

Parendodontic Surgery as a Treatment Option: Case Report with One Year Follow-Up

Cirurgia Parendodôntica como Opção de Tratamento: Relato de Caso com Seguimento de um Ano
Cirurgía Paraendodóntica como Opción De Tratamiento: Reporte de Caso con Seguimiento a un Año

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Abstract

Endodontic treatment aims at eliminating microorganisms from root canal systems. The resistance of these microorganisms contributes for the permanence of the apical lesion, leading to the failure of treatment. The microbiological factor is pointed out as the major cause of failures after intervention. In these cases, root canal retreatment can be performed aims the re-instrumentation, cleaning, and new filling in the root canal. Also, retreatment treatment can be associated with a parendodontic surgery in the attempt to reverse failure without a tooth extraction. The objective of this clinical case is to report a root canal retreatment associated with apical surgery with one year follow-up in the lower central incisor's region. It was concluded that paraendodontic surgery is an effective and conservative treatment option compared to tooth extractions, and when properly performed, with the aid of good materials such a MTA, brings satisfactory results by returning normal conditions to the periodontal tissue, as well as health and function to the teeth affected by the inflammatory process.

Descriptors: Endodontics; Tooth Apex; Retreatment.

Resumo

O tratamento endodôntico visa eliminar os microrganismos dos sistemas de canais radiculares. A resistência desses microrganismos contribui para a permanência da lesão apical, levando ao insucesso do tratamento. O fator microbiológico é apontado como a maior causa de falhas após a intervenção. Nestes casos, o retratamento do canal radicular pode ser realizado visando a reinstrumentação, limpeza e nova obturação do canal radicular. Além disso, o retratamento pode ser associado a uma cirurgia parendodôntica na tentativa de reverter a falha sem a extração do dente. O objetivo deste caso clínico é relatar um retratamento de canal radicular associado à cirurgia apical com seguimento de um ano na região do incisivo central inferior. Concluiu-se que a cirurgia paraendodôntica é uma opção de tratamento eficaz e conservadora em relação às exodontias, e quando realizada corretamente, com auxílio de bons materiais como o MTA, traz resultados satisfatórios devolvendo condições normais ao tecido periodontal, bem como a saúde e função aos dentes afetados pelo processo inflamatório.

Descritores: Endodontia; Ápice Dentário; Retratamento.

Resumen

El tratamiento endodóntico tiene como objetivo eliminar los microorganismos de los sistemas de conductos radiculares. La resistencia de estos microorganismos contribuye a la permanencia de la lesión apical, lo que lleva al fracaso del tratamiento. El factor microbiológico es señalado como la mayor causa de fracasos tras la intervención. En estos casos se puede realizar un retratamiento del conducto radicular con el objetivo de reinstrumentación, limpieza y nueva obturación del conducto radicular. Además, el retratamiento se puede asociar con cirugía paraendodóntica en un intento de revertir el fracaso sin extraer el diente. El objetivo de este caso clínico es reportar un retratamiento de conducto asociado a cirugía apical con un seguimiento de un año en la región del incisivo central mandibular. Se concluyó que la cirugía paraendodóntica es una opción de tratamiento eficaz y conservadora en relación a las exodontias, y cuando se realiza correctamente, con la ayuda de buenos materiales como el MTA, trae resultados satisfactorios, devolviendo las condiciones normales al tejido periodontal, así como la salud y función de los dientes afectados por el proceso inflamatorio.

Descritores: Endodontia; Ápice del Diente; Retratamiento.

INTRODUCTION

Some persistent lesions after conventional endodontic treatment may develop due to the presence of pathogenic microorganisms outside the root canal, next to

periapical tissues, in places inaccessible to non-surgical endodontic therapy¹. The microbiological factor is pointed out as the major cause of treatment failures. This microbiota is predominantly composed of optional anaerobic gram-positive bacteria and may be associated

with species with varying behavior in the presence or not of oxygen. Periapical surgery and microbiological analysis of the removed material allow the identification of bacteria such as *Propionibacterium acnes*, involved with endodontic failures, and studies have revealed an increase in antimicrobial resistance levels, such as what happens with *Enterococcus faecalis*².

When the failure of the treatment is observed, two approaches can be considered: reintervention in the canal or apical surgery³. Retreatment aims at re-instrumentation, asepsis of the root canal system and a new filling⁴. Parendodontic surgery is a secondary alternative, once all therapeutic possibilities have been exhausted^{5,6}. The surgical therapeutic modality should be chosen and planned after verifying a real surgical need of the case in question after evaluating it clinically and radiographically. Apical curettage, apicectomy, retrograde filling and retro instrumentation with retro filling are surgical therapeutic modalities that aim to provide apical disinfection that has not been achieved by conventional endodontics⁷.

