Endodontic retreatment of teeth with cystic lesions and root perforation: clinical case report

Higor de Almeida **BARBOSA**[1]
Nayara Rodrigues Nascimento **OLIVEIRA**[1,2]
Kellen Cristina Mendes **AZEVEDO**[3,4]
Gisele Rodrigues da **SILVA**[5,6]
Leandro Carvalho **QUIRINO**[7,8]
Maria Antonieta Veloso Carvalho de **OLIVEIRA**[9,10]

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ABSTRACT

Introduction: The main cause of endodontic treatment failure may be related to lapses in technique, such as microorganisms left within the root canal and iatrogenesis. These problems may be solved through retreatment and, if necessary, parendodontic surgery. **Objective:** We describe endodontic retreatment followed by parendodontic surgery in a patient with periapical lesions in the roots of teeth #21 and #22, and follow-up exams over 5 years and 5 months. **Methods:** Tooth #21 presented a vestibular fistula and purulent secretions during biomechanical preparation; whereas tooth #22 had a perforation in the cervical third that extended to the region of the periodontal ligament in the middle third. After application of intracanal medication for two months, the teeth were filled, the lesion removed and perforation filled with mineral trioxide aggregate (MTA). After histopathological examination, the lesion tissue was diagnosed as a periapical cyst. **Conclusion:** Clinical case follow-up showed that with the persistence of a fistula and a periapical cystic lesion, surgical retreatment was the most efficient option for eliminating infection and repairing periapical tissues.

Keywords: Case reports. Cist. Endodontics. Surgical Endodontics. Retreatment.

[1] Universidade Federal de Uberlândia, Faculdade de Odontologia (Uberlândia/MG, Brazil).
[2] Specialist in Endodontics, Universidade do Triângulo (Uberlândia/MG, Brazil).
[3] Private practice (Monte Alegre de Minas/MG, Brazil).
[4] Master's degree in Integrated Dental Clinic, Universidade Federal de Uberlândia (Uberlândia/ MG, Brazil).
[5] Universidade Federal de Uberlândia, Faculdade de Odontologia, Departamento de Dentística e Materiais Dentários (Uberlândia/MG, Brazil).
[6] Doctorate degree in Dental Clinic, Universidade Estadual de Campinas, Faculdade de Odontologia de Piracicaba (Piracicaba/SP, Brazil).
[7] Centro Universitário do Triângulo, Curso de Especialização Endodontia (Uberlândia/ MG, Brazil).
[8] Master's degree in Dentistry, Universidade Federal de Minas Gerais (Belo Horizonte/MG, Brazil).
[9] Universidade Federal de Uberlândia, Faculdade de Odontologia, Departamento de Endodontia (Uberlândia/MG, Brazil).
[10] Doctorate degree in Integrated Dental Clinic, Universidade Federal de Uberlândia (Uberlândia/ MG,Brazil).

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Contact address: Maria Antonieta Veloso Carvalho de Oliveira
Departamento de Endodontia, Faculdade de Odontologia, Universidade Federal de Uberlândia, Av. Pará, 1720, Campus Umuarama, bloco 4L, sala 4LA28
Uberlândia/MG, Brazil – CEP: 38.400-902
E-mail: mariaoliveira@ufu.br

Introduction

The goals of endodontic treatment are to model and promote disinfection of the root canal system,[1] and to seal the internal environment from the external environment. The end result is to save teeth that are aesthetically and functionally compromised while maintaining or promoting health of periapical tissues.[2]

Although endodontic therapy is a predictable procedure with high success rates,[2,3] failures can occur either by persistence of infection or by recontamination of the root canal system after endodontic intervention.[3] Primary treatment modalities have a 14 to 16% failure rate.[4] In such cases, disease is usually characterized by signs and symptoms typical of a periradicular lesion, which may arise, persist or recur after treatment.[2,5]

