DOI: http://dx.doi.org/10.17921/2447-8938.2018v20n3p185-189

Apical Surgery: Therapeutic Option for Endodontic Failure

Cirurgia Parendodôntica: Opção Terapêutica para o Insucesso Endodôntico

Paulo Otávio Carmo Souza[a]*; Carolina Ferrari Piloni de Oliveira[a]; Iussif Mamede Neto[a]; Amin de Macedo Mamede Sulaimen[b]; Pedro Luís Alves de Lima[c]; Daniel de Almeida Decurcio[a]

[a]Federal University of Goiás, Dentistry School, Stricto Sensu Graduate Program in Dentistry. SP, Brazil.
[b]Alberta University Canada.
[c]Brazilian Association of Dentistry SP, Brazil.
*E-mail: paulotaviocs@gmail.com
Recebido em: 30/03/2018
Aprovado em: 24/08/2018

Abstract

The aim of this study is present a surgical solution of the case of endodontic root canal failure caused by overfilling, with a history of endodontic retreatment and aesthetic rehabilitation with porcelain veneers. Patient C.F.P.L, 50 years old, female, was looking for treatment complaining of pain. Previous endodontic treatment was reported on tooth 11, and root canal retreatment after 6 months due to the persistence of painful symptomatology. Later, the patient carried out aesthetic rehabilitation with porcelain veneers, and approximately 6 months later the vitro pain related to the tooth 11 occurred again. Radiographic and tomographic images showed obturation of the root canal of the tooth 11 associated with diffuse hypodense area in the periapical region, with overextended endodontic material. The probable clinical diagnosis was symptomatic traumatic apical periodontitis, and apical surgery was proposed as treatment plan. After infiltrative anesthesia, a Newmann incision and split flap were performed, followed by osteotomy with micro-chisel and curettage of the lesion. An apicectomy was performed with Zecrya drill, followed by retro cavity with diamond ultrasonic tip and retrograde obturation with white MTA. After 2 years of follow-up bone neoformation and absence of symptomatology were observed, tooth in function and preservation of aesthetic rehabilitation harmony. Apical surgery is a therapeutic alternative with favorable prognosis for the treatment of endodontic failure, provided that it is correctly indicated and with a well-executed surgical protocol.

Keywords: Apicectomy. Periapical Periodontitis. Periapical Granuloma.

Resumo

O objetivo deste estudo é apresentar a resolução cirúrgica de um caso de insucesso endodôntico ocasionado pela sobre obturação do canal radicular, com histórico de retratamento endodôntico e reabilitação estética com facetas cerâmicas. Paciente C.F.P.L, 50 anos, gênero feminino, procurou atendimento odontológico queixando-se de dor. Foi relatado tratamento endodôntico prévio no dente 11, e retratamento do canal radicular após 6 meses devido à persistência de sintomatologia dolorosa. Posteriormente, a paciente passou por reabilitação estética com facetas cerâmicas e, aproximadamente 6 meses após, houve o reaparecimento de dor espontânea relacionada ao dente 11. As imagens radiográficas e tomográficas revelaram obturação do canal radicular do dente 11 associado à área hipodensa difusa na região periapical, com extravasamento de material obturador. O diagnóstico clínico provável foi de periodontite apical sintomática traumática, e plano de tratamento proposto uma cirurgia parendodôntica. Posterior a anestesia infiltrativa, realizou-se incisão do tipo Newmann e retalho dividido, seguido de osteotomia com micro cinzel e curetagen da lesão. A apicectomia foi realizada com broca Zecrya, seguida da confecção da retrocavidade com ponta ultrassônica diamantada e obturação retrógrada com MTA branco. Após 2 anos de proservação foi observada neoformação óssea e ausência de sintomatologia, dente em função e preservação da harmonia da reabilitação estética. A cirurgia parendodôntica é uma alternativa terapêutica com prognóstico favorável para o tratamento do insucesso endodôntico, desde que corretamente indicada e com protocolo cirúrgico bem executado.

Palavras-chave: *Apicectomia. Periodontite Periapical. Granuloma Periapical.*

1 Introduction

The endodontic treatment failure as a first treatment option involves the retreatment of radicular[1] channel. However, there are clinical situations in which this operation becomes infeasible or with an unfavorable prognosis, being indicated surgical approach for solving the problem[2].

