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CASE REPORT

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Regression of large periapical lesion using calcium hydroxide therapy: a six-year follow-up case report

Regressão de lesão periapical grande usando terapia à base de hidróxido de cálcio: um reporte de caso com 6 anos de acompanhamento

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ABSTRACT

Periradicular lesions occur in non-vital teeth as the result of a chronic aggression by the presence of microorganisms into the root canal, which may appear as a radiolucent lesion in the radiographic exam; treatment varies according to surgical or nonsurgical methods. This case report describes the regression of a periradicular lesion using a nonsurgical endodontic treatment in association with intracanal calcium hydroxide-based medicament. After patient examination and radiographic analysis, a 13 mm (in maximum diameter) radiolucent lesion was observed in tooth number 12. The endodontic treatment was done and Calen-CMCP (S.S. White Artigos Dentários Ltda., Rio de Janeiro, RJ, Brazil) was placed into the root canal, which was changed after every two weeks during two months. It was observed a progressive centrifugal regression of the lesion after every renewing of the medicament. In addition, after six-year follow-up the tooth was still free of re-infection and bone tissue was completely regenerated. In conclusion, calcium hydroxide therapy can conservatively stimulate the regression of large periradicular lesions.

KEYWORDS

Nonsurgical endodontic treatment; Periradicular lesion; Intracanal medicament; Calcium hydroxide.

RESUMO

Lesões periradiculares ocorrem em dentes não vitais como resultado de uma agressão crônica devido a presença de microrganismos dentro do canal radicular, as quais podem ser observadas como uma lesão radiolúcida durante o exame radiográfico; o tratamento varia de acordo com métodos cirúrgicos ou não-cirúrgicos. Este reporte de caso descreve a regressão de uma lesão periapical grande usando um tratamento endodôntico não-cirúrgico em associação com medicação intracanal à base de hidróxido de cálcio. Após exame do paciente e análise radiográfica, uma lesão radiolúcida com 13 mm (no maior diâmetro) foi observada no dente número 12. O tratamento endodôntico foi realizado e Calen-CMCP (S.S. White Artigos Dentários Ltda., Rio de Janeiro, RJ, Brazil) foi aplicado dentro do canal, o qual foi substituído por nova medicação a cada 2 semanas durante 2 meses. A lesão regrediu progressivamente a partir de cada troca de medicação. Além disso, após acompanhamento de 6 anos o dente permaneceu livre de infecção e o tecido ósseo foi completamente regenerado. Conclui-se que terapia à base de hidróxido de cálcio pode estimular de maneira conservadora a regressão de lesões periapicais grandes.

PALAVRAS-CHAVE

Tratamento endodôntico não-cirúrgico; Lesão periapical; Medicação intracanal; Hidróxido de cálcio.

INTRODUCTION

Periradicular lesions occur by microbial infection of the root canal, which may sometimes progress to large dimensions. The treatment of these pathologic alterations normally varies in surgical (e.g., apicoectomy) or nonsurgical methods (e.g., endodontic treatment), and although the latter is more conservative compared to the former [1,2], it depends on the reduction or elimination of microorganisms from the root canal. However, considering that the endodontic treatment may not completely eliminate all microorganisms, intracanal medicaments are commonly used as a complement procedure in an attempt to avoid the bacteria survival [1-3].

The most common intracanal medicament used in association with endodontic treatment is calcium hydroxide (CH), mainly because of its aseptic property, which is powerful and effective [4-6], though due to its biocompatibility [7,8]. In addition, CH can successfully reduce the levels of endotoxins in root canals [9], in part due to its high alkalinity [10] and enzymatic inactivation of bacteria [6,11], but also due to neutralization of the cytotoxic effects produced by the endotoxins [9]. Among several substances that have been evaluated as possible modulators of these bacterial endotoxins (e.g., sodium hypochlorite, chlorhexidine, polymyxin B, ginger extract, antibiotics) [9,12,13], the application of CH has been typically correlated to positive results. Moreover, a recent study demonstrated that CH suppressed bone destruction by attenuating the virulence of an endotoxin present in the Porphyromonas endodontalis, that is, a typical bacteria associated with the development of periapical diseases and alveolar bone loss [14].

Considering all these aforementioned positive characteristics, CH can be considered important/essential for the healing process of large periradicular lesions, since an excess of bacteria and endotoxins may be present under these pathologic circumstances, needing strong chemical elimination. In fact, according to some case reports in the literature, CH is effective in healing these pathologies [1-4]. Thus, the following case report describes the six-year follow-up of the endodontic treatment of a large periradicular lesion when combined with an intracanal calcium hydroxide-based medicament.