In cases of treatment failure, conventional endodontic retreatment is the first-choice alternative because it is less invasive and less risky for the patient,[5] provided that the appropriate indications and limitations are respected.[2] Treatment failure may be indicated by X-rays showing dental or bone resorption and / or clinical symptoms (pain, swelling, fistula).[2] Limitations include the presence of extrusion of root filling material, calcified canals, periapical radiolucency, apical curvatures that do not allow orthographic access, fractured instruments, and root perforation, mainly in the apical region.[2,7] A viable option in these cases is surgical endodontic retreatment, which has various operative modalities, including curettage with smoothing or apical plasty, apicectomy with or without retrograde filling, apicoectomy with instrumentation and retro-filling, and root canal filling and simultaneous surgery.[5] Parendodontic surgery usually replaces or complements conventional retreatment when there is difficulty in eliminating persistent microorganisms from the canal.[6]

The present study reports on endodontic retreatment and complementary surgery of an extensive periapical lesion in teeth #21 and #22 and a perforation in tooth #22, with more than five years of follow-up examinations.

Case Report

The patient (male, 24 years old) attended private practice specialized in endodontic treatment (Uberlândia, Brazil) complaining of acute abscess with extra- and intraoral pain and edema. Amoxicillin (500 mg) was administered every eight hours for seven days as recommended by the American Heart Association for prophylaxis in dental infections.[8]

Clinical examination revealed a fistula on the buccal surface of tooth #21 and an X-ray revealed an extensive periapical lesion that included the apical region of roots of teeth #21 and #22 and the mesial region of the middle third of tooth #21. The teeth had received previous endodontic treatment; however, filling in tooth #22 was missing and filling in tooth #21 was defective, with only two loose gutta-percha cones inside the canal (Fig 1).

Endodontic retreatment started with the removal of the gutta-percha using a Hedströen #25 file (Dentsply Maillefer, Ballaigues, Switzerland). During this procedure, a perforation was observed in the cervical third of tooth #22, which extended from the periodontal ligament to the middle third of the tooth. Biomechanical preparation was performed using manual files (K-Files #15, #10 and #25, Dentsply Maillefer) and automatic Reciproc files (#R25 on tooth #22 and #R50 on tooth #21, VDW, Munich, Germany). The canals were irrigated with 2.5% sodium hypochlorite (Farma Ind. Farmacêutica Ltda, Serrana, Brazil) throughout these processes. Intracanal medication (calcium hydroxide P.A., Biodinâmica, Ibiraporã, Brazil) with saline solution was applied during the two months between sessions.

From the first session, tooth #21 presented purulent secretions and a fistula originating on the mesial surface (Fig 2). These symptoms did not regress even after two months of medication with reapplications every two weeks.

The perforation in tooth #22 was sealed with White Mineral Trioxide Aggregate - MTA (Angelus Indústria de Produtos Odontológicos S/A, Paraná, Brazil) using an MTA applicator with a 0.6 mm diameter (Angelus). During the same session, the lateral

and vertical condensation technique was used to fill the root canals of both teeth (Fig 3) using gutta-percha (Dentsply Maillefer) and zinc oxide-eugenol cement (Fillcanal - Biodente Materiais, Santa Catarina Brazil). Next, the periapical lesion was removed with a blunt surface curette (Jacquette SJ 34/35 curette - Hu-Friedy, Chicago, USA) during periradadicular surgery (Figs 4 and 5). Histopathological analysis of the periapical lesion identified the tissue as a root cyst that was yellowish-brown, measured 22x15x3 mm, and had a rubbery consistency.

Follow-up exams at eight months (Fig 7) and at five years and five months (Fig 8) identified neither clinical symptoms nor signs or symptoms of infection (X-rays) and showed that the periapical region had healed.

