

CASE REPORT

Apicectomy and simultaneous obturation of root canals: a clinical case report

ABSTRACT

Aim: This case report presents a maxillary lateral incisor that had already been treated by endodontic therapy and apicectomy surgery, but still had a persistent lesion. To maintain the tooth in the oral cavity, a third intervention was necessary in which parendodontic surgery followed by retro-obturation was performed. The aim of this report is to demonstrate the effectiveness of the treatment by means of clinical and radiographic follow-ups (6 and 12 months).

Summary: Considering the patient's complaint and the clinical and radiographic aspects, it was decided to perform the parendodontic surgery. The surgery procedures were osteotomy, curettage, apicectomy, root canal retreatment and retrofilling with Mineral Trioxide Aggregate, graft with lyophilized bone and, finally, use of collagen membrane. Through clinical and radiographic examinations were possible to observe that there was good healing of the soft and hard tissues, suggesting total regression of the lesion, and absence of signs and symptoms. Even if periapical lesions persist for a long time after interventions, the association of multiple procedures should be considered to enable the maintenance of the tooth in the oral cavity.

Key learning points

- The parendodontic surgery associating osteotomy, curettage, apicectomy, root canal retreatment and retrofilling can be effective to treat persistent periapical lesion.
- The use of graft with lyophilized bone and collagen membrane helps in bone repair.

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Introduction

Endodontic therapy is the first choice to treat periapicopathies that originate in the pulp and root canal, however, this treatment presents risk of failure. Failures in endodontic treatment may be related to persistent cystic lesion, inflammatory foreign-body-type reaction (caused by leakage of endodontic material and others), endogenous accumulation of cholesterol crystals in apical tissues and extraradicular infections, such as periapical actinomycosis, for example (1). Non-surgical endodontic retreatment is often the first option to treat failure of conventional endodontic treatment (2). However, there are clinical situations in which this approach becomes unfeasible or has an unfavorable prognosis. Thus, the surgical approach in the periapex region is indicated (3, 4).

Apicectomy or root resection is also a surgical procedure that involves exposing the periapical lesion, through an osteotomy, removal of the lesion, removal of part of the root apex and disinfection. Additionally, retro-obturation or apical sealing is applied (5). In addition, root canal retreatment can be used simultaneously after the parendodontic surgery (6).

The use of guided tissue regeneration (GTR) techniques has been proposed as complementary method to endodontic surgery in order to promote bone tissue healing (7). Regarding the topic, many techniques and material, such as bone replacement grafts from numerous sources, nonresorbable and bioabsorbable membranes (8), have been developed that show good clinical and histologic outcomes.

An important step in apical surgery is to identify possible areas that have not been filled in the root apex and, subsequently, to perform adequate filling of the root tip. Only an adequate apical filling will allow satisfactory long-term results. Among the materials used for this filling, the Mineral Trioxide Aggregate (MTA) has been widely used (9). Studies have shown that MTA has a high sealing capacity, good stability

and excellent biocompatibility (10). Prospective randomized clinical studies have reported high level of success rates in teeth treated with MTA in apical surgery (10, 11).

This case report shows a maxillary lateral incisor that had already being treated by endodontic therapy and apicectomy surgery, but still had a persistent lesion. To maintain the tooth in the oral cavity, a third intervention was necessary in which parendodontic surgery followed by retro-obturation was performed. Therefore, the aim of this report is to demonstrate the effectiveness of the treatment by means of clinical and radiographic follow-ups (6 and 12 months), showing complete lesion regression, bone formation and absence of symptoms.

Case Report

This study was approved by the Research Ethics Committee, protocol CAAE: 29178120.7.0000.5220. The patient agreed to participate and signed the consent form. A 36-year-old female patient, who reported a history of endodontic treatment with subsequent apicectomy performed in 2007, sought dental care for period evaluation in 2014. Through radiographic examinations, a slight bone rarefaction was observed at the apex of tooth 12, which presented a root canal filling. Thus, radiographic monitoring and proper follow-up were chosen as treatment. In 2016, increase in the radiolucent area was observed. Clinically, the patient was asymptomatic, and the treatment decision was to follow-up the case.

