

Clinical-surgical approach of periapical cyst: Case report

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ABSTRACT

Introduction: periapical cysts are classified as inflammatory, odontogenic cysts; periapical lesions are the most common lesions in the oral cavity. These lesions are asymptomatic; radiographically, they present radiolucent, unilocular, well-defined images and they surround the apices of devitalized teeth. To correctly diagnose a periapical cyst it is also necessary to perform a histopathological examination. **Methods:** the present study describes the clinical case of a twelve year-old female patient who presented an extensive restoration of composite resin and a periapical lesion in tooth No. 16 (approximately 15.2 x 14.6 mm), with the presence of palatine fistula. Based on the clinical and radiographic

diagnosis of the periapical cyst, we first opted for conventional endodontic treatment. After successive changes of intracanal medication (using 2% chlorhexidine gel and calcium hydroxide) the fistula did not regress and thus it was decided to enucleate the lesion; the material was then sent for histopathological examination. **Results:** after two years follow-up it was possible to verify that the treatment had been effective. **Conclusion:** a correct diagnosis depends on technical knowledge and clinical experience; it is often necessary to work jointly with several different specialists to solve a case.

Keywords: Bone cysts. Surgery, oral. Radiology, endodontics, periapical periodontitis.

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Introduction

Pulp infection can develop due to numerous factors, such as trauma and carious lesions, which lead to pulp tissue necrosis¹ which, together with the immune system response, causes periapical lesions.² Among these lesions, those with inflammatory origin represent about two thirds of the total,³ and the incidence of periapical cysts is around 55%. In pathological processes larger than 200 mm, the occurrence of cysts becomes 92%.¹

The periapical cyst originates from a granuloma with pre-existing epithelium, that is, a focus of granulation tissue that presents chronic inflammation, contained within the bone and located at the apex of a tooth⁴. The proliferation of microorganisms within the root canal, with release of toxins and inflammatory mediators in the dental apex region, leads to inflammatory reaction in the periradicular tissues.⁵ With the maintenance of the inflammatory response, there is the accumulation of defense cells, such as lymphocytes, plasma cells, macrophages and eosinophils. In an attempt to combat the infection, reactivation of the Malassez epithelial remains,³ Hertwing sheath residues, which, under the stimulation of interleukin 1 during inflammation, proliferates,⁶ leading to the formation of a cavity, which grows due to the accumulation of liquid inside.⁷ Thus, the periapical cyst is an odontogenic lesion characterized by a pathological cavity lined with epithelium and internally filled with cystic fluid.⁸

The clinical conditions that characterize a root cyst are involvement of the apex of a devitalized tooth and circumscribed radiolucent radiographic image with a well-defined and unilocular radiopaque halo.⁹ Usually, the lesion is asymptomatic and is often discovered by a radiographic finding.¹⁰ However, periapical lesions caused by dental pulp necrosis can lead to destruction of the periradicular periodontal ligament and hard tissue,⁷ causing painful symptomatology, especially in conditions of secondary local infection, which can lead to pain, exudation and a large increase in your size.¹¹ However, only the clinical and radiographic conditions are not sufficient to complete the diagnosis, and it is necessary to perform the histopathological exam.⁵

The therapeutic approach to a large periapical cyst varies according to the degree of complexity of the case, assessing the benefits and risks for the patient,¹ starting from more conservative treatments, such as

endodontic treatment of the tooth involved with the lesion,⁸ to surgical treatments such as tooth extraction¹ and marsupialization followed by lesion enucleation (most commonly used treatment modality).^{12,13}

The present study aims to present a case of periapical cyst in which resolution was achieved through clinical treatment and surgical therapy. The uniqueness of the case, in which it was necessary to change the initial planning and choose a less invasive surgical approach, as well as the 2-year proservation, can be considered as points of interest to the reader. In the same line of reasoning, this paper brings as a scientific contribution the discussion of the proposed therapies for the treatment of periapical cysts, very prevalent injuries in the clinician's daily routine. In addition, it brings together, in the same text, updated and relevant literature on the proposed theme, guiding the clinical conduct scientifically.