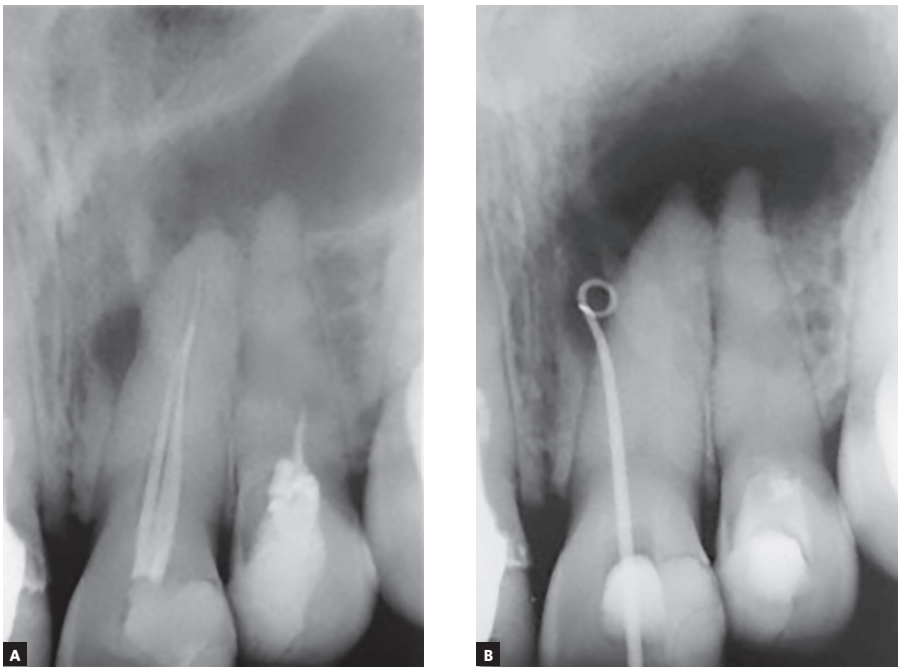

Figure 1. A) Initial radiograph. **B**) Tracking the fistula on tooth #21.

Figure 2. Clinical aspect at the start of root canal filling (note the perforation in the distal canal of tooth #22).

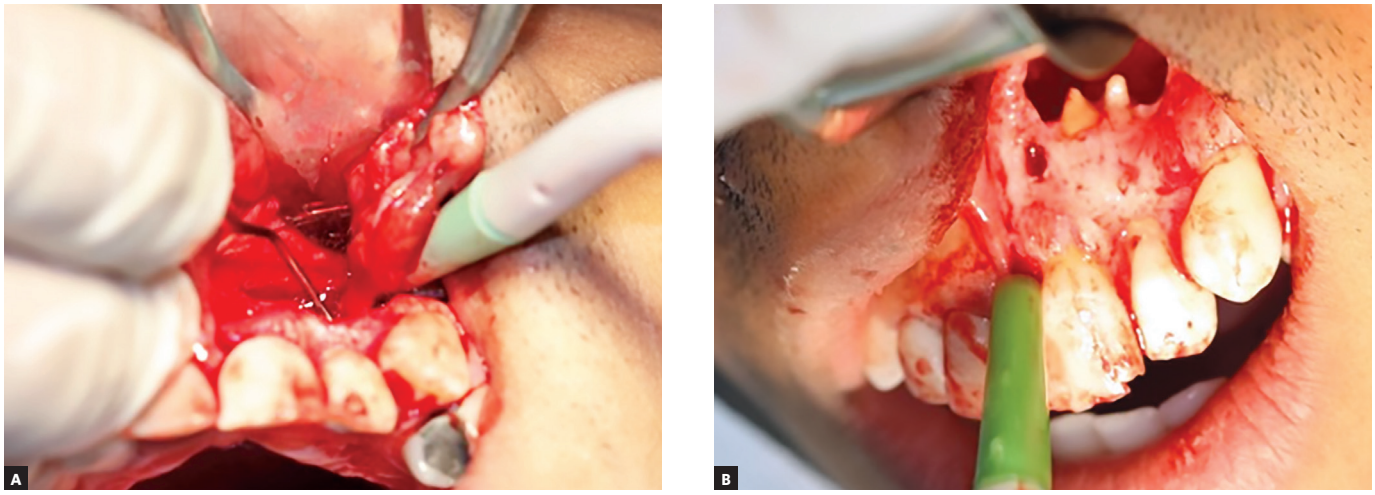

Figure 3. A) Removal of the lesion and its clinical appearance **B**) Clinical aspect of root apices after lesion removal.

