

Revascularization Technique for the Treatment of External Inflammatory Root Resorption: A Report of 3 Cases

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Abstract

The current external inflammatory root resorption treatment protocol, which uses calcium hydroxide dressing, usually comprises multiple and long-term applications. In addition to the need for multiple appointments for calcium hydroxide replacement, the long-term maintenance of this compound in the root canal weakens dental structures. A modification of this therapy would be advisable. In this clinical investigation, 3 patients with external inflammatory root resorption were submitted to revascularization therapy protocol usually used in teeth with necrotic pulp and open apices. The teeth were treated with revascularization therapy protocol, which consisted of disinfecting the root canal system with triantibiotic paste, filling it with blood clot, and sealing of the root canal with mineral trioxide aggregate and bonded resin restoration. During the follow-up, the pathologic process was arrested with tissue repair in pre-existing radiolucent areas. Reduced mobility was observed in the treated teeth. The 3 cases were followed up for 30, 18, and 15 months, respectively. All teeth remained asymptomatic and retained function and physiological mobility. The therapy used in the revascularization procedure was efficient in the treatment of external inflammatory root resorption, reducing the number of appointments and increasing patient compliance. (*J Endod* 2015;41:1560–1564)

Key Words

Calcium hydroxide, revascularization, root resorption, trauma, triantibiotic paste

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External inflammatory root resorption (EIRR) represents a challenge in endodontic practice. EIRR commonly occurs after dental trauma that results in periodontal ligament injury, pulp necrosis, and subsequent infection. EIRR develops from an inflammatory process established along the root periodontium. It progresses rapidly and can lead to tooth loss within a few months (1).

Treatment of EIRR is based on disinfecting the root canal system (RCS) by chemomechanical procedures and then filling it with calcium hydroxide (2–4). Depending on the resorption pattern, calcium hydroxide may remain in the RCS for several months (2). In most cases, dental trauma occurs in young patients whose teeth are still not fully formed and have thin dentinal walls and open apices. Over time, the calcium hydroxide dressing in the RCS weakens the already fragile tooth structure, increasing the likelihood of fractures with consequent tooth loss (5, 6).

Revascularization therapy has proven to be suitable for the treatment of the RCS of teeth with pulp necrosis and open apices (7–10). The triantibiotic paste used in this therapy has proven to be effective in RCS disinfection (11–14). After disinfection according to the revascularization therapy protocol, blood clot formation is induced, and the canal is subsequently sealed, which provides an intracanal environment favorable to tissue repair (10).

Because of the aforementioned aspects, the modification of EIRR therapy is advisable, along with the replacement of calcium hydroxide as the antimicrobial agent used (5, 6). Thus, this study aims at evaluating the use of triantibiotic paste and the revascularization therapy protocol for EIRR treatment.

Case Reports

This study was approved by the CEP-UERJ research ethics committee under protocol no. 2699, September 2, 2010. After an explanation regarding the procedures to be performed, the patients' guardians were asked to sign the informed consent.

Three patients were referred to our endodontic clinic after suffering dental trauma in the maxillary central incisors and presenting with pulp necrosis, open apices, periapical lesions, and EIRR. After the positive result in the first case, 2 more cases were undertaken 1 year after the first case began. The cases are presented in sequence according to the adopted procedure and evolution.

Initial Clinical Description of Patients

Case 1

A 9-year-old boy suffered trauma to his maxillary central incisors, presenting dentinal and enamel fracture in both. These teeth did not receive any treatment at the time the trauma occurred. At the first appointment approximately 12 months after the trauma, the patient complained of a sinus tract. On clinical examination, the electric and thermal pulp sensibility tests were negative in both teeth. The teeth were not tender to percussion or palpation. Pulp necrosis was verified in both teeth. The right maxillary central incisor (RMCI) had class II mobility. On radiographic examination, RMCI presented EIRR in an advanced stage and had been diagnosed with chronic apical abscess. The left maxillary central incisor (LMCI) had asymptomatic apical periodontitis and EIRR.

Case 2

A 9-year-old boy suffered trauma with avulsion of LMCI and underwent replantation approximately 4 hours after trauma (dry storage) in the emergency department, with dental splint for 21 days. No other type of procedure had been performed. In the first appointment 3 months after the trauma, the patient complained of mobility in the traumatized tooth, which was diagnosed as class II. On clinical examination, the electric and thermal pulp sensibility tests were negative. Pulp necrosis was observed. The tooth was tender to percussion and not to palpation. Radiographic examination showed apical radiolucency and advanced EIRR. The apical status was diagnosed with symptomatic apical periodontitis.