In 2019, the patient sought dental care complaining of tooth proclination. The clinical examination showed no signs of inflammation or infection. Regarding radiographic evaluation, a radiolucent and well-defined area was observed associated with the periapex of tooth 12. Due to the radiographic aspect of the lesion in which progression was detected (Figure 1), a refractory periapical lesion was suspected. As part of the clinical examination, diagnostic tests were performed. The palpation test was positive in the periapex area.

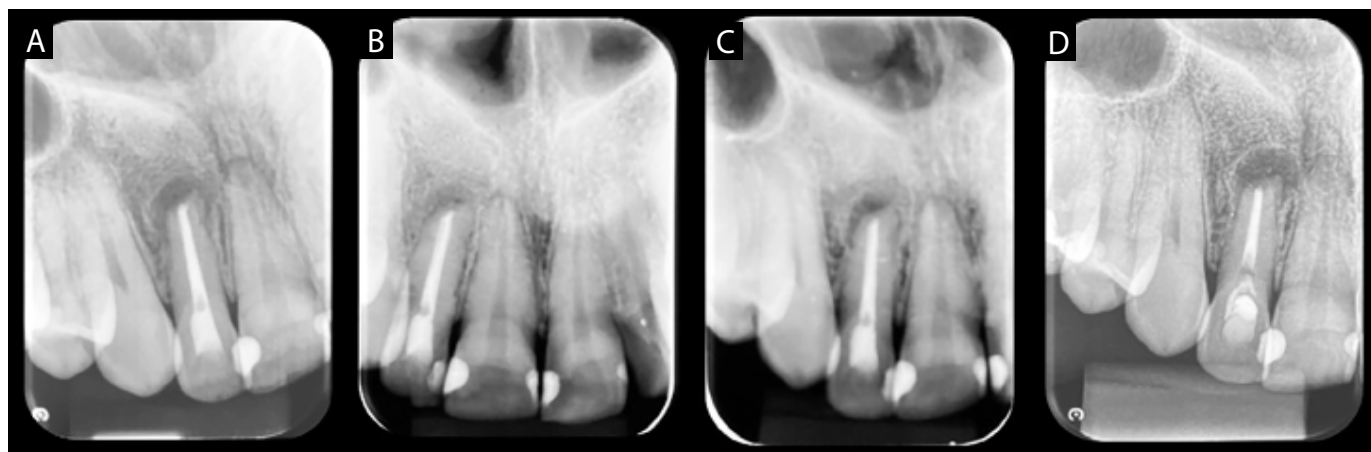


Figure 1
Radiographic evaluation: **A)** Baseline (2014); **B)** 12-months follow-up; **C)** 24-months follow-up - increase in the radiolucent area; **D)** 36-months follow-up - lesion progression showing a refractory periapical lesion.

Regarding percussion tests, vertical test was positive and the horizontal one was negative. Thus, considering the patient's complaining and the clinical and radiographic aspects, it was decided to perform the periradicular surgery. The surgery procedures were osteotomy, curettage, apicectomy, root canal retreatment and retrofilling with MTA. Additionally, the GTR was applied using graft with lyophilized bone and bioabsorbable membrane.

Considering the clinical steps, firstly, intraoral antiseptics was performed using chlorhexidine digluconate 0.12% (Rioquímica, São José do Rio Preto, Brazil) and extraoral antiseptics using iodine-polyvinylpyrrolidone (PVPI - Rioquímica, São José do Rio Preto, Brazil).

The pulp chamber was accessed to remove gutta-percha. After that, the surgery started with anesthesia by regional block with lidocaine solution (2%) with epinephrine 1:100.000 (Alphacaína - DFL, Rio de Janeiro, Brazil).