Clinical case

The 12-year-old female patient K.A.G.O. attended the dental clinic of the Universidade Estadual de Ponta Grossa (UEPG), due to pain and edema in the tooth 16. An intraoral physical examination was performed, which found the presence of palate fistula of the tooth 16 and an extensive restoration in composite resin with microleakage. The thermal vitality test with Endo Frost® (Coltene, Rio de Janeiro, Brazil) was negative, indicating pulp necrosis. The periapical radiography performed at the time of the initial consultation did not clearly show whether or not there was a periapical lesion (Fig 1). The initially proposed diagnosis was chronic periradicular abscess. However, the differential diagnosis included odontogenic keratocyst, unicystic ameloblastoma, periapical cyst and periapical cementum in early development.¹⁴

We decided to perform conventional endodontic treatment (necropulpectomy), aiming at the removal of the inflammatory stimulus and favoring periapical repair¹⁵. After anesthesia, endodontic opening and absolute isolation of the operative field, 2% chlorhexidine gel irrigation was performed and the K # 15 instrument canals were explored to about 2 mm of the apparent length of the roots. The canals were instrumented with Reciproc® (VDW, Munich, Germany) reciprocating files of # 25 in the buccal canals and # 50 in the palatal canal, initially in the cervical and

middle thirds, always using 2% chlorhexidine gel. At this time, odontometry was performed with foraminal locator (Raypex 6, VDW, Munich, Germany). The working lengths (TC) obtained were: palatal canal 25 mm in relation to the mesiobuccal cusp; mesiobuccal canal 21 mm in relation to the mesiobuccal cusp; and distovestibular canal 22 mm in relation to the distovestibular cusp. Patency was maintained throughout the preparation by the use of a K # 15 1 mm file beyond the CT. To remove the smear layer, 17% ethylenediaminetetraacetic acid (EDTA) was used together with stirring with Easy Clean® (Easy Dental Equipment, Belo Horizonte, Brazil) at 1 mm CT for

20 seconds, and after that time the solution EDTA has been renewed. This procedure was repeated 3 times, totaling 1 minute, according to the manufacturer's instructions, and a final irrigation with 15 mL of saline was made. After drying the canals with Reciproc® sterile absorbent paper cones (VDW, Munich, Germany), intracanal medication of chlorhexidine gel 2% + Ca (OH)₂ was inserted with lentulo 2 mm from the CT. The medication change protocol was repeated during 4 sessions, with an interval of 7 days between each one, without remission of the fistula. Thus, a surgical approach to the case was proposed.

For the planning of the surgery, a cone-beam computed tomography (extended jaw and maxillary tomography, DFOV 179.0 mm, kV 120.0, mA 311 and 1:1 dimension) was requested, which demonstrated the presence of a radiolucent, unilocular, circumscribed image rounded, associated with the root apex of the palatal root of tooth 16, with 15.2 x 14.6 mm in axial section, and 14.3 x 14.9 mm in sagittal section (Figs 2 and 3).¹⁶

From the tomographic images, the enucleation of the cyst was chosen due to the size of the lesion, since only cysts larger than 3 mm are indicated for marsupialization and subsequent enucleation.¹⁷ The choice of this treatment modality was also determined by the conditions of surgery, since the service was provided in an educational institution, where a more conservative approach would be more prudent.



Figure 1. initial periapical radiograph.

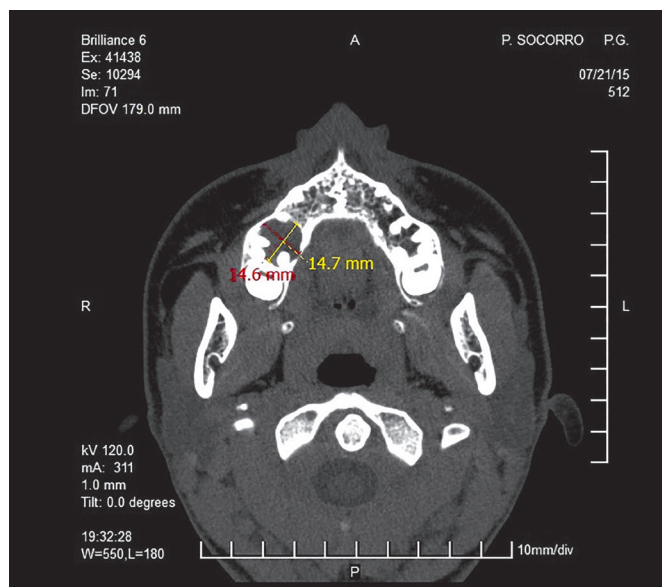


Figure 2. Cone-beam computed tomography in axial section.