CASE REPORT

A 32-year-old female was referred to the Department of Operative Dentistry and Endodontics to receive endodontic treatment at the right maxillary lateral incisive (tooth 12). She related no spontaneous pain during clinical examination and pulp vitality test, but little sensitivity after vertical percussion test. The tooth did not present mobility. Radiographic exam was performed and a well-defined radiolucent lesion around the tooth apex could be observed (13 mm in maximum diameter and without radiopaque halo) (Figure 1a). Nonsurgical endodontic treatment was suggested and accepted by the patient. Thus, the root canal was chemo-mechanically prepared with 2.5% sodium hypochlorite (NaClO) (Indaclor, Indalabor, Dores do Indaiá, MG, Brazil) and 17% ethylenediamine tetraacetic acid (EDTA) solutions and K Files (#15 to #80) (Dentsply Maillefer, Petrópolis, RJ, Brazil), using the coronal-apex technique. Next, the canal was filled with calcium hydroxide/camphorated paramonochlorophenol paste (Calen-CMCP, SS White, Artigos Dentários Ltda.) and then sealed with a temporary filling material (IRM, Dentsply Caulk, York, PA, USA).

After two weeks of intracanal medicament placement, the tooth was radiographed (Figure 1b) and the root canal was newly irrigated with 2.5% NaClO, filled with Calen-CMCP and sealed again with IRM. This protocol was repeated for three more times, resulting in a total of five Calen-CMCP applications. After two months (Figure 1c), the patient did not present any pain on percussion, so the tooth was sealed with Tanari® (Tanari Industrial, Manacapuru, AM, Brazil) gutta-percha and endodontic cement (EndoFill, Dentsply Caulk, York, PA, USA)

using the lateral compaction technique (Figure 2a). The tooth was temporarily restored with ionomeric cement (VitroFill, DFL, Taquara, RJ, Brazil) and after two weeks, permanently restored with composite resin (Filtek™ Z-250, 3M ESPE, St. Paul, MN, USA), shade B3; a final radiography was taken (Figure 2b). The patient was monitored yearly and after six years a new radiographic exam was performed (Figure 3).

DISCUSSION

The aseptic property of CH is already known [4-6]. According to Kontakiots [11], it can absorb carbon dioxide from the root canal environment, hampering the survival of facultative anaerobic bacteria; in addition, this previous study has also demonstrated that CH is even effective without getting in direct contact with the microorganisms. This may therefore

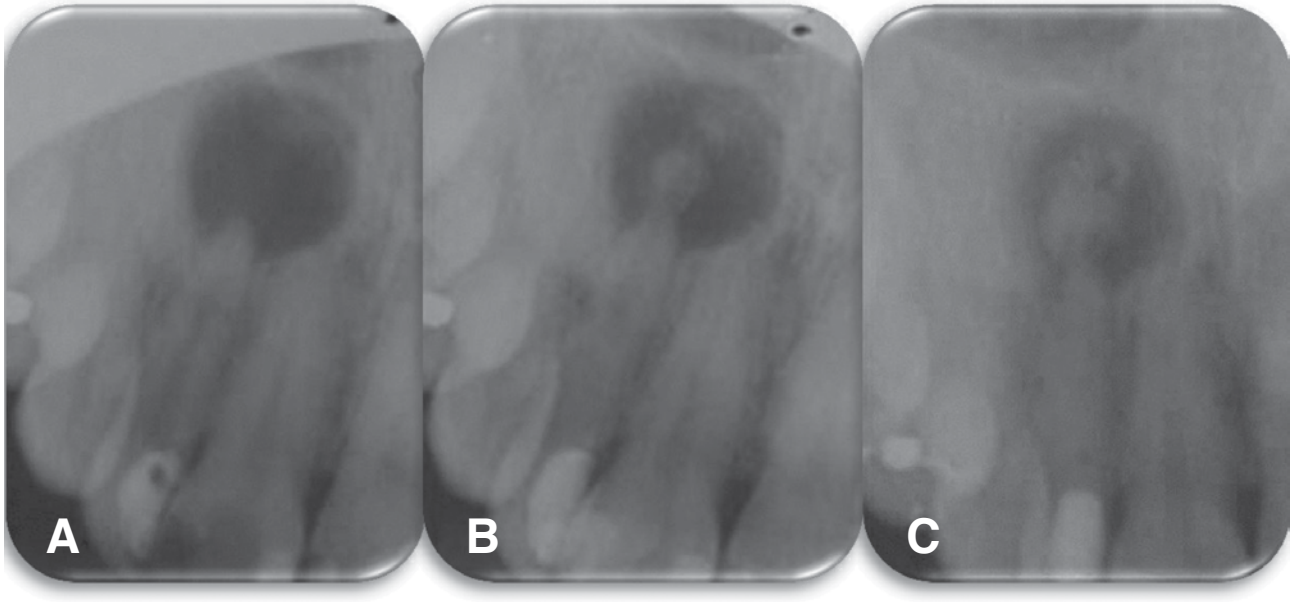

Figure 1 - Periapical radiographies: (a) initial case; (b) 14 days after first intracanal medicament placement; and (c) 28 days after first intracanal medicament placement.