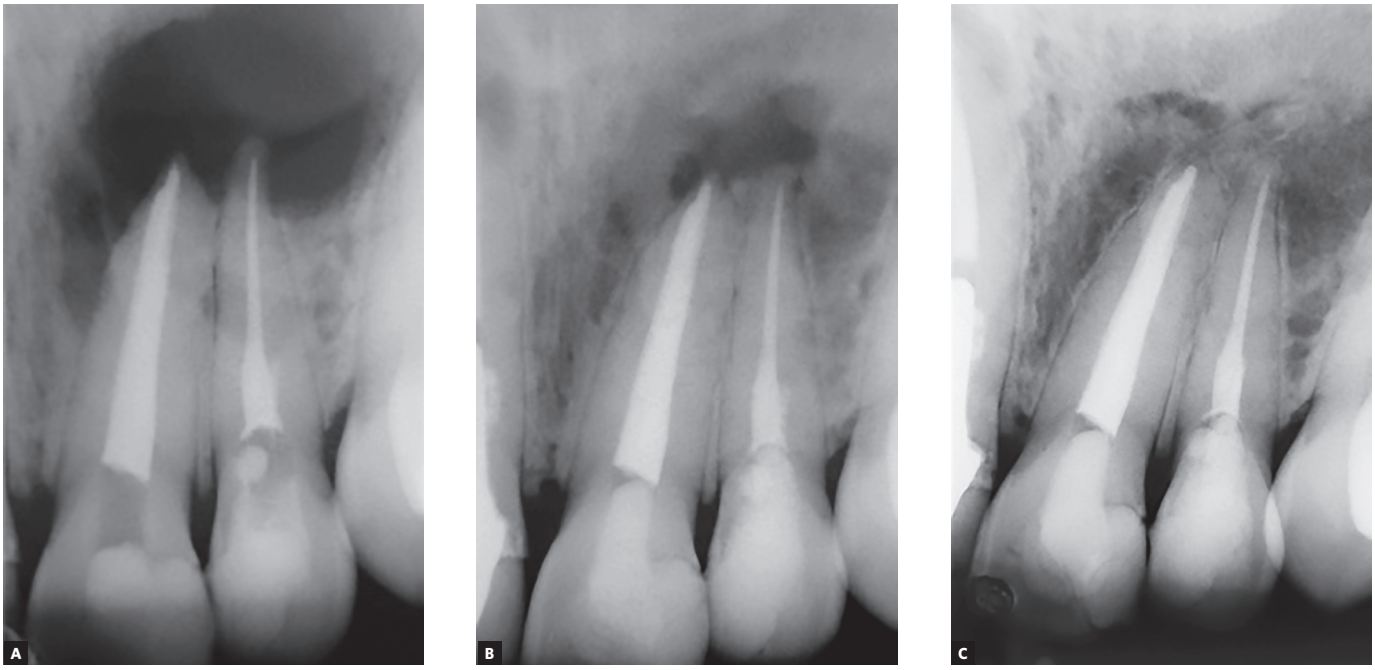

Figure 4. A) Radiographic appearance after filling, sealing of the perforation, and surgical removal of the lesion. **B**) Follow-up exam after eight months **C**) Follow-up exam after five years and five months.

Discussion

Success rates of non-surgical endodontic retreatments range from 70 and 86%; however, this index decreases to 49% when periapical lesions are present.[9,10] Periapical lesions harbor great bacterial diversity and are thus more resistant to treatment.[2,5]

The periapical lesion and fistula in the present case showed no signs of regression even after two months of calcium hydroxide treatments. Calcium hydroxide was used because it provides microbial control, organic residue dissolution, anti-inflammatory properties, and inhibition of inflammatory resorptions.[11] This medicine was used for 60 days and reapplied every 15 days. This regimen seems adequate given that the literature recommends at least 15 days of treatment inside the root canal, without reapplication.[11]

The fistula represented a drainage pathway of purulent exudate located in the underlying tissues,

which was produced by chronic infection[12] and exited from the canal of tooth #21. This pathway may facilitate the flow of bacteria from the oral cavity to the tip of the root where bacteria can colonize and predispose the area to extraradicular infection that further reduces the success rate of endodontic retreatment to 48%.[13] Given that the fistula did not regress and the extent of the lesion (over 20 mm long), complementary surgery was performed to remove the lesion.