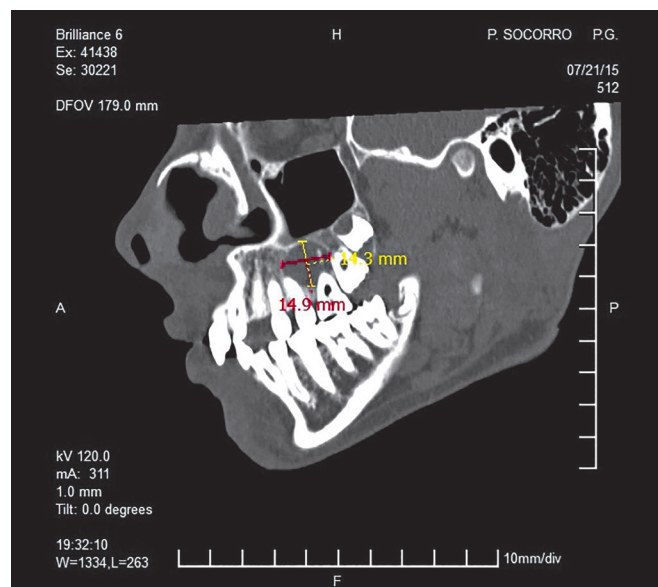


Figure 3. Sagittal cone-beam computed tomography.

Following the proposed planning, canal filling was performed one day before surgery. After anesthesia and absolute isolation of the operative field, the canals were irrigated with serum and re-instrumented with Hedström-like instruments in the reciprocating file calibers in the CT, aiming at drug removal. Next, there was irrigation with EDTA according to the protocol already described and drying of the channels with Reciproc® absorbent paper cones (VDW, Munich, Germany). The canals were filled with Sealer 26® (Dentsply, New York, USA) and provisional cavity sealing was performed with Ionoseal® (Voco, Porto Alegre, Brazil) (Fig 4). The surgery was performed the next day (Figs 5 to 8).

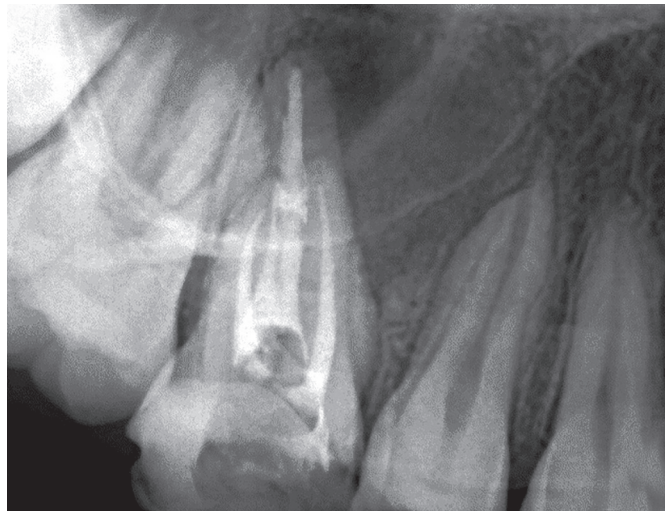


Figure 4. Tooth 16 at the time of obturation.