Partschi incision was performed with a scalpel blade no. 15 (Solidor, Barueri, Brazil) and flap division with Molt 2-4 detacher (Trinity, São Paulo, Brazil). Osteotomy was performed using surgical drills 702 (KG - Sorensen, São Paulo, Brazil) and Zecrya drill (Microdont, São Paulo, Brazil) under irrigation with saline solution. The lesion was detected and curettage and smoothing (adjacent structures and the root apex) was performed using curette by Lucas no. 85 (Quinelato, Rio Claro, Brazil). Macroscopically, gran-

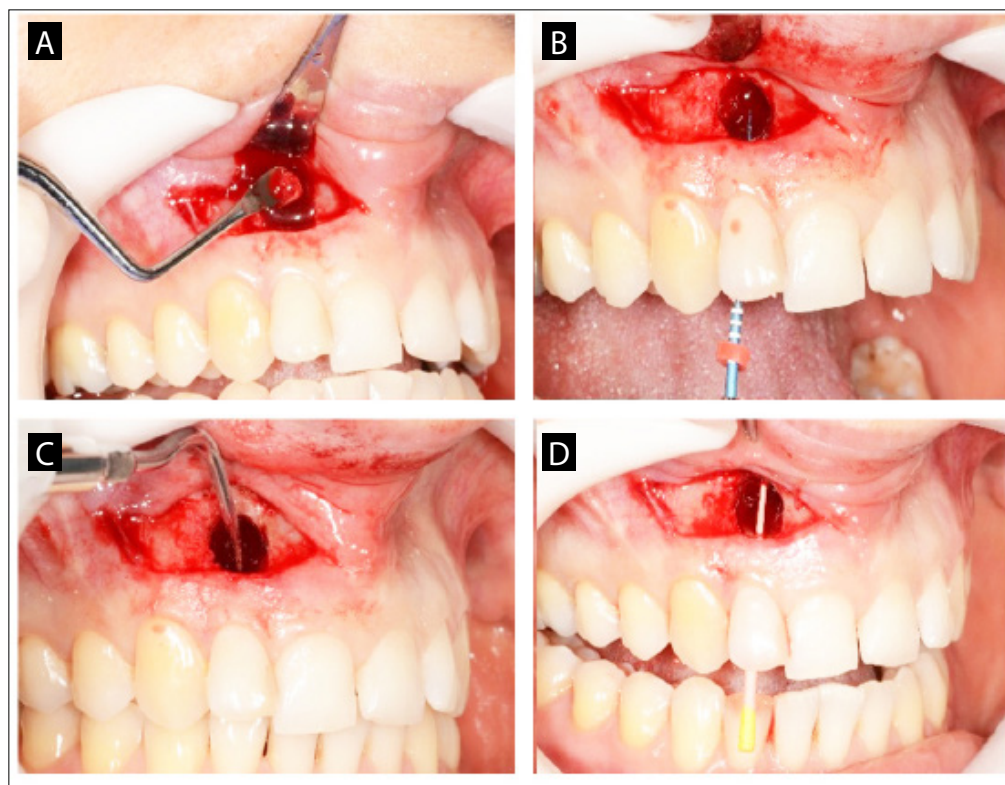
ulomatous inflammatory tissue was observed.

Apicectomy was performed with a Zecrya drill (Microdont, São Paulo, Brazil) approximately 3 mm from the apex, seeking a 45° angle with a bevel to the vestibular face due to facilitate the subsequent condensation of the retrofilling material. The cavity was cleaned using sterile gauze soaked with chlorhexidine 2% (Rioquímica, São José do Rio Preto, Brazil). After, gutta-percha was removed from the root canal with largo II drills (Dentsply Malleifer, Ballaigues, Switzerland), Reciproc primary file (VDW GmBG, Munich, Germany) and, for root canal preparation a rotary file size F5 (Universal Protaper - Dentsply Malleifer, Ballaigues, Switzerland) was used.

