Non-surgical treatment of large periapical lesions

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ABSTRACT

Objective: To report two cases in which conventional endodontic therapy resulted in clinical success without the need for further corrective surgery. **Case report:** The first case reports a 21-year-old patient who sought dental care for orthodontic reasons. Panoramic radiograph revealed a large radiolucent area in the periapical region of teeth #12 , 11 , 21 , 22 and 23. Treatment was limited to endodontic therapy which consisted of pulpectomy , emptying the septic content, biomechanical preparation and dressing. In the second session , the root canal system of all 5 teeth were filled. Radiographic control after two and five years showed complete repair of the radiolucent area and areas of bone formation. The second case reports a 84-year-old, diabetic patient who sought dental care for prosthodontic reasons . Intraoral examination revealed expansion of cortical bone in the lower anterior region. Panoramic radiograph revealed extensive radiolucent area in teeth #32 , 31 , 41 , 42 and 43 . Treatment consisted of conservative endodontic treatment , without the further need for surgery similar to the first case. Radiographic control after one year showed decreased radiolucency and bone healing. **Conclusion:** Surgery is not always recommended for cases of large periapical lesions and the clinical and radiographic follow-ups are of paramount importance for treatment.

Keywords: Periapical periodontitis. Periapical diseases. Root canal preparation.

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Introduction

The majority of periradicular lesions (90%) is classified as periapical granuloma, radicular cyst or abscess.[1,2,3] Oftentimes, they develop due to necrosis of infected pulp tissue, which spreads to periradicular tissues.[1] Nevertheless, diagnosis of a periapical lesion can not be established only on the basis of radiographic findings; a histopathological examination of the lesion is essential for proper elucidation of the case, although, regardless of histological classification, the recommended treatment usually includes endodontic treatment of root canals.

In these cases, radiographic imaging is usually radiolucent, of homogeneous density, unilocular, circumscribed or not, round or oval, and associated with a devitalized tooth.[4] Some studies determine whether the lesion is a periradicular cyst through radiographic examination and further histopathological confirmation.[5,6,7] Some authors assert that if the image of the lesion covers one or more than one tooth, has a total area equal to or greater than 200 mm², diameter ranging between 10 and 20 mm, and reveals drainage of a brownish liquid through the root canal, the likelihood of being a periapical cyst ranges from 60 to 100%.

Periapical lesions of great extent are commonly treated by endodontic therapy followed by complementary apical endodontic surgery. Several methods and case reports have been published showing recovery of extensive lesions by means of more conservative treatment, in other words, without the need for additional surgery to achieve treatment success.

Therefore, this study aims to report two clinical cases of extensive periapical lesions treated with conventional endodontic therapy. Both cases achieved clinical and radiographic success.

Case reports

The first case reports a 21-year-old female patient who sought dental care for orthodontic reasons. Her chief complaint was crown movement of teeth #22 and 23. Panoramic radiograph revealed a large radiolucent area in the periapical region of teeth #12, 11, 21, 22 and 23. This lesion was the main cause of root displacement between #22 and 23 (Fig 1).

Teeth #13, 12, 11, 21, 22, 23 and 24 were subjected to cold testing. Teeth #12, 11, 21, 22 and 23 responded negative, whereas teeth #13 and 24 responded positive. All teeth were negative upon percussion. Thus, pulp necrosis was diagnosed on teeth #12, 11, 21, 22 and 23.

During the first interview, the patient reported having suffered a head trauma as a result of fall, which affected the upper anterior region of the mouth and probably caused pulp necrosis and the emergence of a large area of rarefaction.

Treatment was limited to endodontic therapy which consisted of pulpectomy, drainage of septic content, and biomechanical preparation using 2.5% sodium hypochlorite as irrigation solution. With a view to improving bactericidal action, controlling exudate drained via root canal and removing endotoxin, calcium hydroxide diluted with water-soluble vehicle (0.9% sodium chloride) was used as intracanal dressing. Sodium chloride allows faster deionization of calcium hydroxide which, as a result, allows faster action and healing.

After 15 days, temporary intracanal dressing was removed and new irrigation was performed with 2.5% sodium hypochlorite. A chelating calcium ion solution (17% EDTA) was applied for five minutes to remove the smear layer and clear the dentinal tubules, thereby providing better root canal sealing. Root canal filling was performed with gutta-percha and zinc oxide and eugenol sealer (Endofill, Dentsply Maillefer, York, Pennsylvania, USA) by means of the lateral condensation technique.