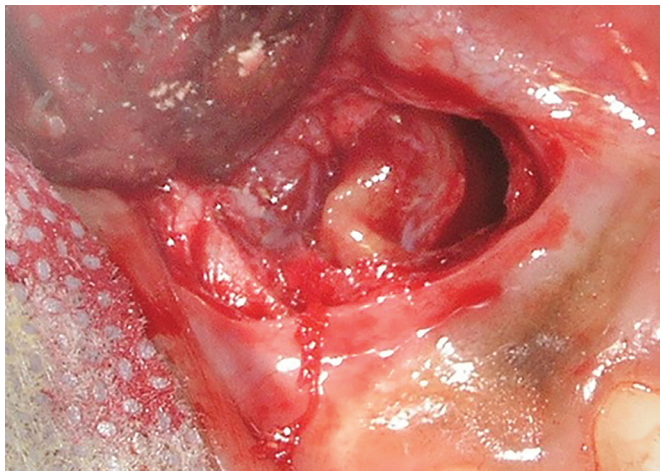


Figure 5. Osteotomy performed.

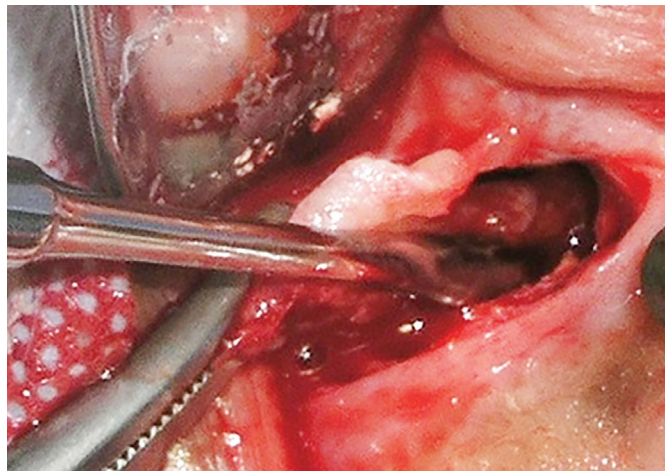


Figure 6. Removal of the lesion.

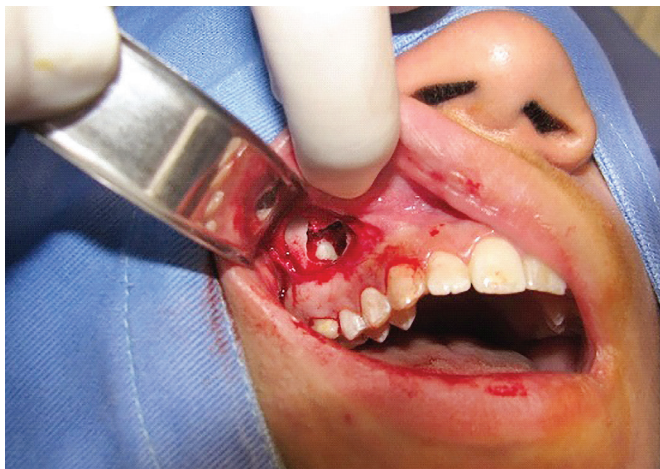


Figure 7. Cystic cavity.



Figure 8. Suture completed.

Histological analysis performed by the Oral Pathology discipline of Universidade Estadual de Ponta Grossa confirmed the diagnosis of periapical cyst (Fig 9A and 9B).

Ten days after the surgical procedure, the suture was removed. The patient presented no pain, edema and fistula. In that same session, the final restoration was performed with Opallis resin (FGM, Joinville, Brazil). The patient was followed by the Surgery, Pathology, End-

odontics and Restorative Dentistry services of Universidade Estadual de Ponta Grossa for 7 months, and after this period we lost contact with her. We were able to contact the patient's family about 2 years after surgery. During the proservation consultation, the patient had an orthodontic appliance installed and no symptoms. Radiographic examination revealed the effectiveness of the proposed treatment, with bone neoformation and complete regression of the lesion (Fig 10).