After the gutta-percha removal, the apical portion was prepared with the aid of ultrasonic device, obtaining approximately 2 mm for the MTA filling cement (Angelus, Londrina, Brazil). Gutta-percha cone size F5 (Universal Protaper - Dentsply, Malleifer, Ballaigues, Switzerland) was used to fill the root canal. For this, the cone was adapted at the apical third of the root and was cut at the level of the dental apex with a scalpel no. 15 (Solidor, São Paulo, Brazil). Thus, the cone was removed and recalibrated on a sterile glass plate, in order to keep it 2 mm above the root apex, providing enough space for a correct condensation of the retrofilling material - MTA (Figure 2).

The MTA Repair HP was mixed according to the manufacturer's instructions. Then,

Figure 2
 Parendodontic surgery: **A)** Curettage, **B)** Gutta-percha removal and root canal preparation; **C)** Apical preparation with ultrasonic device; **D)** Apical gutta-percha cone adaptation.



the material was condensed into the cavity. The surgical area was filled with lyophilized bone (GenOx Org - Baumer, Pacaembu, Brazil). Then, collagenous membrane (Lumina Coat - Critéria, São Carlos, Brazil) was used to accelerate and improve tissue healing (Figure 3). Regarding suture, 3-0 silk thread (Shalon, São Luís de Montes Belos, Brazil) was used. Seven days after surgery, the stitches were removed. Radiographic assessment was performed at 15 days, six and twelve months (Figure 4). Through clinical and radiographic examinations were possible to observe that there was good healing of the soft tissues, suggesting total regression of the lesion, and absence of signs and symptoms.

Discussion

Periapical lesions can be treated through conventional endodontic treatment, associated or not with surgical endodontic therapy, and even by tooth extraction (12). However, more conservative practices should be advocated, whenever its possible.

Even periapical lesions with large extension can be treated by non-surgical endodontic therapies (13). Success in conventional endodontic treatment usually occurs when the lesion presents direct communication with the root canal. In these situations, to obtain the best possible clinical result, pus drainage should occur by the access cavity. On the other hand, when the lesion is separated from the apical foramen due to the presence of an intact epithelium, it may not heal after non-surgical therapies (12).

Parendodontic surgery is a well-known procedure and a meta-analysis reported that it can present success and failure rates about 91.6% and 4.7%, respectively (7). In the present clinical case, the authors decided to perform parendodontic surgery that involved osteotomy, curettage, apicectomy, retreatment of the root canal associated with retrofilling, GTR, in the same surgical session, due to a persistent and refractory periapical lesion.

According to Fehlberg and Bittencourt (14), the aim of the apicectomy is to eliminate bacteria and areas of imperfection in the



Figure 3
Parentodontic surgery: **A)** MTA condensation, **B)** filling the surgical area with lyophilized bone; **C)** using the collagenous membrane.

root canal with persistent apical lesion. Thus, the apicectomy provides airtight seal and facilitates access to the root canal. It is recommended to remove three or more millimeters of depth from the root apex to obtain a safe and effective closure of the region and to have enough space for adequate curettage of the root surface and bone cavity (14). In the present study, the patient had already undergone previous apicectomy surgery. Therefore, it was decided to remove 3 mm of the root apex in order to avoid further wear and loss of root structure.

Although it is an invasive procedure, during parentodontic surgery, necrotic cells, tissue debris and bacteria from periapical area are removed (15). If the case selection is adequate, compared to non-surgical endodontic therapy, healing of the periapical lesion is much more effective and faster when parentodontic surgery is performed (15). However, if endodontic treatment is unsatisfactory, surgical inter-

vention will not work. In the present case, the patient reported a previous history of surgical intervention, but had a persistent lesion. This long-term failure can probably be associated with unsatisfactory root canal filling. Other factors could be considered as the partial removal of the cystic lesion, and even individual factors such as the organism response associated to the tissue repair process (16).

