

Large apical periodontitis healing following root canal dressing with calcium hydroxide: a case report

Reparo de lesão periapical extensa após utilização de curativo de demora à base de hidróxido de cálcio: relato de caso

Abstract

Purpose: The objective of this paper is to report the clinical case of a patient who presented a chronic apical periodontitis, arising from internal inflammatory resorption followed by pulp necrosis, and a long-term success of a root canal therapy using calcium hydroxide as root canal dressing.

Case description: A 20-year-old male patient presented for routine dental treatment. By radiographic examination we noted an extensive radioluscent area, laterally to the permanent maxillary right lateral incisor, with possibility of communication with the lateral periodontium, suggestive of a chronic apical periodontitis. Due to external root resorption detection, we used a calcium hydroxide root canal dressing, changed every 15 days, for a period of 2 months. Root canal filling was performed using gutta-percha cones by lateral condensation technique. Radiographic follow up held after 19 years of treatment indicated a periodontium in conditions of normality, with the presence of lamina dura.

Conclusion: Calcium hydroxide is a suitable material to be used as root canal dressing in teeth with apical periodontitis. Long-term evaluation demonstrated the satisfactory clinical outcome following root canal treatment.

Key words: Apical periodontitis; root canal dressing; calcium hydroxide; dental trauma

Resumo

Objetivo: O objetivo deste trabalho é relatar o caso clínico de um paciente que apresentava lesão periapical crônica decorrente de necrose de pulpar e o sucesso a longo prazo de uma terapia endodôntica utilizando o hidróxido de cálcio como curativo de demora.

Descrição do caso: O paciente, do gênero masculino, com 20 anos de idade, compareceu à Clínica Odontológica para tratamento de rotina. Por meio de exames radiográficos observamos uma área radioluscente extensa, lateralmente ao incisivo lateral superior direito, com possibilidade de comunicação com o periodonto lateral, sugestivo de lesão periapical. Devido à presença de reabsorção radicular externa, foi utilizado um curativo de demora à base de hidróxido de cálcio (Calen®), trocado a cada 15 dias, por um período de 2 meses. A obturação do canal radicular foi realizada com cones de gutta-percha pela técnica de condensação lateral ativa. O acompanhamento radiográfico realizado após 19 anos do tratamento endodôntico indicou um periodonto em condições de normalidade, com integridade da lamina dura.

Conclusão: O hidróxido de cálcio é um material adequado para ser usado como curativo de demora em dentes com lesão periapical, uma vez que a avaliação a longo prazo demonstrou resultados clínicos satisfatórios após o tratamento endodôntico.

Palavras-chave: Lesão periapical; curativo de demora; hidróxido de cálcio; trauma dental

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Introduction

Long-term apical periodontitis infection occurs due to the predominance of anaerobic gram-negative microorganisms, both in main root canal and also disseminated throughout the apical delta (1,2). These microorganisms present different virulence factors and generate toxic products and by-products to apical tissues, mostly because of the presence of endotoxin in their cellular wall (3). Endotoxin carries a series of important biological effects that lead to an inflammatory reaction and periapical bone resorption (4).

Clinical studies have demonstrated that teeth with chronic apical periodontitis present microbial niches in cementum craters and periapical tissue, areas considered inaccessible to root canal shaping (5,6). Endodontic biofilm can only be removed by mechanical instrumentation if it is located in the main root canal whereas apical biofilm necessitate a therapeutic conduct to be eliminated (3,7).

Biomechanical root canal cleaning and shaping can be performed employing bactericide washing solutions and manual or rotary instrumentation, aimed to combating infection by removing bacteria present in the main root canal (1,3). During root canal treatment substances must be used to combat not only infection in main root canal or root canal walls, but also to reach those located deeply and diffusely by tooth structure, areas inaccessible to the biomechanical preparation or the body's defense system (8). The objective of this paper is to report the clinical case of a patient who presented a chronic apical periodontitis, arising from internal inflammatory resorption followed by pulp necrosis, and the long-term success of a root canal therapy using calcium hydroxide as root canal dressing.