The surgical modality used varies from curettage with straightening in the apical third of the root to apicectomy, which consists of cutting the apical third with surgical drills in high rotation, giving it smooth and flat appearance, without the presence of steps and/or irregularities that may hinder healing, with retro filling, depending on the severity of the case^{8,9}.

There is a wide variety of materials suggested for use parendodontic surgeries, such as: amalgam^{9,10}, calcium hydroxide pastes¹¹, trioxide mineral aggregate cements^{12,13}. Currently, The MTA is the most suitable material for retrograde fillings, mainly due to its chemical properties and biocompatibility⁶. The MTA is formed by fine hydrophilic particles that harden in contact with the humid medium. A study conducted at the American Association of Endodontists showed that the main ions present in the composition of the MTA are calcium and phosphorus, which are also the main components of dental hard tissues, giving it biocompatibility. This study also proved the induction property of hard tissue formation that the material presents¹⁰.

Thus, the aim of this article is to report a clinical case of endodontic retreatment in association of an apical curettage and apicectomy paired surgery in lower central incisors region, emphasizing the technique and

followed operative steps clinical and radiographic one year follow-up.

CLINICAL CASE

A 40-year-old female patient, leucoderma, sought dental care with the main complaint: "There's a ball in my gum that goes back and forth pus" (SIC); patient reported pain when performing chewing in the lower incisor region. Patient had no systemic alteration and/or allergies and did not undergo any previous surgical procedures. During intraoral physical examination was observed the presence of a fistula in the vestibule bottom region, near the right lower central incisor and a depression in the same region, detectable through palpation. Radiographic examination showed a unilocular radiolucent lesion in the mandibular midline region of approximately 2 cm, also could be observed the presence of an endodontic treatment in the right lower central incisor (Figure 1A). After evaluation and planning, the first treatment option was endodontic retreatment for the right lower central incisor and endodontic treatment for the left lower central incisor (Figure 1B). However, no positive results were obtained, the patient continued with a previously mentioned symptomatology and the lesion did not regress, requiring a second option of treatment as an apical surgery to remove the lesion.

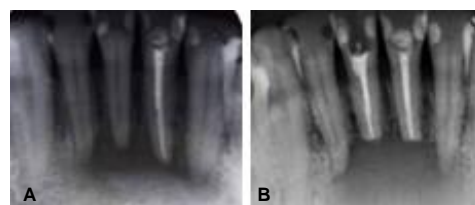


Figure 1: A – Radiographic image evidencing radiolucent periapical lesion in lower central incisors.; B - Radiographic image post apicectomy.

Initially, intra and extraoral antiseptics was performed with chlorhexidine at concentrations of 0.12% and 2%, respectively, followed by regional blockade of the mentonian and lingual nerves, bilaterally with anesthetic solution of lidocaine 2% with epinephrine 1:100,000. Neumann incision was carried out, with scalpel blade number 15 and total retail detachment; ostectomy for the manufacture of a bone shop with the aid of the surgical drill number 702 in high rotation, exposing the apex of dental elements (Figure 2A), followed by curettage of the lesion with Luke's curettage (Figure 2B), apicectomy of the apexes of central incisors also with the 702 surgical drill and abundant irrigation with saline. Then, MTA cement was introduced in the root apical region

of the central incisor's teeth, an irrigation of the bone store with saline and filling with blood clot was performed, the flap was repositioned, and the suture performed with nylon thread (4.0) in simple points (Figure 2C). The collected material was referred to the pathology center, being diagnosed as inflammatory periapical granuloma (Figure 2D).

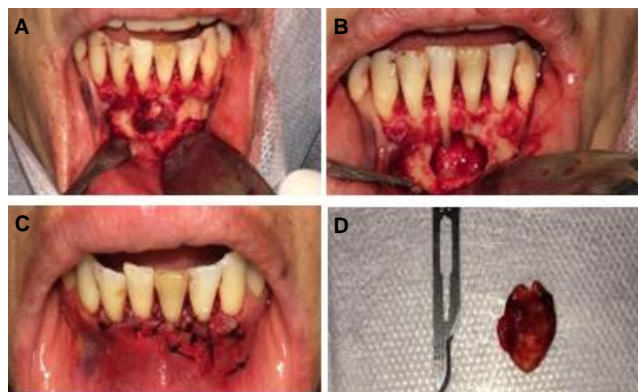


Figure 2: A - Total detachment of flap and osteotomy for bone window making.; B - Visual aspect of bone resorption after removal of the lesion.; C - Suture with nylon thread 4.0; D - Injury of approximately 2 cm.

Soon after, a periapical radiography was performed for documentation (Figure 3A). In the postoperative radiographic sockets, to monitor the tissue regeneration of 10 days, 2 months and one year. It was observed that the radiolucent region gradually reduced, indicating the presence of bone neoformation, which suggests a probable success with the treatment of choice (Figure 3B and 3C).



