

Asymptomatic apical periodontitis with cortical bone disruption in patient under continuous treatment with Isotretinoin: case report

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ABSTRACT

Introduction: Asymptomatic apical periodontitis (AAP) is characterized by inflammation and destruction of the periapical tissues and its progression leads to bone resorption, which may be aggravated by continuous use of Isotretinoin. The objective of this study was to report the resolution of AAP with mandibular cortical disruption in a patient under continuous treatment with isotretinoin (Roacutan®) and kickboxing practitioner, by conventional chemical-mechanical procedures and cone-beam computed tomography (CBCT) follow-up. **Description:** A 21-year-old Caucasoid individual, ASA I, under continuous use of isotretinoin and kickboxing practitioner sought dental care with moderate pain at the region of tooth #38. After clinical, radiographic and tomographic examination, the need for endodontic treatment of tooth #36 was verified. The CBCT showed an

extensive and hypodense apical image between teeth #36 and #37, compatible with cystic bone lesion, with dimensions of 25.59 mm wide x 14.37 mm high x 8.40 mm deep. Apical resorption of the distal root, hypodense halo under a coronal restoration at #36, and rupture of the external buccal and lingual cortical bone were also observed. The endodontic treatment was performed in three sessions with the aid of a microscope and chemical-mechanical protocols, such as Easy Clean and photodynamic therapy. **Result:** Resolution of AAP was observed after follow-up for three years. **Conclusion:** Endodontic treatment allowed healing of an extensive periapical lesion, avoiding immediate par-endodontic surgery and the continuous use of isotretinoin did not affect the AAP resolution.

Keywords: Periapical Periodontitis. Tomography, X-Ray Computed. Endodontics. Isotretinoin

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Introduction

Apical periodontitis (AP) is an infectious disease caused by microorganisms that access the pulp cavity through extensive and/or inadequate coronal restorations, fractures or cracks due to trauma, and caries.¹ Once inside the root canal system, necrotic tissues serve as nutrient source and allow bacterial colonization and biofilm establishment.² AP is classified as symptomatic or acute and asymptomatic or chronic, both associated with different symptoms, clinical and radiographic signs.³ Asymptomatic apical periodontitis (AAP) is characterized by inflammation and destruction of periapical tissues and its progression leads to bone resorption.⁴ The involved tooth is clinically asymptomatic, non-vital, and the diagnostic imaging aspect shows a periapical radiolucent area.^{5,6}

Considering total debridement of the root canal is not yet feasible, techniques have been developed to increase the efficiency of chemical disinfecting protocols.⁷ The gold standard and most widely used irrigation protocol involves the use of sodium hypochlorite (NaOCl), due to its capacity to eliminate bacterial biofilm and dissolve vital and necrotic tissues^{7,8} followed by 17% ethylenediaminetetraacetic acid (EDTA).⁹ An alternative protocol also includes final irrigation with NaOCl¹⁰ Photodynamic therapy (PDT),^{7,11} passive ultrasonic irrigation (PUI)¹² and the mechanical device called Easy Clean¹³ are also antimicrobial strategies to improve root canal disinfection. Supporting disinfection protocols are also required, such as intracanal medication with calcium hydroxide (CH) paste, which promotes significant bacterial reduction.¹⁴

Radiographic examination is fundamental for correct diagnosis and treatment of endodontic problems, but its limitations are recognized. Cone beam computed tomography (CBCT) as an aid in diagnosis, therapy and follow-up¹⁵ is increasing in endodontic practice worldwide, since its three-dimensional images overcome the limited two-dimensional periapical radiographs.¹⁶ CBCT is highly accurate to detect AAP.

Retinol is a multifunctional molecule that directly or indirectly regulates the biological processes in several cell types, being necessary for reproduction, metabolism, differentiation, bone development and

embryogenesis.¹⁷ In addition to its biological functions, synthetic retinoids play an important role as therapeutic agents, being used to treat cutaneous diseases.¹⁸ The most well-known retinoid is 13-cis-retinoic acid or isotretinoin, commercially known as Roacutan®. Although it is considered “one of the greatest successes of dermatology”,¹⁸ information from Roacutan® manufacturers warns about the side effects, including skeletal abnormalities such as cortical bone thickening, hyperostosis, premature bone fusion, osteoporosis and thinning of long bones. Although studies suggest that oral therapy with isotretinoin may have effects on bone mineralization, the available information about its actions is still obscure.¹⁹ Its effects on bone mineral density and bone growth appear to depend on treatment dose and duration and are directly related to the use of high doses for prolonged periods of time.²⁰

The objective of the present study was to report the resolution of asymptomatic apical periodontitis with mandibular cortical disruption in a patient under continuous treatment with isotretinoin (Roacutan®) and kickboxing practitioner, by conventional chemical-mechanical procedures and CBCT follow-up.