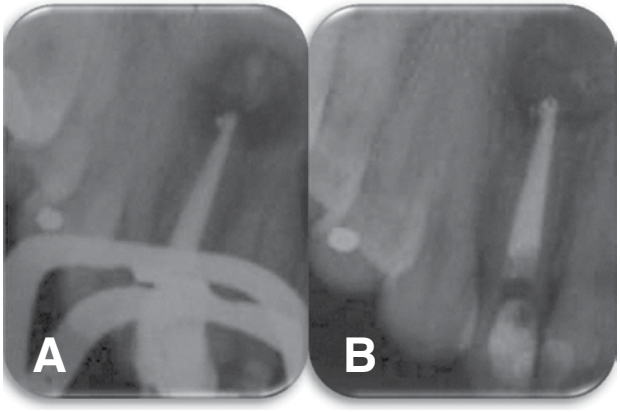

Figure 2 - Periapical radiographies: (a) canal obturation with gutta-percha and endodontic cement (2 months after first intracanal medicament placement); and (b) 14 days after canal obturation.

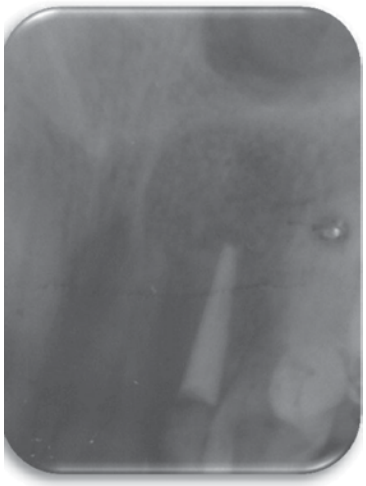

Figure 3 - Six-year follow-up.

explain the favorable results obtained with the CH-based therapy chosen in the present case report, where a fresh material was placed into the root canal at every two-week space, allowing the elimination of microorganisms and endotoxins, and consequently, bone regeneration.

After the second application of the intracanal medication, only a slight and centrally located regression of the lesion occurred (Figure 1b), probably because it may take some months to completely regenerate bone tissue. However, the healing of the periradicular area occurred in a progressive fashion, and after the third and fourth medication replacement, the lesion healed laterally, that is, following a centrifugal and expansive direction (Figure 1c).

Depending on the size and pathogenicity of the periradicular lesion, even a CH-based therapy may sometimes be insufficient in healing the lesion, thus maintaining the signs and symptoms of the pathology. This is probably due to the presence of endotoxins. In these circumstances, it has been suggested that the replacement of CH-based materials by antibiotic pastes could generate better results, probably due to their more specific activity against complex type of bacteria [1]. Notwithstanding, antibiotic-based materials typically produce cytotoxic effects, which may be considered a disadvantage compared to non-cytotoxic materials. Interestingly, Oliveira et al. [9] demonstrated that the application of CH and 2% chlorhexidine gel as intracanal medication for 14 days resulted in the neutralization of cytotoxic effects produced during the endodontic treatment. Moreover, the use of CH for 30 days contributed for an improvement of endotoxin reduction [12]. All of these aforementioned statements corroborate the present finding, since the adopted CH-based therapy was effective in solving the patient symptoms, leading to the complete bone regeneration as seen after the six-year follow-up (Figure 3).

Although the positive outcome obtained in the present case report was probably related to the CH therapy used, the success of an endodontic treatment also depends on the quality of the sealer and restorative materials used to fill the root canal, which should maintain the environment the most aseptic the possible [15]. Depending on the restorative material used and its properties/characteristics, it may degrade faster over time, leading to micro-leakage of new microorganisms to the root canal system. Thus, the use of a good restorative is very important. The present case report used Filtek™ Z250 as the resin composite, which is an excellent and well recognized material [16]. Furthermore, the permanent restoration was placed only after two weeks the root canal was sealed, as the endodontic cement used is constituted by eugenol, which is a substance that may inhibit the polymerization of polymer-based materials [17]. So, the resin composite was placed only after the residual eugenol molecules could be dissipated from the pulp chamber surface, allowing the proper polymerization of the material.

CONCLUSIONS

The calcium hydroxide therapy presented in this case report revealed to be an effective treatment of a large periradicular lesion with complete bone regeneration and absence of recurrent infection after a period of six years.

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