The apical surgery aims at the removal of the contaminated portion of the tooth root, associated with the use of biocompatible materials, in order to avoid micro infiltration and preexisting periapical lesion recurrence[3]. Thus, one of the steps involves the preparation of an adequate retrograde cavity, with regular walls along the main channel, in sufficient depth for the retro filling material[4].

Due to frequent post-operative complications, inadequate and of invasive nature instruments, the apical surgery was seen for some time as a last therapeutic resource[5]. However, after the decade of 1990, with the scientific and technical refinement, this surgical approach demonstrated greater predictability and success in the treatment[6].

The success rate of apical surgery reaches 85% to 96.8%, being this predictability related to a correct indication, as well

as a rigor in the surgical protocol[3]. According to Abramovitz et al.[7], the main indications of this surgical technique consists of cases of persistent periapical lesions, calcified canals with periapical lesions, cast posts that prevent access, apical perforations or extravasation of refilling material for the periapex.

The aim of this study is present a surgical solution of the case of endodontic root canal failure caused by overfilling, with a history of endodontic retreatment and aesthetic rehabilitation with porcelain veneers.

2 Case Report

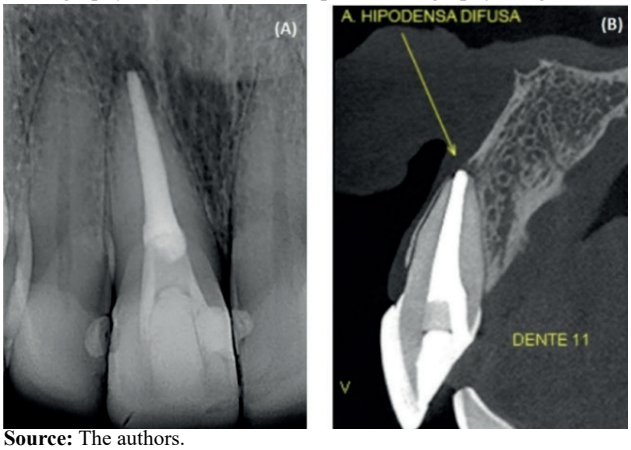
Patient C.F.P.L, 50 years, female, looked for dentistry service complaining about pain. In the anamnesis prior endodontic was reported treatment on a tooth 11, and after about 6 months symptoms associated to the same started, being indicated the endodontic treatment. Subsequently, the patient underwent rehabilitation aesthetics with ceramic facets, and there was the reappearance of pain in the anterosuperior region near tooth 11.

On clinical examination, tooth 11 showed normal tissue and tooth staining, absence of edema and fistula, presence of pain on palpation and vertical percussion, and ceramic facets on the teeth 13 to 23 (Figure 1). The radiographic images and tomography revealed root canal obturation of tooth 11 associated with diffuse hypodense area in the periapical region, related to the extravasation of refilling material (Figure 2), leading to probable clinical diagnosis of symptomatic apical traumatic periodontitis. As a treatment plan apical surgery was proposed.

Figure 1 - Initial clinical aspect of tooth 11

Source: The authors.

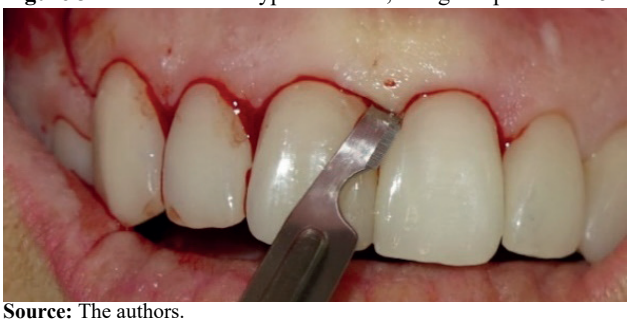
Figure 2 - Diagnostic Imaging of tooth 11) - The periapical Radiography; B) cone beam computed tomography - sagittal cut



Source: The authors.

Supraperiosteal and intrapapillary anesthesia was performed with 2% mepivacaine with epinephrine 1:100,000 (New DFL® - Rio de Janeiro, RJ, Brazil), and incision of the type Newman using scalpel blade 15C (Figure 3).