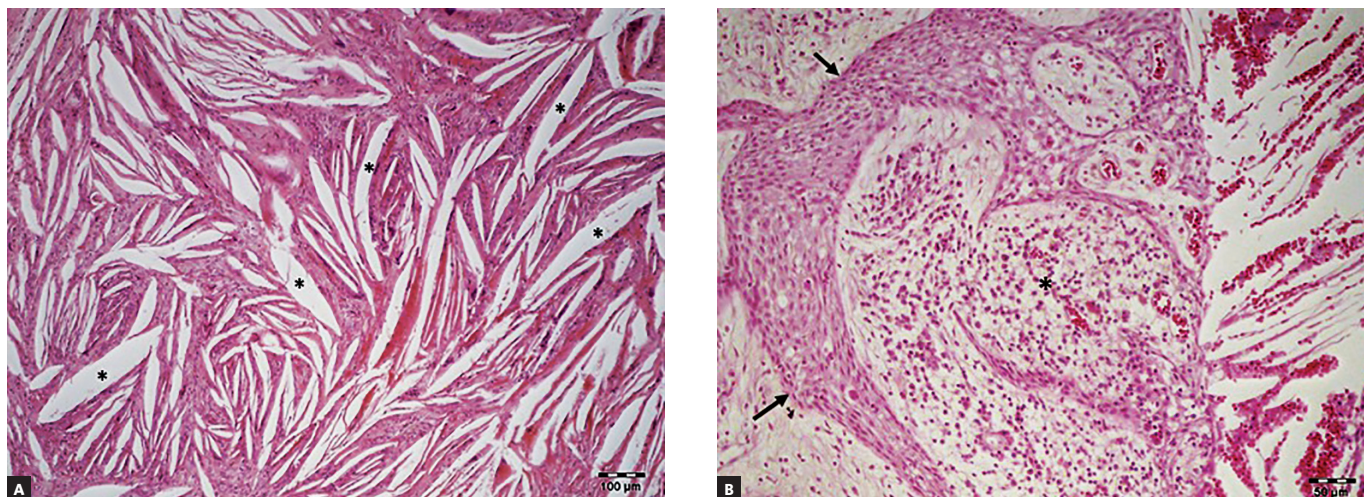


Figure 9. Microscopic aspects of cystic lesion. In (A) there is a large amount of cholesterol crystals (*). In (B) there are areas of proliferating stratified non-keratinized pavement epithelium (arrow), associated with a granulation tissue (*). These histological findings are compatible with Periapical Cyst (Photomicrograph A - Hematoxylin and Eosin Stain at 100X magnification; Photomicrograph B - Hematoxylin and Eosin Stain at 200X magnification).

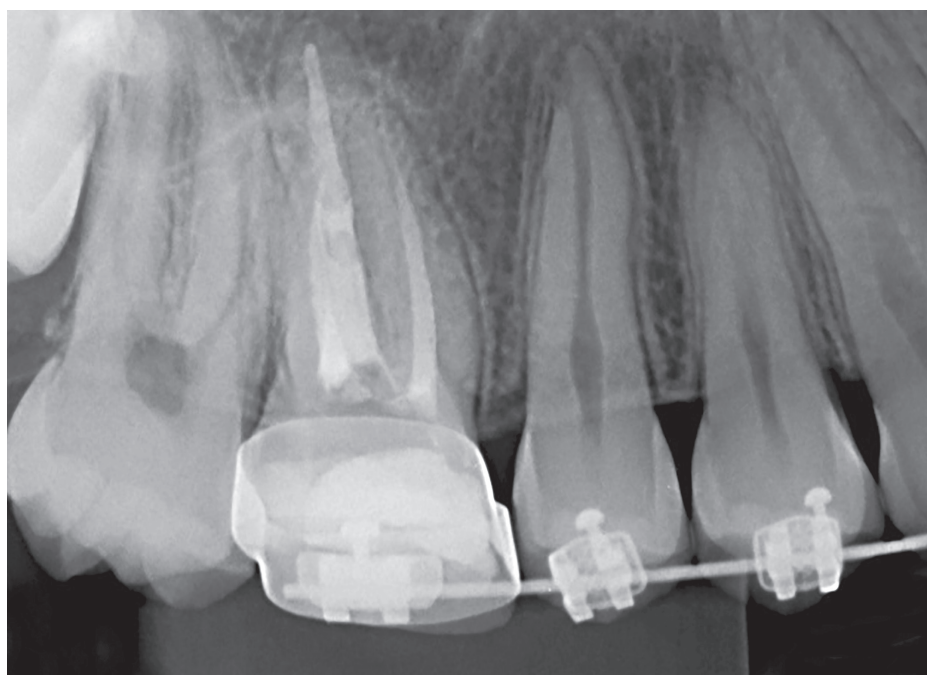


Figure 10. Radiographic image of tooth 16 after 2 years of surgery revealing complete regression of cystic lesion.