Case report

All clinical procedures were conducted with the understanding and written consent of the patient, after revision and approval by the Institutional Review Board of the Universidade do Extremo Sul de Santa Catarina (UNESC, Criciúma/SC) (protocol n. 2.923.829). A 21-year-old Caucasoid individual ASA I, using continuous isotretinoin medication (Roacutan®) for approximately 6 months, kickboxing practitioner, sought dental care with moderate pain complaint at the region of left mandibular third molar (tooth #38). After clinical examination, pericoronitis of tooth #38 was diagnosed. A complementary panoramic radiography revealed a radiolucent halo under the restoration of left mandibular first molar (tooth #36), which had already undergone stepwise treatment some years before. In addition, root resorption of #36 and a wide bone rarefaction involving the apices of teeth 36 and left mandibular second molar (tooth #37), suggestive of AP, were observed (Fig 1A). The cold sensitivity test (Roeko Endo-frost, Langenau, Ger-

many) reported negative response on tooth #36 and positive on left mandibular second premolar (tooth #35) and second molar (tooth #37). To aid the diagnosis and therapy planning, a CBCT was requested by the endodontist. Nonetheless, the patient sought another opinion, from an oral and maxillofacial surgeon, who suggested immediate surgical removal of the lesion, with probable tooth loss.

After one month the patient returned to the endodontist office agreeing to follow the treatment. Thus, the first CBCT was performed and the diagnosis of AAP was confirmed. The endodontic treatment of tooth #36 was proposed to the patient, the bad prognosis was explained and the patient signed an informed consent form. In case of endodontic failure, a complementary parendodontic surgery would be