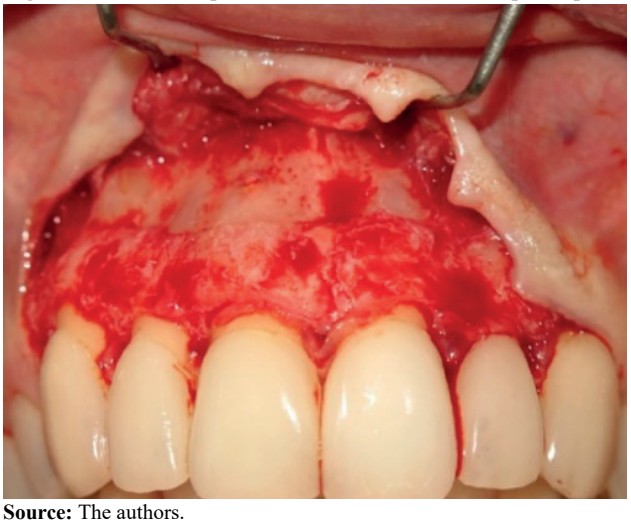
Figure 3 - incision of the type Newman, using scalpel blade 15C



Source: The authors.

For the dilatation of the tissues, it was opted for the technique of retail divided, keeping part of the periosteum, in order to avoid possible recessions marginal tissue in teeth rehabilitated with ceramics facets and, consequently, the smile disharmonization (Figure 4).

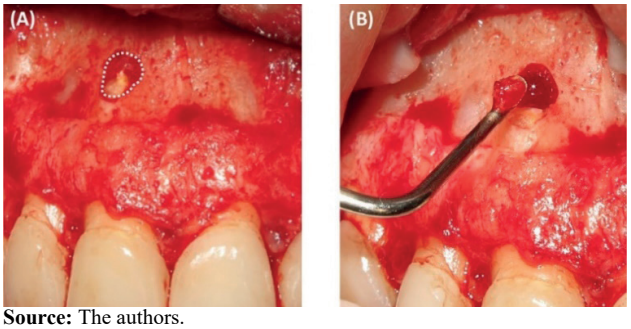
Figure 4 - Clinical aspect after the full thickness of split flap.



Source: The authors.

The osteotomy was performed with micro chisel (Hu-Friedy® Chicago, Illinois, USA) and the lesion removed and deposited in the container with a solution of 10% formalin for histopathological examination (Figure 5).

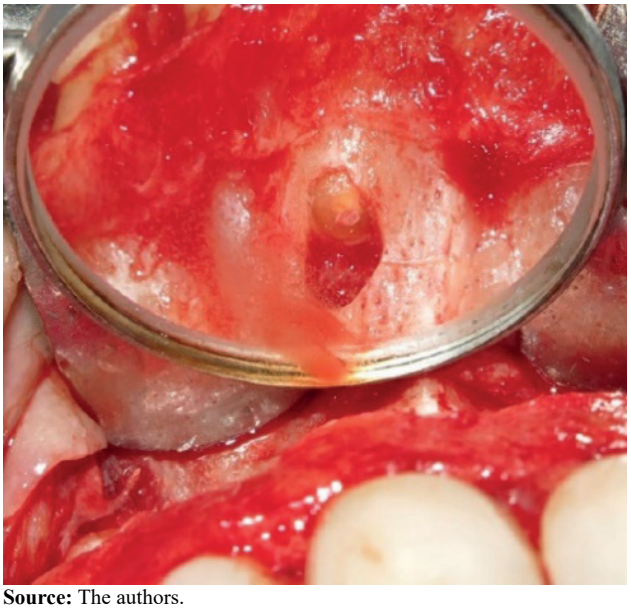
Figure 5 - (A) clinical condition after osteotomy (highlighted) in the periapical region of the tooth 11; B) curettage of periapical lesions.



Source: The authors.

Apicectomy of tooth 11 with a drill Zecrya 151 was performed (Denstply Sirona® - York, Pennsylvania, USA) with zero angle in relation to the long axis of the tooth being removed 3mm of the root apex (Figure 6).

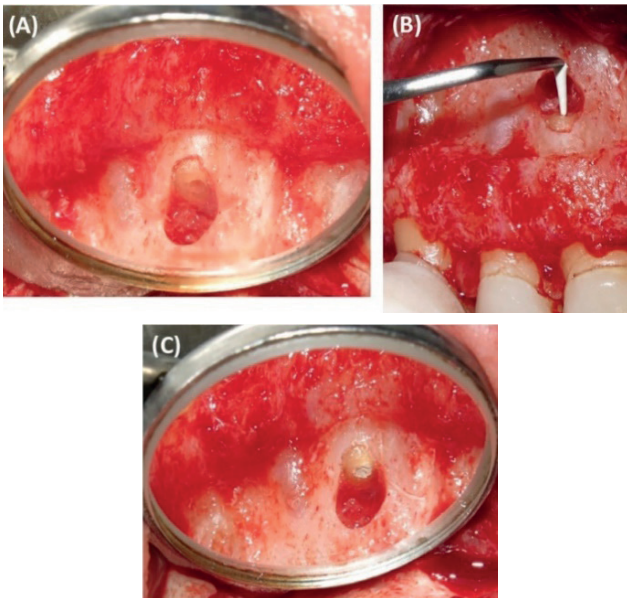
Figure 6 - Indirect view of the surgical store after apicectomy of tooth 11.