Discussion

The vast majority of periapical cysts have a slow evolution and do not reach large proportions, being often detected in routine radiographic exams. When they are larger, edema, tenderness, mobility and tooth displacement usually occur. On clinical examination, the associated tooth has a negative response to thermal and electrical sensitivity tests, indicating pulp necrosis.^{18,19}

Cone-beam computed tomography has been an important diagnostic tool. Obtaining three-dimensional images facilitates the identification of periapical lesions, increasing the predictability of treatments. It has, among other indications, help in the diagnosis of cases that do not respond to conventional treatment and in cases with nonspecific or contradictory clinical signs.^{16,20,21}

The dental surgeon often concludes the diagnosis of periapical cyst based only on clinical and radiographic examinations, often failing to refer the removed tissues for histopathological examination.¹⁸ In order to confirm the relevance of histopathological exams, Diegues et al. (2011)¹⁸ evaluated 255 cases of periapical inflammatory lesions in the Oral Pathology laboratory of the Faculty of Dentistry of the Federal University of Alfenas. Of this total, 206 cases had only one hypothesis of clinical diagnosis, of which 191 were conclusive of periapical cyst or granuloma and 15 cases of abscess. However, after the histopathological exams, of the 191 cases in which the clinical diagnosis was periapical cyst, only 113 had this diagnosis maintained.¹⁸ This study demonstrates that only clinical and radiographic findings are not sufficient for the conclusion of diagnosis.

From the correct diagnosis to guide the treatment of cystic lesions, the literature has numerous reports, ranging from conservative to invasive treatments⁸. In the case reported here, the therapy employed was initially a more conservative approach, with conventional endodontic treatment (necropulpectomy) and the use of Ca (OH)₂ associated with 2% chlorhexidine gel as intracanal medication in an attempt to regress the fistula. Considering that the etiology of periapical lesions is microbial, treatment should begin with root canal disinfection. In the case of cysts, endodontic treatment removes the offending agent, reducing the inflammatory response.¹¹

Chlorhexidine gel 2% used as intracanal medication has more efficient antimicrobial activity against *Enterococcus faecalis* and *Candida albicans*²² than Ca (OH)₂. Ca (OH)₂ is generally used as an intracanal medication in necropulpectomy because of its high pH (around 12.5), with excellent antimicrobial activity and endotoxin inactivation capacity.^{23,26,27} To increase its bactericidal effect against resistant pathogens, an association with chlorhexidine gluconate has been proposed.^{25,26,28-30}

The result obtained after dressing changes was compatible with what was proposed by Nair (2004), who states that the cyst does not reach cure after conventional endodontic treatment due to its self-sustainable nature.³¹ Small cystic lesions present regression after non-surgical endodontic treatment, which usually does not occur with larger lesions, which require surgical therapy.¹⁸ Thus, surgery is indicated, especially in cases where endodontic treatment does not result in tissue repair.^{11,32}

Surgery can be performed as treatment in extensive periapical lesions, with several modalities cited in the literature: curettage, enucleation, decompression, marsupialization and block resection.³²⁻³³ Removal of part of the epithelium may recur months or years later.³⁴ The treatment modality chosen in this case was enucleation of the cystic lesion, considering that its dimensions were not extensive to the point of leaving a large bone defect and involving neighboring teeth, with no need for previous decompression or marsupialization.^{33,34} The biopsy report corroborated the hypothesis of an initial diagnosis of periapical cyst with the histopathological characteristics compatible with those described by REGEZI; SCIUBBA; JORDAN (2008) with non-keratinized stratified squamous epithelium lining,⁴ and there is also the transmigration of inflammatory cells to the epithelium, with a large number of polymorphonuclear leukocytes (PMNs) and a small amount of lymphocytes involved. With the conclusion of the treatment, the case was preserved and, after 2 years, it was possible to observe, clinically and radiographically, the success of the therapy employed, without recurrence of the lesion.