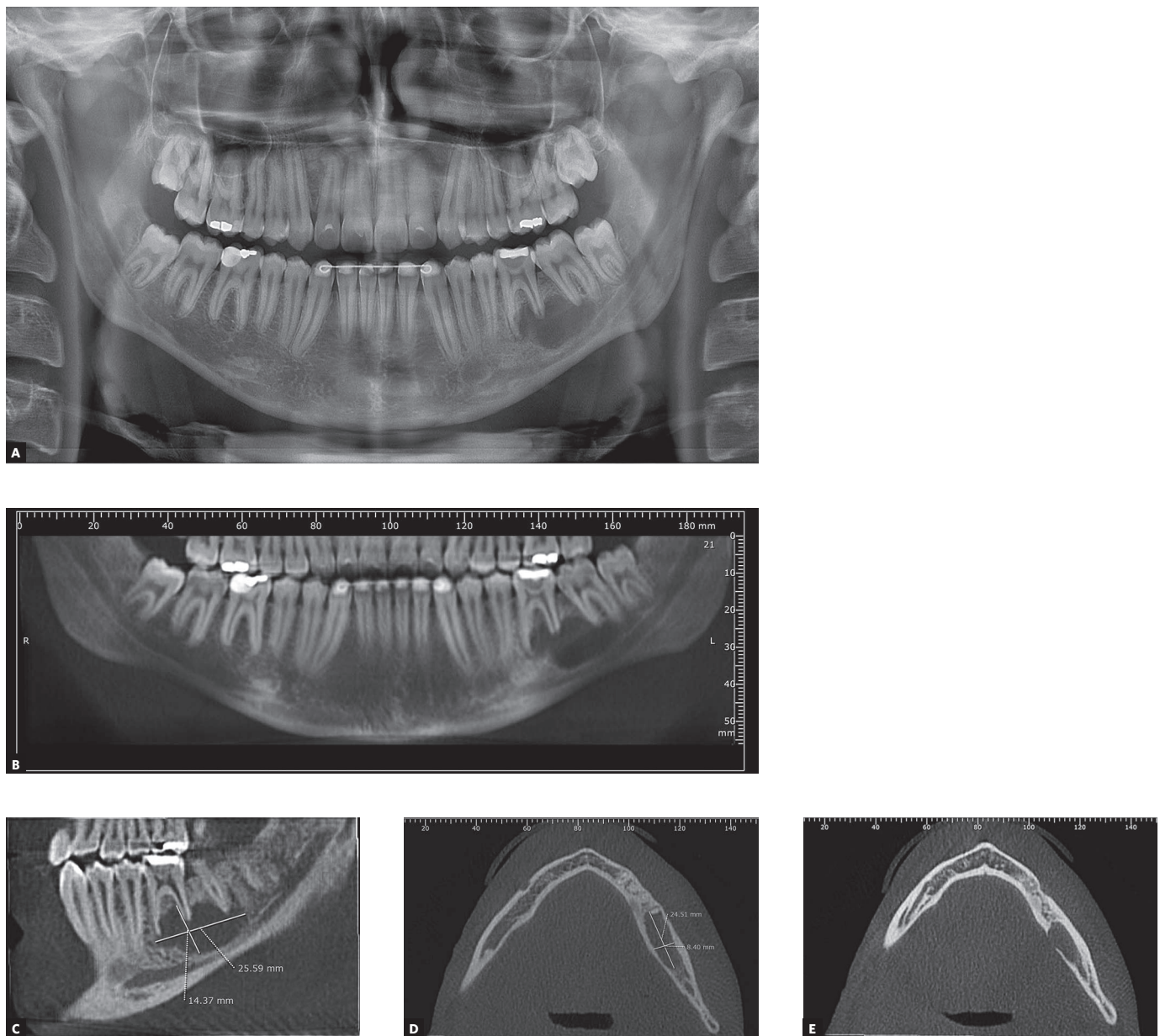


Figure 1. (A) Panoramic radiograph (August/2015). (B) CBCT, coronal-panoramic image (November/2015). (C and D) CBCT, sagittal image and lesion dimensions (mm). (E) CBCT, axial image showing external lingual cortical bone disruption.

necessary. Interruption of kickboxing activity was requested due to the cortical mandibular disruption. The CBCT showed mesial and distal root resorption of tooth #36, with a hypodense halo under the coronal restoration. The presence of an extensive apical hypodense area between teeth #36 and #37, with dimensions 25.59 mm wide x 14.37 mm high X 8.40 mm deep (Figs 1B and 1C), was compatible with cystic bone lesion. Disruption of the external buccal and lingual cortical bone was observed (Fig 1D). Additionally, external root resorption of the mesial and distal root of #36, suggesting a previous inflammatory process, was also diagnosed (Fig 1E).

Before onset of endodontic treatment, laboratory tests (hemogram, leukogram, platelets and alkaline phosphatase) were requested, which presented normality. Using an operating microscope (DFV Vasconcelos, Valença, Rio de Janeiro, Brazil), the three root canals were accessed. Spontaneous drainage of serous secretion and blood occurred, mainly from the distal canal. Meticulous disinfection with 2.5% NaOCl followed by exhaustive negative and absolute aspiration were carried out. After electronic determination of root canal length (Root ZXII, J Morita Corp., Tokyo, Japan), root canals were shaped with Easy Prodesign Logic rotary system (Easy Dental Equipment, Belo Horizonte, Minas Gerais, Brazil) until file 25.04 at the apical foramen. Endo-PTC cream (Formula and Action, São Paulo, São Paulo, Brazil) was used as lubricant. Due to the impossibility of complete root canals drying, an apical barrier of CH powder (Biodynamic Chemistry and Pharmaceutical Ltda, Ibioporã, Paraná, Brazil) was made, and the remaining root canals space was filled with Calen® (SS White, Rio de Janeiro, Brazil). During the postoperative period, the patient had no complaint of pain.

After 30 days, the root canals were dry. Prior to intracanal medication renewal, a final irrigation with 3 mL 17% EDTA-T (Formula and Action, São Paulo, Brazil) and 3 mL of 2.5% NaOCl was performed. Easy Clean (Easy) was used three times for 20 sec in each canal. Then, PDT with 0.005% methylene blue (Chimiolux-DMC São Carlos, São Paulo, Brazil) and laser (660 nm, 100 mW) (MMO, São Carlos, São Paulo, Brazil) was performed for 90 sec. The final

irrigation protocol was repeated as previously mentioned. Another intracanal medication was prepared, and CH powder was added to the Calen® paste (SS White) to make it thicker and remain active within the canals for a longer period.²¹ Cavity access was sealed with composite resin.

