma-Aldrich, St Louis, MO) paste (0.5 mg of each), as described by Takushige et al (7), was prepared. The mixture had a creamy consistency and was spun down the root canal with a lentulo spiral. It was changed every month for a period of 3 months until the teeth displayed no symptoms. On examination, the teeth showed no sensitivity to percussion, and the soft tissues were healthy. According to these data, the decision was made to fill the canals. The teeth were reopened, and the antibiotic paste was removed. The canals were irrigated with 2.5% sodium hypochlorite. After that, the root canal of the canine tooth was obturated with gutta-percha (Diadent; Diadent Group International, Chongchong, Korea) and AH 26 (Dentsply, Konstanz, Germany) by using a lateral condensation technique. The apical part of the root canal of the lateral tooth was obturated with gray MTA (Dentsply-Maillefer, Ballaigues, Switzerland). MTA was prepared according to the manufacturer's instructions. An endodontic plugger adequate for the length of the canal was used, and the stopper was fixed 1 mm behind the working length. MTA was inserted into the canal with a messing gun (Dentsply-Maillefer, Ballaigues, Switzerland) and pushed further in with a plugger. A radiograph was taken to ensure there was no excess. A cotton pellet moistened with distilled water was placed over the MTA, and the access cavity was sealed with a temporary filling. After 24 hours, the temporary filling material and cotton pellet were removed. Then the MTA in the remaining pulp space was obturated with gutta-percha and AH 26 by using a lateral condensation technique (Fig. 1*B*). The restoration of these teeth was accomplished with composite resin (Z250; 3 M ESPE, St Paul, MN). After 1 year, the radiograph showed complete healing (Fig. 1*C, D*). After 30 months, the radiograph showed no pathology (Figs. 1*E* and 2*B*).

Discussion

Children frequently experience trauma to their teeth and supporting structures (1). Pulp therapy is necessary for 41.3% of traumatized

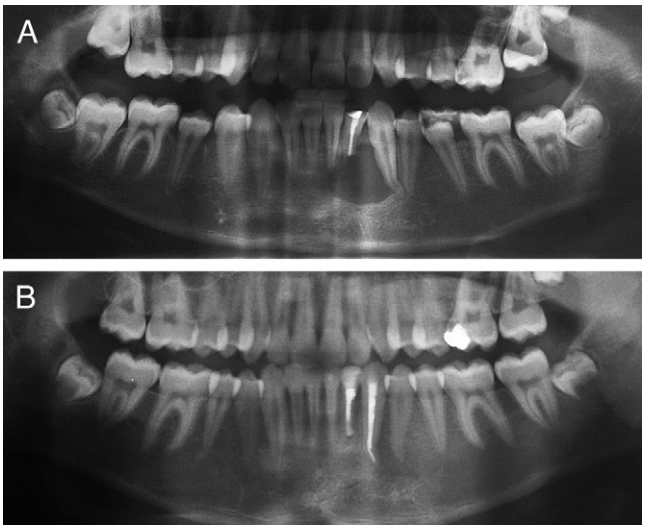


Figure 2. (*A*) Pretreatment panoramic radiograph shows a large radiolucent lesion associated with the left mandibular canine and lateral tooth; (*B*) panoramic radiograph 2 years after treatment.

teeth (13) because of pulpal necrosis. Necrotic pulps are suitable places for pathogenic bacteria, which are responsible for periradicular lesions (14). There are surgical and nonsurgical methods to eliminate these bacteria from periradicular lesions.

After the failure of one nonsurgical method, the success rate is higher for surgical methods than additional nonsurgical methods (15). However, when endodontic retreatment and surgery fail and a second surgical procedure is performed, the success rate is much lower than that found after the initial periradicular surgery (16). This clinical case experienced a nonsurgical and a surgical endodontic failure before our treatment. In this case, the nonsurgical retreatment protocols were based on published reports (15, 16).

The success of nonsurgical endodontic treatment methods is based on appropriate cleaning, shaping, antisepsis, and filling of the root canal (17). Calcium hydroxide is the most commonly used medicament for antisepsis of the root canal because of its high alkalinity, antibacterial activity, and ability to induce hard tissue deposition. The success of a calcium hydroxide dressing for the endodontic treatment of children's teeth with large periradicular lesions has been shown (18). To eliminate bacteria, another protocol called lesion sterilization and tissue repair therapy (LSTR), which uses a combination of antibiotic drugs, was developed (19). In recent studies, the use of a combination of antibiotic drugs in a tooth with a large cyst-like periradicular lesion produced excellent clinical results (7, 20, 21). In another study on the treatment of a tooth with dens invaginatus that was associated with a large periradicular lesion, calcium hydroxide paste was chosen for the dressing material, but an enlargement of the periradicular lesion was seen. Therefore, a triple antibiotic paste was chosen next, and this paste produced successful clinical results (22). In this study, calcium hydroxide was used, but the symptoms were not eliminated. The treatment protocol was changed, and a triple antibiotic paste was used instead. After its application, the symptoms were resolved.

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

Another criterion for successful nonsurgical endodontic treatment is a hermetic seal to prevent microorganisms from migrating to the root canals. The root-end anatomy of resected teeth is similar to that of teeth with open apices, so it is very difficult to obtain a hermetic seal with conventional gutta-percha obturation techniques. Many studies recommended the use of MTA in teeth with necrotic pulps and open apices (11, 23). Additional studies were performed that were associated with the application of open apices, and it was concluded that MTA can be successfully used in these teeth.

We believe that because of the difficulty in achieving an apical stop, MTA should be used in resected teeth, and consequently, MTA was selected for this case. This is the first known case report in which MTA was used clinically as an apical plug technique for the treatment of unsuccessfully resected teeth, and the patient was followed for 30 months.

Conclusions

As in all dental applications, the diagnosis and treatment plan play a significant role in the successful treatment of traumatic injuries. Therefore, being aware of medical advances and treatment choices is crucial. A triple antibiotic paste can be an alternative material to calcium hydroxide in teeth with a large periradicular lesion when calcium hydroxide has failed. The use of MTA in the treatment of a resected tooth and large periapical lesion is not a routine application; however, MTA positively affected the healing of this tooth during a period of 30 months. In conclusion, MTA and triple antibiotic paste can be used clinically in the treatment of unsuccessfully resected teeth with a large periradicular lesion.

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ERRATUM

Due to a publication error, the acknowledgment section of the article titled "NiTi Rotary PathFile To Create the Glide Path: Comparison With Manual Preflaring in Simulated Root Canals" by Elio Berutti, Giuseppe Cantatore, Arnaldo Castellucci, Giorgio Chiandussi, Francesco Pera, Giuseppe Migliaretti and Damiano Pasqualini published in J Endod 35:408, 2009 should contain the following statement: "The authors state that Drs. Elio Berutti, Giuseppe Cantatore, and Arnaldo Castellucci have financial involvement (patent licensing arrangements) with Dentsply Maillefer with direct financial interest in the materials discussed in this manuscript." The editor regrets this error.