Fig. 1. Initial radiograph: extensive radiolucent area, laterally to the tooth, suggestive of a chronic apical periodontitis. The main root canal was calcified at its apical portion.

Case Description

A 20-year-old male patient presented for routine dental treatment. Anamnesis indicated a dental trauma history by accidental fall in the right lateral incisor when the patient was 15-year-old. The patient reported recurrent episodes of edema in the buccal mucosa and referred usage of antibiotic medication. The patient sought dental treatment only after 5 years from the occurrence of the trauma. Clinical examination indicated the presence of a silver amalgam restoration in the palatal face of the tooth. Periodontal tissues presented normal aspect and painful sensitivity was reported to percussion and palpation. Pulp vitality tests were negative. By radiographic examination we noted an extensive radiolucent area, laterally to the tooth, with possibility of communication with the lateral periodontium, suggestive of a chronic apical periodontitis. The main root canal was calcified at its apical portion (Fig. 1). Root canal treatment was established. The entire procedure was carried out with rubber dam isolation of the operatory field and aseptic maintenance. After staging cavity access, neutralization of septic/toxic content was performed using #K files compatible with diameter of the main root canal in a crown-apex direction without pressure. During cleaning and shaping, the root canal lateral communication was confirmed. The root canal was prepared using manual instrumentation under irrigation, inundation and aspiration with a 2.5% sodium hypochlorite solution. The final irrigation was performed with an EDTA solution, under constant agitation with a thin #K file to remove the smear layer. As external root resorption was detected, therefore we used a calcium hydroxide root canal dressing (Calen[®]), changed every 15 days, for a period of 2 months. Root canal filling was performed after external resorption was ceased, by means of Sealapex[®] sealer using gutta-percha cones by lateral condensation technique (Fig. 2).



Fig. 2. Root canal filling following a calcium hydroxide root canal dressing changed every 15 days, for a period of 2 months.

Tooth was restored with composite resin. Radiographic follow up was carried out annually within the first 2 years, when complete bone repair was achieved (Fig. 3). The last radiographic control was held after 19 years, when we observed the periodontium in conditions of normality, with the presence of lamina dura (Fig. 4).



Fig. 3. Radiographic follow up 2 years following root canal filling indicating improved bone repair.



Fig. 4. Radiographic control after 19 years of root canal filling: periodontium in conditions of normality, with the presence of lamina dura.

Discussion

Several substances have been proposed to be used as root canal dressing, including the phenolic derivatives, aldehydes, corticosteroids in combination or not with antibiotics, and calcium hydroxide (9,10). However, current studies have proved unsatisfactory biological and antimicrobial of most of them (3).

Topical drugs used as root canal dressing, which have antimicrobial properties, anti-inflammatory and mineralizing induction properties present a beneficial effect on the living tissue of the periapical region. Calcium hydroxide is the medication of choice, used in dentistry since the beginning of the 20th century, which presents ability to improve apical healing, has a recognized action in soaking up the fluid when edema occurs, and induces mineralization (11). Also, it penetrates through the dentin tubules and increases the pH in the areas of cementum resorption (12), therefore, impairing external root resorption (13). The ability of a calcium hydroxide based formulation in removing the periapical exsudate may be explained by its hygroscopic characteristic. These properties are the main responsible for the long term clinical and radiographic success observed in this study.

The alkalinity of calcium hydroxide induces a zone of superficial tissue necrosis and this necrotic tissue separates the material from the vital tissues (14). The ability to induce the formation of mineralized tissue occurs by stimulating enzymes, such as alkaline phosphatase, and inhibiting acid phosphatase and osteoclastogenesis (15).

Recent studies have demonstrated that the infection of root canals system induces the migration of immune and inflammatory cells to the periapical bone area determining the drop of the pH in the area and the presence of cytokines which initiate and perpetuate bone and cementum resorption. As shown in this case report, calcium hydroxide is a suitable material to be used as root canal dressing in teeth with apical periodontitis. Long-term evaluation demonstrated the satisfactory clinical outcome following root canal treatment.

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