The patient returned to the office four months later and a new periapical radiograph showed small bone healing. Another CBCT was requested, which was performed only 3 months later. Once again, it showed the presence of apical bone rarefaction involving tooth #36, extending to the apex of the mesial root of #37. Resorption of the mesial and distal root apices of tooth #36 was still present. The lesion measurement (23.65 mm wide X 13.20 mm high X 6.74 mm deep) indicated slight repair. No evidence of external cortical bone disruption was observed, but thinning of the external lingual cortical bone was emphasized (Figs 2A-C).

Due to health problems, the endodontist was not able to continue the treatment and the patient chose to wait for her return. After 7 months the endodontist proceeded with therapy and root filling was performed. Intracanal medication was removed with manual files and 2.5% NaOCl irrigation. Easy Clean and PDT with 0.005% methylene blue and laser for 90 sec were performed as previously mentioned. The final irrigation protocol was repeated and then root canals were dried with paper points. Mineral trioxide aggregate (MTA) plugs (Angelus, Londrina, Paraná, Brazil) served as apical barriers in all root canals, followed by Thermo Pack II (Easy) continuous-wave obturation technique using AH Plus cement (Dentsply De Trey, Konstanz, Germany) and gutta percha points (Tanari, Tanari Industrial Ltda, São Paulo, Brazil). Coronal restoration was performed with Riva light cure (SDI, Victoria, Australia) and composite resin (Z-350, 3 M ESPE, St. Paul, MN, USA). A follow-up CBCT was performed and indicated that wound healing process was occurring (Figs 3A-C).

The last follow-up CBCT was performed 1 year and 11 months after root canals filling. The extensive apical hypodense area between teeth #36 and #37 was absent, compatible with wound healing (Figs 4A-C).

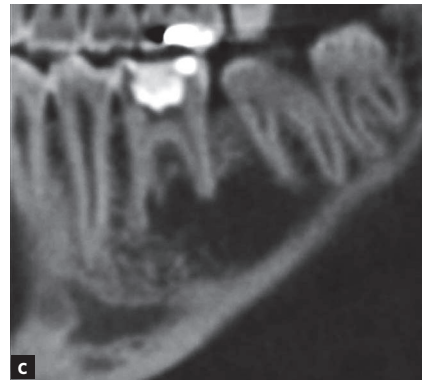
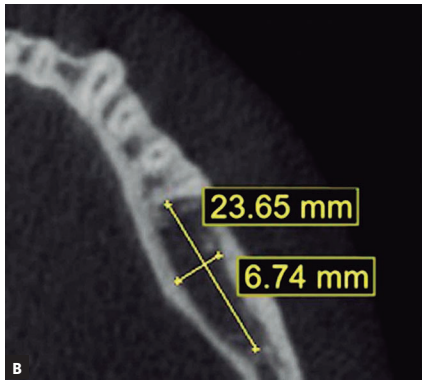
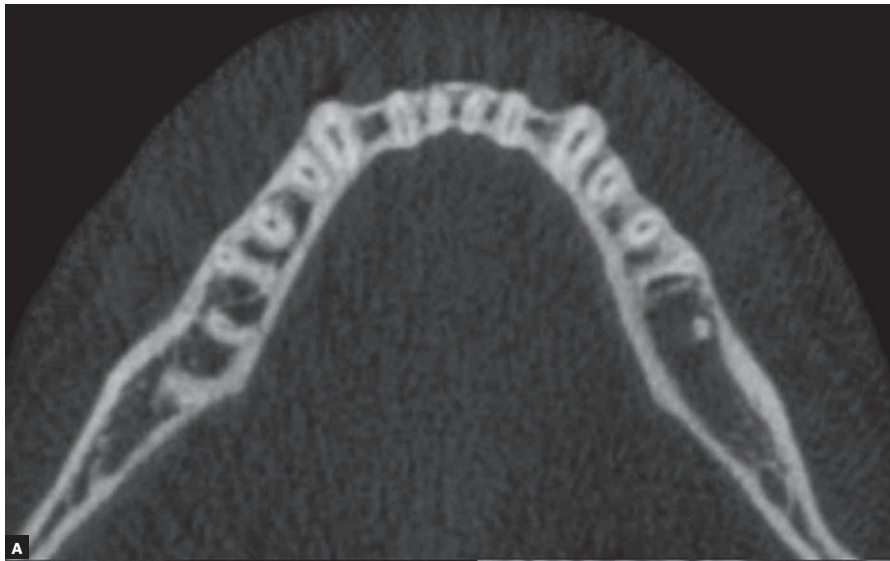