Although uncommon, as in the present case, chronic periapical cysts with persistent exudate may occur. The indicated clinical intervention is to perform the root canal retreatment simultaneous to the surgical procedures. This approach is mainly indicated for cases in which it is not possible to eliminate persistent exudate through systemic and intracanal medication (14). In this clinical case, although there was no exudate, the lesion was persistent even after clinical interventions already performed.

Endodontic retreatment is an excellent

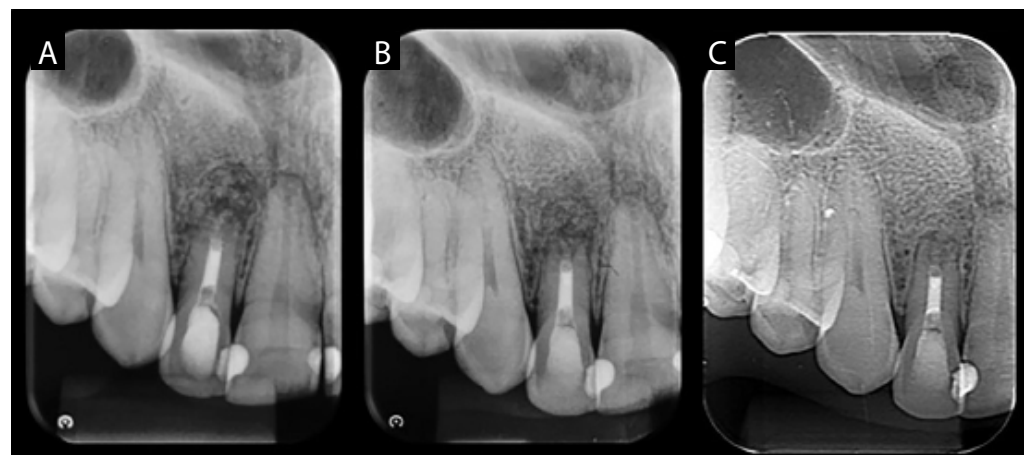


Figura 4
Radiographic follow-up after surgery: **A)** 15 days **B)** 6-months follow-up **C)** 12-months follow-up.

option, as it promotes good root sealing and restores favorable conditions for bone neof ormation (4, 14). Endodontic retreatment with simultaneous parendodontic surgery has a significantly higher healing rates compared to endodontic treatment only (6). Considering the present clinical case, previously, the patient had undergone an apicectomy, however, without retreatment. For this reason, it was decided to associate endodontic retreatment with the surgical procedure in order to optimize the clinical results.

Regarding the endodontic retreatment, different techniques can be used to remove gutta-percha from the root canals. Therefore, the clinician needs to choose a technique that is both effective and safe. The use of ultrasonic devices has shown good results in relation to gutta-percha removal (17). Therefore, it was decided to use this technique in the present clinical case.

Different materials can be used in the retrofilling procedure, such as amalgam, composite resin and glass ionomer. However, the MTA seems to be the gold standard as a root filling material, presenting higher success rates (9, 18). In the case reported by Garlapati et al. (15), MTA has been used as a root filling material producing favorable results in terms of absence of inflammation and hard tissue and cementum formation (15, 4).

Additionally, considering periapical lesions larger than 5mm, lyophilized bone grafts could be used and represent a good resource for better healing of hard tissues (19).

In the present clinical case, several procedures were performed in a single session. It is paramount to consider the skill and clinical experience of the professional to perform all these steps associated. The intervention was proposed as a last attempt to intervene in the maxillary lateral incisor.

Conclusion

Even if periapical lesions persist for a long time after interventions, the association of multiple procedures, including conventional and surgical ones, should be considered to enable the maintenance of the tooth in the oral cavity.

Clinical Relevance

The association of multiple procedures can be a valid resource to treat persistent periapical lesions, allowing the maintenance of tooth in the oral cavity.

Conflict of Interest

The authors deny any conflicts of interest related to this study.

Acknowledgement

The authors deny any financial affiliations.

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