Source: The authors.

Then, retro cavity was performed with a diamond ultrasonic tip ‘ (Helse Ultrasonic BR® - Santa Rosa de Viterbo, São Paulo, Brazil) under constant irrigation with saline solution (Figure 7A). The material selected for retrograde obturation was white MTA (Mineral Trioxide Aggregate - Angelus® - Londrina, Paraná, Brazil) associated to cement Sealapex (Kavo Kerr® - Joinville, Santa Catarina, Brazil) (Figure 7B-C).

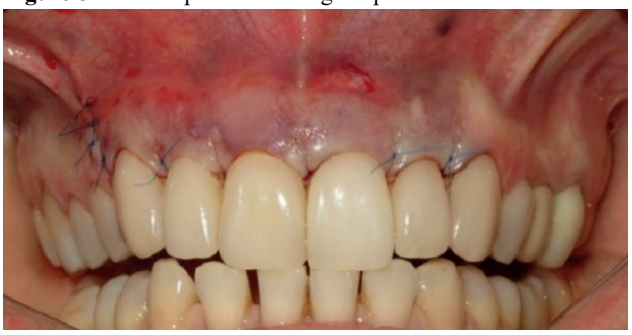
Figure 7 - A) Indirect view of retro cavity. B) retrograde Obturation with white MTA - Angelus®; C) indirect view of retrograde obturation



Source: The authors.

The flap was repositioned and then sutured with absorbable thread Vicryl 6.0 (Ethicon® Cincinnati, Ohio, USA) (Figure 8).

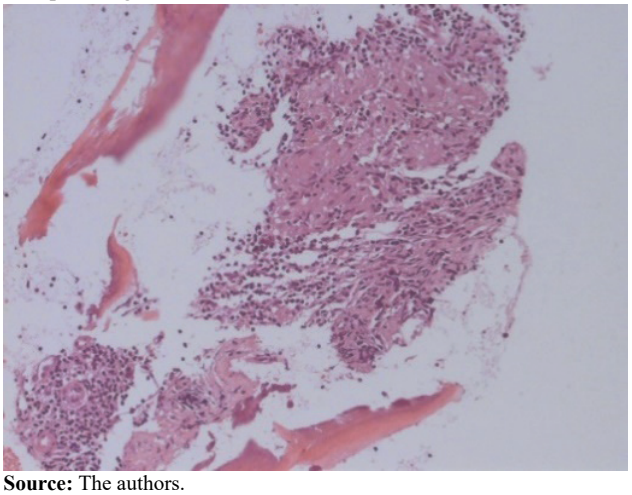
Figure 8 - Final aspect of the surgical procedure after suture



Source: The authors.

After 7 days suture was removed, and the patient has not reported postoperative complications. To the histopathological examination, the photomiscroscopy and descriptive report suggested a small lesion consisting of fibrous connective tissue associated with the numerous mononuclear inflammatory cells, compatible with periapical granuloma (Figure 9).

Figure 9 - Photomiscroscpy of periapical lesion after histopathological examination



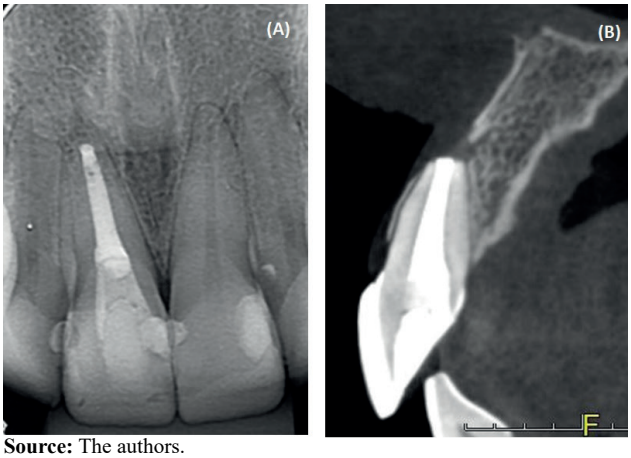
Source: The authors.