Radiographic control after two (Fig 2) and five years (Fig 3) showed complete repair of the radiolucent area and areas of bone formation. Patient's early age suggests an accelerated physiological metabolism which speeds up and favors the process of bone repair.

The second case reports a 74 year-old, diabetic and hypertensive patient who sought dental care for prosthodontic reasons. Intraoral examination revealed expansion of cortical bone in the lower anterior region. Panoramic radiograph revealed extensive radiolucent area in teeth #32, 31, 41, 42 and 43 (Fig 4). Teeth #33, 32, 31, 41, 42, 43 and 44 were subjected to cold testing. Teeth #32, 31, 41, 42 and 43 tested negative while teeth #33 and 44 tested positive. All teeth had negative response to vertical and horizontal percussion. Thus, diagnosis of pulp necrosis was confirmed for teeth #32, 31, 41, 42 and 43.

Conservative endodontic treatment consisted of drainage of septic content as well as conventional biomechanical preparation with the aid of two solutions: 2.5% sodium hypochlorite used to disinfect the root canal system, and 17% EDTA solution to promote chelation of calcium ions, thereby favoring dentin cutting by endodontic instruments. A 0.9% sodium chloride solution was used to remove remaining sodium hypochlorite. Calcium hydroxide associated with 2% chlorhexidine gel was used as temporary intracanal dressing which provided broad-spectrum bactericidal action and high substantivity, thereby increasing the duration of the medication.

After two weeks, intracanal dressing was removed with saline solution (0.9% sodium chloride) and a new irrigation procedure was carried out with 2.5% sodium hypochlorite. 17% EDTA solution was reapplied for five minutes to remove smear layer (dentin debris) produced during instrumentation, and clear the dentinal tubules, thereby providing better root canal sealing. Root canal filling of compromised teeth was performed with gutta-percha as well as zinc oxide and

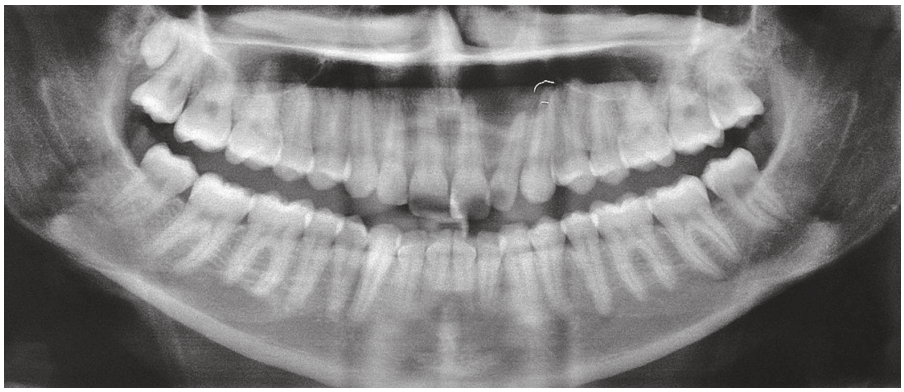

Figure 1. Initial panoramic radiograph. Note the radiolucent area on the apices of teeth #12, 11, 21, 22 and 23, suggestive of necrotic pulp with periapical lesion.

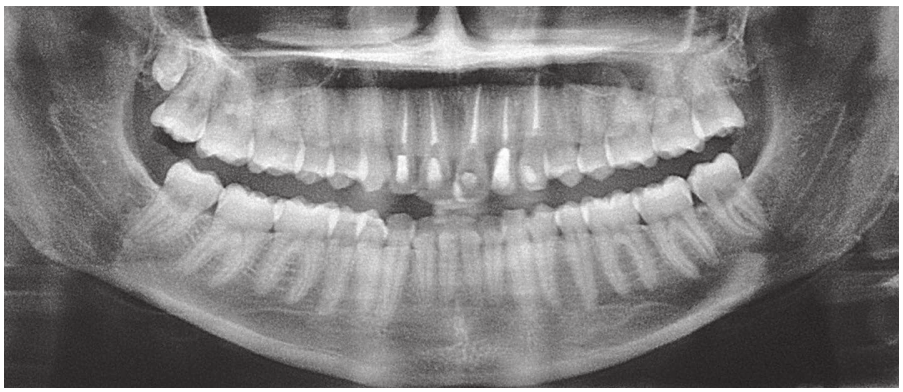

Figure 2. Panoramic radiograph after a two-year follow-up. Note bone formation on the apex of endodontically treated teeth.