Case 3

An 8-year-old boy suffered dental trauma with avulsion of both maxillary central incisors and underwent replantation 2 hours after trauma (milk storage medium) in the emergency department, with dental splint for 30 days. No other type of procedure had been performed. At the first appointment 1 month after the trauma, the teeth were asymptomatic. After clinical examination, the electric and thermal pulp sensibility tests were negative in both teeth. The teeth were not tender to percussion or palpation. Pulp necrosis was verified in both teeth. It was detected that both incisors showed asymptomatic apical periodontitis, and the RMCI had early-stage EIRR on radiograph examination.

Clinical Procedures

All patients received the same treatment, which followed revascularization therapy protocol (9). At the first appointment, the following procedures were performed: medical and dental history, clinical and radiographic examinations, pulp vitality, and percussion and palpation tests. Initially the tooth was cleaned with pumice and isolated with rubber dam. The tooth and the rubber dam were cleaned with a solution of 3% hydrogen peroxide and then disinfected with 2.5% NaOCl solution (15). After accessing the pulp cavity, the working length was determined by means of a K-type file (Dentsply Maillefer, Petrópolis, RJ, Brazil)

1 mm shorter than the root apex and confirmed by a periapical radiograph. The teeth were slowly flushed to within 3 mm of the apex with 20 mL 5.25% NaOCl (Fórmula e Ação, São Paulo, SP, Brazil), accompanied by slow flush with 10 mL sterile saline solution. After drying with sterilized paper points, the canal was filled with triantibiotic paste containing metronidazole (Sanofi Aventis, Ocoyoacac, México), ciprofloxacin (Bayer Schering Pharma, Leverkusen, Germany), and minocycline (Sigma-Aldrich, St Louis, MO) to a final concentration of 100 µg each (13). The teeth were sealed with Fuji IX glass ionomer cement (GC America, Alsip, IL).

In the second appointment 30 days after the first, the patient's history of this period was collected along with clinical and radiographic examinations. After anesthesia with 3% Mepivalem SV (Dentsply, Petrópolis, RJ, Brazil), the teeth were disinfected and isolated with a rubber dam as previously described in the first appointment. The cavity sealing and triantibiotic paste were removed, aided by flushing the root canal with 20 mL 5.25% NaOCl and subsequently with 10 mL sterile saline solution. Bleeding from the periapical region was evoked by using a K-type file 2 mm beyond the root apex. After the formation of a blood clot approximately 3 mm apical of the cemento-enamel junction, triple sealing of the root canal was performed, with mineral trioxide aggregate (Angelus, Londrina, PR, Brazil) placed immediately on the blood clot. After initial mineral trioxide aggregate aggregation, glass ionomer cement (Fuji IX; GC America) was applied, and finally, sealing was performed with Filtek Z250 adhesive resin (3M ESPE, Sumaré, SP, Brazil).

The cases were followed up every 3 months with dental history and clinical and radiographic examinations. In each case 3 months after the procedure, the teeth were asymptomatic, and normal dental function was maintained. In all cases, teeth returned to physiological mobility. All teeth that were submitted to revascularization technique for the treatment of EIRR presented different stages of crown discoloration. Cases 1 and 2 showed radiographic arrest of the external resorption process and resolution of the radiolucency areas, and the root resorptive defect areas showed evidence of hard tissue ingrowth after 3 months. Case 3 presented the same data at the second visit after the procedures (6 months). The first case was monitored for 30 months (Fig. 1), case 2 for 18 months (Fig. 2), and case 3 for 15 months (Fig. 3). Throughout



Figure 1. Case 1. (A) Initial periapical radiograph (approximately 12 months after trauma) showing maxillary central incisors presenting both dental and enamel fracture and periapical radiolucency. RMCI presents signs of EIRR in advanced stage. LMCI presents signs of EIRR in apical third area. (B) At 3-month follow-up, radiograph image shows radiographic arrest of external resorption process, resolution of radiolucency areas, and root resorption areas filled with hard tissue formation. (C) At 30-month follow-up periapical radiograph, RMCI showing maintenance of clinical conditions previously reported at 3-month follow-up description. LMCI presented new periapical radiolucency, and root canal treatment was performed.

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