During clinical-radiographic follow-up of 2 years bone neoformation was observed in the periapical region of tooth 11, with absence of pain and recurrence of the lesion, tooth in function and preservation of harmony of the aesthetics rehabilitation with the periodontal region (Figure 10 and 11).

Figure 10 - Final clinical aspect after 2 years of follow-up

Source: The authors.

Figure 11 - Radiographic and tomographic aspects after 2 years of follow-up



Source: The authors.

3 Discussion

The root canal obturation presents decisive role for the success of endodontic treatment, because it has as its objective the elimination of voids, which could harbor micro-organisms[8]. Meta-analysis studies have addressed that the apical limit of obturation from 1 to 2 mm below the radiographic vertex presents a better prognosis[9.10].

Despite the development of refilling materials with physico-chemical properties each time more biocompatible, its extravasation to the periapical region can cause foreign body reactions associated with post-operative pain, and induce an apical periodontitis, just as observed in the present case[11,12]. According to the *American Dental Association*, the overfilling represents a technical error attributable to over instrumentation, inadequate odontometry and lack of apical stop[13].

In this context, the cone beam computed tomography is an important resource to assist the clinician in establishing the diagnosis, which is essential for the surgical planning[8]. It is worth pointing out that it is necessary the differential diagnosis among non-odontogenic lesions, which may mimic periapical lesions of inflammatory origin in the anterosuperior region[14,15].

The periodontal management should also be part of the surgical planning, in this case the option for split flap aimed to minimize gingival recessions to the rehabilitated teeth with ceramic facets[16]. Another limiting factor observed was the patient presenting high line of smile, so, if the incision of the intra-type sulcular was discarded, there would be a risk of gingival cicatricial fibrosis in the region, which is undesirable in aesthetic region[17].

Concerning the surgical technique, Gilheany et al. [2] showed that the apical infiltration can be decreased when the apicectomy is held perpendicular to the long axis of the tooth. In addition, the internal anatomy of the upper incisors presents a complex system of canals, therefore it is suggested to remove 3 mm of root, in order to reduce more than 90% of the apical ramifications and accessory canals[18].

After the apicectomy and confection of retro cavity, MTA becomes the material of choice for the refilling, due to its capacity of marginal sealing, stimulation in the osteoblast's adherence on the material surface, induction of less inflammatory response and antimicrobial activity[19.20]. Studies show that the use of collagen membrane and/or bone substitute in the surgery store does not significantly influence the surgical repair, when compared to only filing l with blood clot[21]. In this case, the guided tissue regeneration was disregarded, once the osteotomy was conservative and the surgical store had 5 walls, factors that propitiated the periapical osteogenic repair.

The extravasation of the filling material can occur as a surgery accident, and not always interfere with the prognosis of the case, a time which may be present in clinical silence; however, it is indispensable to the regular monitoring, in order to assess potential biological reactions[12].

4 Conclusion

Endodontics, as well as other dental specialties, is not free from complications that may compromise the success of endodontic treatment. In the specific case of filling material extravased to the to the periapex, apical surgery becomes a therapeutic alternative with favorable prognosis for treatment, provided that correctly indicated and with well executed surgical protocol.

References

1. Estrela C, Pécora JD, Estrela CRA, Guedes OA, Silva BSF, Soares CJ, et al. Common operative procedural errors and clinical factors associated with root canal treatment. Braz Dent J 2017;28(2):179-90. doi: http://dx.doi.org/10.1590/0103-6440201702451.

2. Gilheany PA, Figdor D, Tyas MJ. Apical dentin permeability and microleakage associated with root end resection and retrograde filling. J Endod 1994;20(1):22-6. doi: https://doi.org/10.1016/S0099-2399(06)80022-1

3. Kim S, Kratchman S. Modern endodontic surgery concepts and practice: a review. J Endod 2006;32(7):601-23. doi: https://doi.org/10.1016/j.joen.2005.12.010

4. Wang WH, Wang CY, Shyu YC, Liu CM, Lin FH, Lin CP. Compositional characteristics and hydration behavior of mineral trioxide aggregates. J Dent Sci 2010;5(2):53-9. doi: https://doi.org/10.1016/S1991-7902(10)60009-8