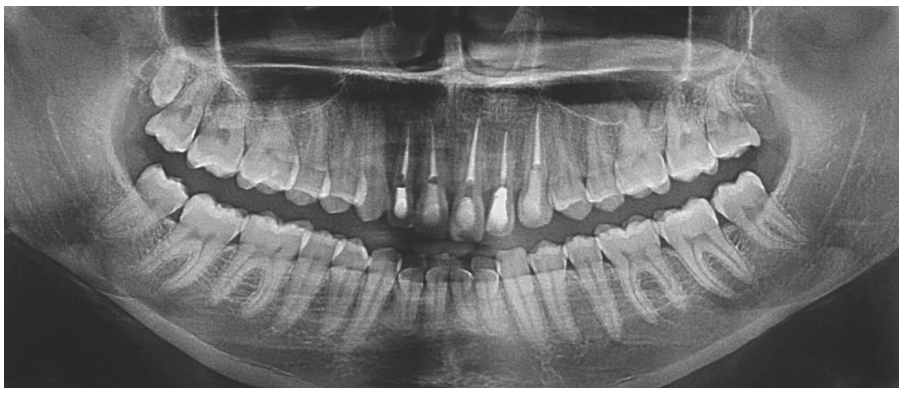

Figure 3. Panoramic radiograph after five years. Note total repair of the radiolucent area with intense formation of mineralized tissue.

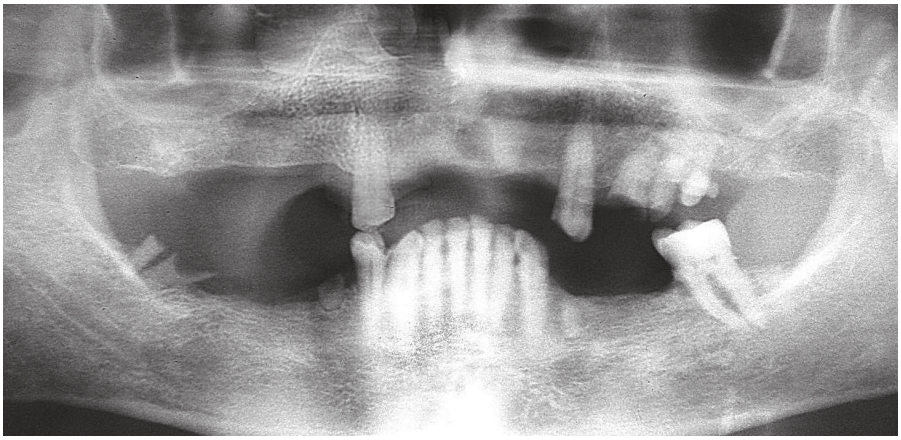

Figure 4. Initial radiograph revealing extensive radiolucent area under the apices of teeth #43, 42, 41, 31 and 32.

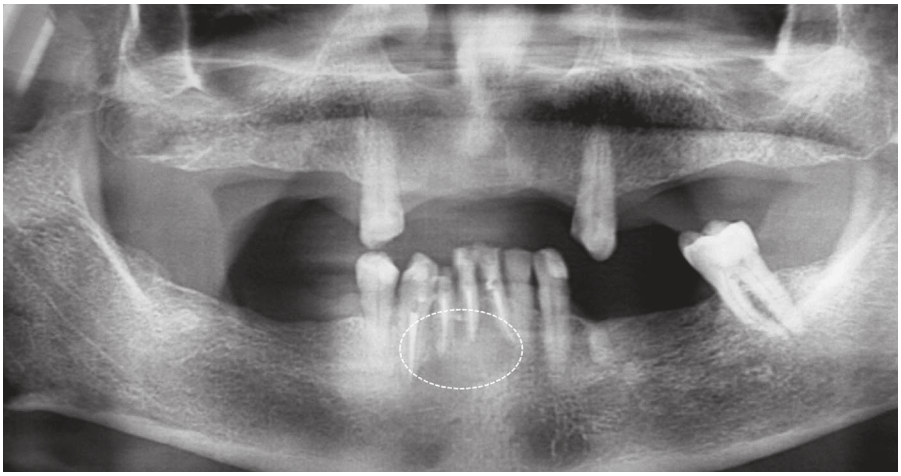

Figure 5. Panoramic radiograph after one-year follow-up. Despite patient's systemic condition, there was mineralized tissue formation suggestive of healing process.

eugenol sealer (Endofill, / Dentsply Maillefer, Switzerland) by means of Tagger's hybrid technique: thermoplastification of gutta-percha cones carried out by means of a McSpadden compactor. This technique provides better root canal three-dimensional sealing.