Non-surgical retreatment is the first option for correcting endodontic failure because it is more successful than surgical procedures.[10,14] However, there are situations in which periapical surgery may be used as a complement to non-surgical retreatment to eliminate microbial agents that are inaccessible to conventional endodontic therapies.[15] The main objective of parendodontic surgery is to seal the root canal system, providing a barrier between irritants in the pulp of the root area and the pulp of the periapical tissue, and eliminating any reactive tissue.[16]

Histopathological examination showed that the surgically removed lesion tissue was a root cyst. Cysts and apical granulomas are the most commonly encountered periapopathies and originate from preexisting epithelial granulomas.[16,17] Periapical granuloma presents radiographically as a delimited but not completely and uniformly circumscribed radiolucent lesion, and is rarely larger than 1 cm in diameter. Periapical cyst, however, has a well delimited radiolucent area that is circumscribed by a definite and usually continuous radiopaque line.[17] Even with these radiographic differences, histological analysis is the only way to confirm whether periapicopathy is a cyst or granuloma.[15,17]

The main therapy for any inflammatory disease usually involves identification and elimination of the cause. In the case of periapical granulomas, adequate endodontic treatment can eliminate aggressive microbiota from the infected root canal.[18] Nevertheless, periapical cysts usually need to be surgically removed because this type of lesion appears to be self-sustaining regardless of the source of irritation in the root canal. Thus, endodontic treatment may have no effect on these cysts, especially on larger examples that require surgical removal.[18,19]

After removal of large periapical lesions, biomaterial such as resorbable or non-absorbable membranes are recommended to replace the structural function of bone tissue and act as a physical barrier that separates one tissue from another.[19] Although these membranes are recommended, several factors are critical to their success or failure. These factors include ideal size, membrane stability, and barrier durability.[19] A membrane was not used in the present case study because, although regenerative therapies have great potential, their ability to consistently yield acceptable results in all situations is inconsistent.[19]

In the current case, an apicoectomy was not performed on teeth #21 and #22 during surgery, even though it is preferable to conventional treatments in cases in which the periapical lesion is persistent.[20] This was done because instrumentation and filling in the first endodontic treatment were deficient and because retreatment offered easy access to cleaning and sealing the entire root canal, in addition to filling the perforation in tooth #22. Retro-filling was not recommended in the present case because there was no calcification, curvature, stepping, prosthesis, or fractured instruments in the canals.[20]

The perforation in the cervical third of the distal wall of tooth #22 was not shown by X-ray, but only clinically detected after removal of the restoration. Definitive radiographic diagnosis of a perforation is difficult due to the limited two-dimensional capacity of periapical radiography that shows overlapping anatomical structures.[21] This limitation can be overcome by computed tomography, which shows three-dimensional images that provide a more comprehensive view of anatomy and spatial relationships among pathologies and anatomical structures.[22]

MTA was used to seal the perforation because of the following characteristics: potential for inducing dentinogenesis, cementogenesis and osteogenesis, antimicrobial capacity, ability to provide adequate marginal sealing that prevents infiltrations, biocompatibility, and natural tooth coloring that resists darkening.[23,24]

Conclusion

We concluded that even in teeth with extensive lesions, conventional endodontic retreatment combined with simple lesion removal surgery was sufficient for a successful prognosis after more than five years of follow-up examinations.