Figure 3: A - 10-day postoperative follow-up radiography.; B - 2 months postoperative follow-up radiography.; C - 1-year postoperative follow-up radiography.

DISCUSSION

Parodontal surgery is indicated in cases of persistent infections⁶, where some difficulties resulting from endodontic treatment are sought or that have not been resolved by it⁵. It allows the removal of infected periapical tissue and improves cleaning, modeling, and sealing of the apical region, avoiding the reappearance of lesions¹⁰. According to Siqueira Jr et. al.¹⁴, endodontic failures are classified as the inability that conventional endodontic treatment presents in eliminating microorganisms from the root system of canals and periapex, resulting in the permanence of apical biofilm, which allows the emergence of apical lesions after the completion of endodontic treatment.

Persistent infections usually have in its composition a single species, or a smaller number of bacterial species compared to primary infections. These has predominance of Gram-positive anaerobic bacteria, such as *Parvimonas micra*, *Actinomyces spp.*, *Streptococcus sp.*, *Propionibacterium spp.*, *Pseudoramibacter alactolyticus*, *Olsenella uli*, *E. Faecalis*, *Lactobacilli sp.*, and fungal infections caused by *Candida albicans*¹⁵. Siqueira et al.¹⁶ identified, through a culture method, 103 bacterial species and 6 fungal species even after instrumentation and intracanal medication, which contributes significantly to the appearance of these lesions.

Apical granuloma, which was the lesion compatible with histopathological in this case, it can be describe as a localized mass of chronic inflammatory tissue in the periapical region, with acute inflammatory infiltrate (containing macrophages and polymorphonuclear) and chronic (containing B and T lymphocytes). it is common to also find epithelium nests with latent proliferation capacity, which are formed from remains of Malassez epithelial cells¹⁷.

In this case reported, after failure in the attempt of endodontic treatment and endodontic retreatment, the paraendodontic surgery was the option chosen. The curettage of the apical lesion was performed, followed by root apicectomy and apical MTA cement insertion in the apex root canal was simultaneously to the surgical act. Apical curettage consists of pathological tissue removal, or a strange body located in the apical region, which is making repair impossible⁵. In apicectomy, root apex is cut, aiming at the elimination of biofilm and microorganisms and infected tissue^{16,18}.

Apical sealing was performed with MTA, a material that was originally developed as a retro filling cement, as it can induce repair in periapical tissues and is characterized as a good apical sealant material, by maintaining its sealing properties and mechanics even in contact with water. An apical sealing done in a deficient way can compromise the success of treatment^{18,19}.

Among the surgical modalities in cases of paraendodontic surgery, the apical curettage⁷, which consists of the removal of all granulation tissue, as well as extruded, excess gutta-percha that are in the periapex region without the need for surgical cutting of root apices^{7,20}.

In apicectomy, it is understood as an act of removing the more apical portion from the root of a dental organ when pathological

processes that affected that region cannot be treated with traditional endodontic procedures²¹. According to the literature the ideal cut should be performed in the last 3 millimeters of the apex at an angle of 90° in relation to the long axis of the tooth, because it minimizes the possibility of apical micro infiltration due to the smaller number of exposed dentin tubules²², followed by a sealing of the region, which can be done with bio aggregate cements⁶, calcium hydroxide pastes¹¹, or even amalgam^{9,10,21}, which has already been widely used for this purpose.

In apicectomy with retro filling, in addition to the dental apex cut, a retrograde filling is made, which aims to trap any irritant existing inside the root canals²². The retro filling material of choice needs to offer a good airtight sealing and be compatible bio so that it does not interfere negatively in the tissue repair of the region²³.

Apicectomy with retro-instrumentation and retro filling is the instrumentation and filling of the canal performed by apical access after cutting the apexes²⁴. It is indicated when the tooth has a deficient filling and/or when conventional access is interrupted by the presence of fractured instrumental or prosthetic pin⁷. Simultaneous filling to the surgical procedure aims to solve cases of extensive chronic periapical lesions, where the channels are well instrumented, there were already changes in intra-canal medication, application of antibiotic therapy on a systemic route and yet there is still the presence of persistent inflammatory exudate that makes it impossible to complete the treatment²⁵⁻²⁷.

The success rates of parentodontic surgeries are highly variable, because several factors interfere in the prognosis of surgery, such as: systemic condition of the patient, virulence of the microbiota associated with infection, localization and amount of bone resorption, the quality of treatment or retreatment performed, surgical materials chosen, involved techniques, in addition to the experience and ability of the surgeon that is fundamental for the success of treatment⁶.

CONCLUSION

Through the follow-up of the case described, together with the studies carried out over the years, it can be concluded that paraendodontic surgery is an effective and conservative treatment option compared to tooth extractions, and when properly performed, with the aid of good materials such a MTA, brings

satisfactory results by returning normal conditions to the periodontal tissue, as well as health and function to the teeth affected by the inflammatory process.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interests.

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