Conclusion

With the complete resolution of the case presented, it can be concluded that for a correct diagnosis, we must follow a logical sequence based on the lit-

erature and clinical experience, in which anamnesis and complementary exams are fundamental. Even so, in some situations, there is a need for change in the initially proposed planning. The performance of different specialties, such as Endodontics, Pathology,

Radiology and Surgery, demonstrates the importance of the convergence of knowledge for the resolution of cases of periapical lesions, which should not only seek cure of the pathology, but also rehabilitation of the element affected.

References

- Ghorbanzadeh S, Ashraf H, Hosseinpour S, Ghorbanzadeh F. Nonsurgical management of a large periapical lesion: a case report. *Int Endod J*. 2017;12(2):253-56.
- Silva LABD, Bueno MR, Yamamoto FP, Gomes RS, Paters OA, Estrela C. Analysis of CD57+ natural killer cells and CD8+ T lymphocytes in periapical granulomas and radicular cysts. *Braz Oral Res*. 2017;31:e106.
- Alvares PR, Arruda JAA, Silva LP, Nascimento GJF, Silveira MF, Sobral APV. Immunohistochemical expression of TGF- β 1 and MMP-9 in periapical lesions. *Braz Oral Res* 2017;31:e51.
- Regezi J, Sciuba J, Jordan R. *Patologia Bucal - Correlações Clinicopatológicas*. Rio de Janeiro: Guanabara Koogan; 2000.
- Kinyamoju AO, Gbadebo SO, Adeyemi BF. Periapical lesions of the jaws: a review of 104 cases in Ibadan. *Ann Ibd Pg Med*. 2014;12(2):115-9.
- Keinan D, Cohen RE. The significance of epithelial rests of Malassez in the periodontal ligament. *J Endod*. 2013;39(5):582-7.
- Weber M, Schlittenbauer T, Moebius P, Herold MB, Ries J, Preidl R, et al. Macrophage polarization differs between apical granulomas, radicular cysts, and dentigerous cysts. *Clin Oral Invest*. 2017;22(1):385-94.
- Bernardi L, Visioli F, Nôr C, Rados PV. Radicular cyst: An update of the biological factors related to lining epithelium. *J Endod*. 2015;41(12):1951-61.
- Brave D, Madhusudan AS, Gayathri RVR. Radicular cyst of anterior Maxilla. *Int J Dent Clin*. 2011;3(2):16-7.
- Milagres RM, Pereira JS, Andrade BAB, Messoro MR, Kawata RT. Cisto periapical de grande extensão: relato de caso. *Rev Cir Traumatol Buco-Maxilo-Fac*. 2012;12(2):37-42.
- Vasconcelos RG, Queiroz LMG, Alves LC Jr, Germano AR, Vasconcelos MG. Abordagem terapêutica em cisto radicular de grandes proporções: relato de caso. *Rev Bras Ciênc Saúde*. 2012;16(3):467-74.
- Matijevic S, Jovicic B, Bubalo M, Dukic S, Cutovic T. Treatment of a large radicular cyst-enucleation or decompression? *Vojnosanit Pregl*. 2015;72(4):372-4.
- Lin LM, Ricucci D, Lin J, Rosenberg PA. Nonsurgical root canal therapy of large cyst-like inflammatory periapical lesions and inflammatory apical cysts. *J Endod*. 2009;35(5):607-15.
- El Naggar AK, Chan JKC, Grandis JR, Takata T, Slootweg PJ. *World Health Organization Classification of Tumors*. Paris: IARC; 2017.
- Dandotikar D, Peddi R, Lakhani B, Lata K, Mathur A, Chowdary UK. Nonsurgical management of a periapical cyst: a case report. *J Int Saúde Oral*. 2013;5(3):79-84.
- AAE and AAOMR Joint Position Statement: use of Cone Beam Computed Tomography in Endodontics 2015 Update. Special Committee to Revise the Joint AAE/AAOMR Position Statement on use of CBCT in Endodontics. *Oral Surg Oral Med Oral Pathol Radiol*. 2015;120(4):508-12.