Radiographic control after one year showed decreased radiolucency and the presence of bone healing, regardless of patient's age and physiological conditions (for instance, diabetes). Nevertheless, despite bone formation and radiographic success, total repair should be slower than the first case. Long-term clinical and radiographic follow-up is required (Fig 5).

Discussion

Despite increasing the chances of cure, apical endodontic surgery has disadvantages that impact patients' well-being, namely: swelling, postoperative pain and discomfort.[8,9] The American Association of Endodontics recommends periapical surgery in cases in which endodontic treatment was not enough to cure apical lesion.[5] Thus, less invasive methods are proposed: root canal system treatment without complementary methods; non-surgical decompression; irrigation and aspiration technique; aspiration via canal using calcium hydroxide; lesion sterilization and repair therapy.[1,6,10] Lokade et al[3] reported a case of a right lower first molar with large periapical lesion treated with endodontic therapy associated with lesion sterilization and repair therapy (LSRT). This technique uses an antibiotic paste and a second calcium hydroxide paste. After two months of treatment, radiographic examination revealed bone formation, thereby proving the technique to be effective.

Lesion sterilization and repair therapy (LSRT) associates metronidazole, a broad-spectrum antibiotic acting against anaerobic bacteria; ciprofloxacin and minocycline to eliminate all bacteria from the root canal system. After 15 days, the antibiotic paste is removed and a calcium hydroxide paste associated with a water-soluble vehicle is used to promote periapical tissues repair. Root canal filling is carried out after 60 days.[2,3,11,12,13] Ibrahim et al[14] have recently conducted an *in vitro* study to assess the effect of associating these three antibiotics on inhibiting *E. faecalis*. The authors recommend associating these three antibiotics with a view to inhibiting these anaerobic bacteria which are so recurrent in endodontic infections.

Ülkü and Kürsat[2] and Çaliskan[6] demonstrated the effectiveness of antibiotic and calcium hydroxide pastes. In the present study, antibiotic paste was not used in either case, calcium hydroxide paste was the only intracanal dressing used. Nevertheless, repair of rarefaction areas was achieved. Due to ionization and diffusion, calcium hydroxide exerts antimicrobial action; inactivation of endotoxin; and, in the periapical region, activation of cellular and molecular mechanisms of tissue regeneration.

This procedure provides sharp decrease of periapical radiolucent areas as well as complete radiographic periapical repair within 10 to 12 months after root canal filling. Calcium hydroxide associated with chlorhexidine acts on both gram-positive and gram-negative bacteria. Furthermore, the benefits of both medications are associated; for instance, chlorhexidine substantivity and action on *E. faecalis* and calcium hydroxide neutralization power of bacterial LPS and alkalinity, both of which promote tissue repair.[15,16]

Asgary and Ehsani[11] reported a case of a right upper first molar with large, radiographically visible periradicular lesion treated in one single session. Clinical and radiographic success was achieved after nine months of control.

Treatment performed in one single session raises some questions about biological control of infection, tissue repair and postoperative pain. However, should the clinician have the ability to perform treatment within a single session , with control of septic content in the root canal system and without drainage of exudate via canal, single-session treatment should be used, since it ensures control of antisepsis. In our study, single-session treatment was not employed in any of the two cases reported. Calcium hydroxide was the intracanal dressing of choice, applied between sessions to improve periradicular tissue response as well as bactericidal action and endotoxin neutralization.

Soares and Cesar[17] monitored 27 patients subject to nonsurgical endodontic treatment for apical periodontitis therapy. After 12 months, 46.4% of lesions were completely repaired and asymptomatic, i.e., they were considered radiographic successful cases while partially repaired lesions were understood as failure. The methods and concepts applied in the present study differ from Soares and Cesar, since we believe the immune and tissue response of each patient must be taken into account. In the present study, neither one of the two cases presented symptoms or clinical symptoms after the period of 12 months, which could classify these cases as failures. Instead, after one year, radiographic examination revealed mineralized tissue formation, thereby suggesting tissue repair.