5. von Arx T, Peñarrocha M, Jensen S. Prognostic factors in apical surgery with root-end filling: a meta-analysis. J Endod 2010;36(6):957-73. doi: https://doi.org/10.1016/j.joen.2010.02.026

6. Pecora GE, Pecora CN. A new dimension in endo surgery: Micro endo surgery. J Conserv Dent 2015;18(1):7-14. doi: https://doi.org/10.4103/0972-0707.148864

7. Abramovitz I, Better H, Shacham A, Shlomi B, Metzger Z. Case selection for apical surgery: a retrospective evaluation of associated factors and rational. J Endod 2002;28(7):527-30. doi: https://doi.org/10.1097/00004770-200207000-00010

8. Estrela C, Holland R, Estrela CR, Alencar AH, Sousa-Neto MD, Pécora JD. Characterization of successful root canal treatment. Braz Dent J 2014;25(1):3-11. doi: http://dx.doi.

org/10.1590/0103-6440201302356

9. Kojima K, Inamoto K, Nagamatsu K, Hara A, Nakata K, Morita I, et al. Success rate of endodontic treatment of teeth with vital and nonvital pulps: a meta-analysis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;97(1):95-9. doi: https://doi.org/10.1016/j.tripleo.2003.07.006
10. Schaeffer MA, White RR, Walton RE. Determining the optimal obturation length: a meta-analysis of literature. J Endod 2005;31(4):271-4. doi: https://doi.org/10.1097/01.don.0000140585.52178.78
11. Nair PN. On the causes of persistent apical periodontitis: a review. Int Endod J 2006;39(4):249-81. doi: https://doi.org/10.1111/j.1365-2591.2006.01099.x
12. Ricucci D, Rôças IN, Alves FR, Loghin S, Siqueira Junior JF. Apically extruded sealers: fate and influence on treatment outcome. J Endod 2016;42(2):243-9. doi: https://doi.org/10.1016/j.joen.2015.11.020
13. Santoro V, Lozito P, De Donno A, Grassi FR, Introna F. Extrusion of endodontic filling materials: medico-legal aspects. Two cases. Open Dent J 2009:3:68-73. doi: https://doi.org/10.2174/1874210600903010068
14. Faitaroni LA, Bueno MR, Carvalhosa AA, Mendonça EF, Estrela, C. Differential diagnosis of apical periodontitis and nasopalatine duct cyst. J Endod 2011;37(3):403-10. doi: https://doi.org/10.1016/j.joen.2010.11.022
15. Carvalhosa AA, Estrela CRA, Borges AH, Guedes AO, Estrela C. 10-year follow-up of calcifying odontogenic cyst in the periapical region of vital maxillary central incisor. J Endod 2014;40(10):1695-7. doi: https://doi.org/10.1016/j.joen.2014.04.003
16. Velvart P, Peters CI, Peters OA. Soft tissue management: flap design, incision, tissue elevation, and tissue retraction. Endod Topics 2005;11(1):7897. doi: https://doi.org/10.1111/j.1601-1546.2005.00157.x
17. Taschieri S, Del Fabrro M, Francetti L, Perondi I, Corbella S. Does the Papilla Preservation Flap Technique Induce Soft Tissue Modifications over Time in Endodontic Surgery Procedures? J Endod 2016;42(8):1191-5. doi: https://doi.org/10.1016/j.joen.2016.05.003
18. Kim S, Pécora G, Rubinstein R. Comparison of traditional and microsurgery in endodontics. Color atlas of microsurgery in endodontics. Philadelphia: Saunders; 2001.
19. Estrela C, Bammann LL, Estrela CRA, Silva RS, Pécora JD. Antimicrobial and chemical study of MTA, portland cement, calcium hydroxide paste, Sealapex and Dycal. Braz Dent J 2000;11(1):3-9.
20. Bernabé PF, Gomes-Filho JE, Rocha WC, Nery MJ, Otoboni-Filho JA, Dezan-Júnior E. Histological evaluation of MTA as a rootend filling material. Int Endod J 2007;40(10):758-65. doi: https://doi.org/10.1111/j.1365-2591.2007.01282.x
21. Bernabé PF, Gomes-Filho JE, Cintra LT, Moretto MJ, Lodi CS, Nery MJ, et al. Histologic evaluation of the use of membrane, bone graft, and MTA in apical surgery. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109(2):309-14. doi: https://doi.org/10.1016/j.tripleo.2009.07.019