- Marzola C. *Fundamentos de cirurgia maxilo facial*. São Paulo: Elevação; 2008.
- Diegues LL, Robazza CRC, Hanemann JAC, Pereira AAC, Silva CO. Correlation between clinical and histopathological diagnoses in periapical inflammatory lesions. *J Investig Clin Dent*. 2011;2(3):184-6.
- Torres-Lagares D, Segura-Egea JJ, Rodríguez-Caballero A, Llamas-Carreras JM, Gutiérrez-Pérez JL. Treatment of a large maxillary cyst with marsupialization, decompression, surgical endodontic therapy and enucleation. *J Can Dent Assoc*. 2011;77:b87.
- Parker JM, Mol A, Rivera EM, Tawil PZ. Cone-beam computed tomography uses in clinical endodontics: observer variability in detecting periapical lesions. *J Endod*. 2017;43(2):184-7.
- Tonea A, Badea M, Oana L, Sava S, Vodnar D. Antibacterial and antifungal activity of endodontic intracanal medications. *Ciujul Med*. 2017;90(3):344-7.
- Siqueira JF Jr, Lopes HP. Mechanisms of antimicrobial activity of calcium hydroxide: a critical review. *Int Endod J*. 1999;32(5):361-9.
- Manzur A, Gonzalez AM, Pozos A, Silva-Herzog D, Friedman S. Bacterial quantification in teeth with apical periodontitis related to instrumentation and different intracanal medications: a randomized clinical trial. *J Endod*. 2007;33(2):114-8.
- Valera MC, Salvia AC, Maekawa LE, Camargo SE, Carvalho CA, Camargo CH, et al. Antimicrobial analysis of chlorhexidine gel and intracanal medicaments against microorganisms inoculated in root canals. *Minerva Stomatol*. 2010;59(7-8):415-21.
- Gondim JO, Avaca-Crusca JS, Valentini SR, Zanelli CF, Spolidorio DM, Giro EM. Effect of a calcium hydroxide/chlorhexidine paste as intracanal dressing in human primary teeth with necrotic pulp against *Porphyromonas gingivalis* and *Enterococcus faecalis*. *Int J Paediatr Dent*. 2012;22(2):116-24.
- Safavi KE, Nichols FC. Effect of calcium hydroxide on bacterial lipopolysaccharide. *J Endod*. 1993;19(2):76-8.
- Gomes BP, Vianna ME, Sena NT, Zaia AA, Ferraz CC, Souza Filho FJ. In vitro evaluation of the antimicrobial activity of calcium hydroxide combined with chlorhexidine gel used as intracanal medicament. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2006;102(4):544-50.
- Sathorn C, Parashos P, Messer H. Antibacterial efficacy of calcium hydroxide intracanal dressing: a systematic review and meta-analysis. *Int Endod J*. 2007;40(1):2-10.
- Mohammadi Z, Abbott PV. The properties and applications of chlorhexidine in endodontics. *Int Endod J*. 2009;42(4):288-302.
- Comim L, Durant V, Carli JP, Rinaldi I, Linden MSS. Cisto periapical de grandes proporções na região anterior de maxila: relato de caso. *Salusvita*. 2017;36(2):501-8.
- Nair PN. Pathogenesis of apical periodontitis and the causes of endodontic failures. *Crit Rev Oral Biol Med*. 2004;15(6):348-81.
- Sakkas N, Schoen R, Schulze D, Otten JE, Schmelzeisen R. Obturator after marsupialization of a recurrence of a radicular cyst of the mandible. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2007;103(1):16-8.
- Brandt-Filho S, Marzola C, Toledo-Filho JL, Pereira LC, Pastori CM, Zorzetto DLG, et al. Técnica da descompressão para o tratamento cirúrgico dos cistos da cavidade bucal. *Rev ATO*. 2010;5(1):254-66.
- Bordini JP, Grosso SFB. Câncer bucal, lesões e condições cancerizáveis. In: Kignel S. *Estomatologia - bases do diagnóstico para o clínico*. São Paulo: Ed. Santos; 2007.