Figure 2. CBCT (September/2016). (A) axial image. (B) axial image, no evidence of external cortical bone disruption; lesion dimension; (C) sagittal image.

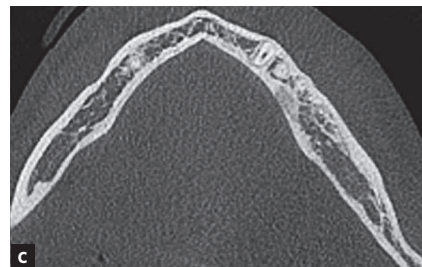
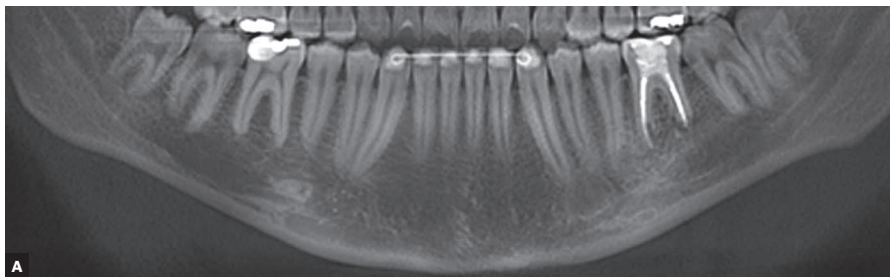


Figure 3. CBCT (June/2017). (A) coronal-panoramic image. (B) sagittal image. (C) axial image.

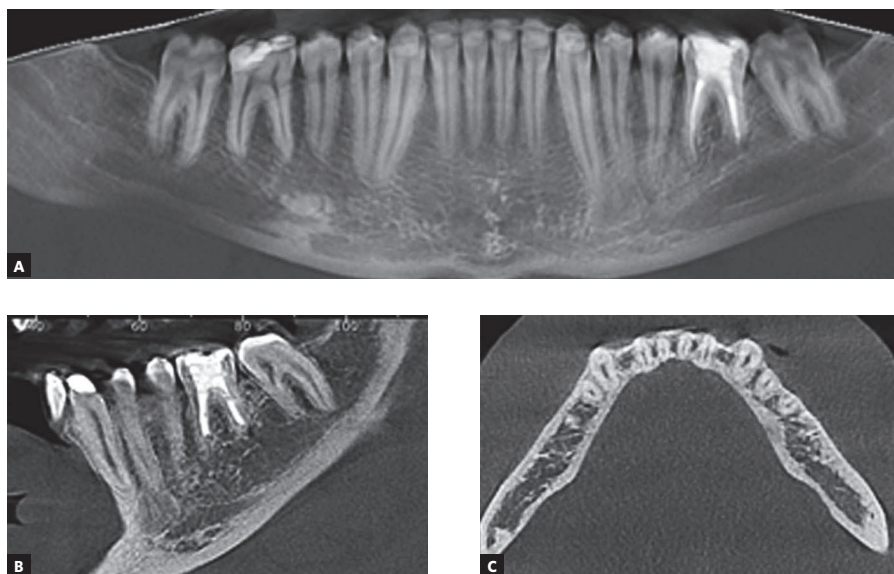


Figure 4. Last follow-up CBCT (March/2019): (A) coronal-panoramic image; (B) sagittal image; (C) axial image.

Discussion

The American Association of Endodontists describes asymptomatic apical periodontitis as a disease of pulp origin, characterized by inflammation and destruction of the apical periodontium.⁵ It appears as an apical radiolucency and presents no clinical symptoms, such as pain on percussion or palpation.