Moreover, in this research, the first patient began treatment during adolescence and had no systemic changes, which provided her with better tissue repair. However, the second case proves to be the complete opposite: an elderly patient with clinically relevant systemic disease, which explains the presence of incomplete tissue repair after 12 months. Nonetheless, it seems premature to assert that the patient was a treatment failure. Thus, it is reasonable to affirm that the systemic condition of each patient should be individually considered throughout preservation.

Conclusion

Apical endodontic surgery is not always recommend for cases of large periapical lesions compromising several teeth. Additionally, clinical and radiographic follow-ups are of paramount importance for treatment and complementary therapy definition. Moreover, the clinician should establish fright from the start proper means of disinfection and tissue repair, such as calcium hydroxide paste which is a temporary intracanal dressing that contributes to clinical success.

Lastly, patient's systemic conditions must be taken into consideration during planning, implementation and follow-up phases, particularly because tissue repair is directly linked to each patient's general health conditions.

References

1. Fernandes M, Ataide I. Nonsurgical management of periapical lesions. J Conserv Dent. 2010;13(4):240-5.
2. Ülkün O, Kürsat E. Endodontic treatment of a large cyst-like periradicular lesion using a combination of antibiotic drugs: a case report. J Endod. 2005;31(12):898-900.
3. Lokade J, Wankhade SV, Gade V. Nonsurgical endodontic treatment of a periradicular lesion using LSRT therapy: a case report. Int J Dent Clinics. 2012;4(3):63-6.
4. Neville BW. Patologia oral e maxilofacial. 5ª ed. São Paulo: Atheneu; 2009.
5. Öztan MD. Endodontic treatment of teeth associated with a large periapical lesion. Int Endod J. 2002;35(1):73-8.
6. Çalskan MK. Prognosis of large cyst-like periapical lesions following nonsurgical root canal treatment: a clinical review. Int Endod J. 2004;37(6):408-16.
7. Manuel S, Parolia A, Kundabala M, Vikram M. Non-surgical endodontic therapy using triple-antibiotic paste. Kerala Dental J. 2010;33:88-90.
8. Metzger Z, Huber R, Slavescu D, Dragomirescu D, Tobis I, Better H. Healing kinetics of periapical lesions enhanced by the apexum procedure: a clinical trial. J Endod. 2009;35(2):153-9.
9. Nair P. New perspectives on radicular cysts: do they heal? Int Endod J. 1998;31(3):155-60.
10. Iwaku M, Hoshino E, Kota K. Lesion sterilization and tissue repair (LSTR) therapy: new pulpal treatment. How to conserve infected pulps Tokyo: Nihon-Shikahyoron; 1996.
11. Asgary S, Ehsani S. Endodontic treatment of a large periradicular lesion: a case report. Iran Endod J. 2008;3(4):134-7.
12. Hoshino E, Takushige T. LSTR 3Mix-MP method-better and efficient clinical procedures of lesion sterilization and tissue repair (LSTR) therapy. Dent Rev. 1998;6:57-106.
13. Takushige T, Cruz EV, Asgor Moral A, Hoshino E. Endodontic treatment of primary teeth using a combination of antibacterial drugs. Int Endod J. 2004;37(2):132-8.
14. Ibrahim Khalil, KM Mohidul Islam, Md Zahid Hossain, Arup Kumar Shah, Akashlynn Badruddoza, Md Ali Asgor Moral. Lesion sterilization and tissue repair (lstr)-3mix mp therapy showed reliable efficacy against the most resistant endodontic bacteria enterococcus faecalis. City Dental J. 2012;9(2):1-4.
15. Davis JM, Maki J, Bahcall JK. An in vitro comparison of the antimicrobial effects of various endodontic medicaments on enterococcus faecalis. J Endod. 2007;33(5):567-9.
16. Ercan E, Dalli M, Dülgergil T, Yaman F. Effect of intracanal medication with calcium hydroxide and 1% chlorhexidine in endodontic retreatment cases with periapical lesions: an in vivo study. J Formos Med Assoc. 2007;106(3):217-24.
17. Soares JA, César CAS. Avaliação clínica e radiográfica do tratamento endodôntico em sessão única de dentes com lesões periapicais crônicas. Pesquiodontol Bras. 2001;15(2):138-44.