References

1. Ferreira NS, Camargo CH, Palo RM, Martinho FC, Gomes AP. Comparison of the effectiveness of 3 irrigation devices for the cleaning of root canal walls instrumented with oscillatory and rotary techniques. Gen Dent. 2015 Mar-Apr;63(2):71-4.
2. Kang M, In Jung H, Song M, Kim SY, Kim HC, Kim E. Outcome of nonsurgical retreatment and endodontic microsurgery: a meta-analysis. Clin Oral Investig. 2015 Apr;19(3):569-82.
3. Siqueira JF Jr, Rôças IN. Present status and future directions in endodontic microbiology. Endod Topics. 2014;30(1):3-22.
4. Chugal N, Wang JK, Wang R, He X, Kang M, Li J, et al. Molecular characterization of the microbial flora residing at the apical portion of infected root canals of human teeth. J Endod. 2011;37(10):1359-64.
5. Del Fabbro M, Corbella S, Sequeira-Byron P, Tsesis I, Rosen E, Lolato A, et al. Endodontic procedures for retreatment of periapical lesions (Review). Cochrane Database Syst Rev. 2016 Oct 19;10:CD005511.
6. Karabucak B, Setzer, C. Conventional and surgical retreatment of complex perirradicular lesions with periodontal involvement. J Endod. 2009;35(9):1310-5.
7. Evans GE, Bishop K, Renton T. Guidelines for Surgical Endodontics. London: Faculty of Dental Surgery; 2012.
8. Segura-Egea JJ, Gould K, Şen BH, Jonasson P, Cotti E, Mazzoni A, et al. Antibiotics in Endodontics: a review. Int Endod J. 2017 Dec;50(12):1169-84.
9. Oliveira MAVC, Soares J, Azevedo KCM, Biffi JCG, Quirino LC, Faria RA. Apical surgery in complement to the endodontic treatment: case report. Dental Press Endod. 2011;1(2):53-8.
10. Ng YL, Mann V, Gulabivala K. Outcome of secondary root canal treatment: a systematic review of the literature. Int Endod J. 2008 Dec;41(12):1026-46.
11. Zancan RF, Vivan RR, Milanda Lopes MR, Weckwerth PH, Andrade FB, Ponce JB, et al. Antimicrobial activity and physicochemical properties of calcium hydroxide pastes used as intracanal medication. J Endod. 2016 Dec;42(12):1822-8.
12. Gutmann JL. On the management of root canals in teeth that exhibit a draining “fistulous” tract. J Hist Dent. 2014 Summer-Fall;62(2):69-72.
13. Ng YL, Mann V, Gulabivala K. A prospective study of the factors affecting outcomes of nonsurgical root canal treatment: part 1: periapical health. Int Endod J. 2011;44(7):583-609.
14. Imura N, Pinheiro ET, Gomes BP, Zaia AA, Ferraz CC, Souza-Filho FJ. The outcome of endodontic treatment: a retrospective study of 2000 case performed by a specialist. J Endod. 2007;33(11):1278-82.
15. Ribeiro CF, Fabri B, Roldi A, et al. Prevalence of periapical lesions in endodontic treatment teeth. Rev Saúde. 2013;9(4):244-52.
16. Serrano-Giménez M, Sánchez-Torres A, Gay-Escoda C. Prognostic factors on periapical surgery: a systematic review. Med Oral Patol Oral Cir Bucal. 2015;20(6):715-22.
17. Saraf PA, Kamat S, Puranik RS, Puranik S, Saraf SP, Singh BP. Comparative evaluation of immunohistochemistry, histopathology and conventional radiography in differentiating periapical lesions. J Conserv Dent. 2014 Mar;17(2):164-8.
18. Ricucci D, Siqueira JF Jr, Lopes WS, Vieira AR, Rôças IN. Extraradicular infection as the cause of persistent symptoms: a case series. J Endod. 2015 Feb;41(2):265-73.
19. Sánchez-Torres A, Sánchez-Garcés MÁ, Gay-Escoda C. Materials and prognostic factors of bone regeneration in periapical surgery: a systematic review. Med Oral Patol Oral Cir Bucal. 2014 July 1;19(4):e419-25.
20. Serrano-Giménez M, Sánchez-Torres A, Gay-Escoda C. Prognostic factors on periapical surgery: a systematic review. Med Oral Patol Oral Cir Bucal. 2015 Nov 1;20(6):e715-22.
21. Davies A, Patel S, Foschi F, Andiappan M, Mitchell PJ, Mannocci F. The detection of periapical pathoses using digital periapical radiography and cone beam computed tomography in endodontically retreated teeth - part 2: a 1 year post-treatment follow-up. Int Endod J. 2016 July;49(7):623-35.
22. Patel S, Kanagasingam S, Mannocci F. Cone beam computed tomography (CBCT) in endodontics. Dent Update. 2010;37(6):373-9.
23. Tawil K, Lee AH, Cheung GS. Treatment outcome of repaired root perforation: a systematic review and meta-analysis. J Endod. 2015 Nov;41(11):1795-804.
24. Virgens ABM, Silva RV, Pereira RP, Nunes E. Endodontic reintervention with MTA apical plug: a case report. Dental Press Endod. 2015 Sept-Dec;5(3):56-61.