The patient's initial complaint was pain from pericoronitis of tooth #38. However, on routine radiographic examination, extensive apical periodontitis was observed between teeth #36 and #37. A recent study classified periapical lesions as large when ranging from 4.6 mm to 7 mm, with 30% to 50% of bone demineralization; and small ranging from 2 mm to 4.5 mm.²² A periapical lesion was also considered large when diameter was about 15 mm.²³ In another clinical study, large periapical lesions were ranging in diameter from 7 mm to 18 mm.²⁴ The present clinical case reported AAP with tomographic dimensions (24.30 mm width x 13.85 mm height x 8.19 mm depth) above the standards found in the literature, additionally worsened by disruption of the buccal and lingual cortical bone. Due to the uncommon size, it may be challenging to establish an accurate diagnosis. It is necessary to seek the

patient's history by a detailed anamnesis combined with clinical examination and complementary exams, for differential diagnosis.⁶

During anamnesis, the patient reported regular utilization of Isotretinoin (Roacutan[®]) to treat severe acne, which is characterized as a chronic inflammatory disease. Its use is effective and safe when prescribed correctly.²⁵ Although some systemic adverse effects may occur,²⁶ laboratory tests (hemogram, leukogram, platelet and alkaline phosphatase) did not present any alterations. According to the literature, a period of 4 to 6 months of isotretinoin is recommended to improve remission rates of the disease and decrease recurrences.²⁷ However, repeated short courses or long-term use of isotretinoin, exceeding the 20-week course normally used for acne, requires monitoring, regarding skeletal toxicity²⁸ and loss of bone density, directly related to alterations in bone metabolism caused by retinoids.²⁹ Isotretinoin can cause disturbs in the physiological homeostasis of bone metabolism including demineralization and thinning of the bones epiphyses, as well as hyperostosis and periostosis.³⁰ The patient was also a kickboxing practitioner, whereby punching, kicking and elbowing are permitted, which can cause several injuries, especially in the head, face and neck region.³¹ Trauma lesions may cause inflammation of

the dental pulp.^{24,32} When left untreated, they evolve to pulp necrosis and infection, which spread to the alveolar bone causing periapical pathology.²⁴ Thus, in the present case, regular and intense physical contact/trauma may have contributed to necrosis of tooth #36, AAP establishment, and cortical bone disruption. The patient reported never having worn a mouth guard.

The endodontic treatment of teeth associated with PAA aims to reduce the microbial load by performing chemical-mechanical protocols, allowing healing of periapical tissues. Root canal filling also prevents new microbial colonization¹. The present treatment consisted of three sessions. Intracanal CH medication was dressed twice, adding up to 1 year and 6 months. On the first time, the goal was to eliminate humidity and on the second time it aimed to promote antimicrobial action and induce bone repair. This protocol is similar to that described by Ricucci et al,³³ in which infected root canals were treated with intracanal medication in two or more sessions to increase the endodontic success rate. Vera et al.³⁴ also reported better microbiological results when root canals were treated in more than one session using CH as intracanal medication compared to single-session treatments.

Complementary disinfecting techniques, such as mechanical agitation of irrigating solutions with Easy Clean file and PDT,³⁵ were also used to promote better cleaning of dentin walls. Both systems are recognized adjuvants during the disinfection process.^{36,37}

Clinical case diagnosis and follow-up were performed by CBCT, an excellent imaging tool, which enables to observe detailed three-dimensional, high-resolution images.³⁶ Early bone lesions, not detected in conventional radiographs, are easily observed by CBCT.^{38,39} It also allows observation of lesion regression, fundamental to discard any need of surgery.³⁶

In the present case, the diagnosis of CBCT suggested an image compatible with cystic bone lesion, which cannot be considered a definitive diagnosis due to absence of histopathological examination. Despite different opinions among dentists regarding the resolution of cystic lesions, endodontists believe they heal after endodontic treatment, contrary to oral and maxillofacial surgeons, who usually suggest their surgical removal.³⁷ Since this clinical case was treated by an endodontist, a more conservative therapy was indicated, and endodontic success was achieved.

Conclusion

It was possible to conclude that endodontic treatment allowed healing of an extensive periapical lesion, avoiding immediate paraendodontic surgery. CBCT was strongly effective for diagnosis and follow-up, due to its detailed three-dimensional images. Continuous use of isotretinoin (Roacutan®) did not affect the AAP resolution. Martial arts practice may have contributed to pulp necrosis, with supports the use of mouthguards during impact sports.

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