Apical Surgery: Therapeutic Option for Endodontic Failure

Cirurgia Parendodôntica: Opção Terapêutica para o Insucesso Endodôntico

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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 treatment 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 intrapulpal 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.

I Introduction

The endodontic treatment failure as a first treatment option involves the retreatment of radicular1 channel. However, there are clinical situations in which this operation becomes infeasible or with an unfavorable prognosis, being indicated surgical approach for solving the problem2.

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 recurrence3. 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 material4. However, there are clinical situations in which this operation becomes infeasible or with an unfavorable prognosis, being indicated surgical approach for solving the problem2.

Due to frequent post-operative complications, inadequate and of invasive nature instruments, the apical surgery was seen for some time as a last therapeutic resource5. However, after the decade of 1990, with the scientific and technical refinement, this surgical approach demonstrated greater predictability and success in the treatment6.

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. According to Abramovitz et al., the main indications of this surgical technique consist 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.

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).

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).

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).
Apicectomy of tooth 11 with a drill Zecrya 151 was performed (Dentsply 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.

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

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

After 7 days suture was removed, and the patient has not reported postoperative complications. To the histopathological examination, the photomicroscopy 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** - Photomicroscopy of periapical lesion after histopathological examination

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
Apical Surgery: Therapeutic Option for Endodontic Failure

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. Meta-analysis studies have addressed that the apical limit of obturation from 1 to 2 mm below the radiographic vertex presents a better prognosis.

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. According to the American Dental Association, the overfilling represents a technical error attributable to over instrumentation, inadequate odontometry and lack of apical stop.

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. 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.

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. 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.

Concerning the surgical technique, Gilheany et al. 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.

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. 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 I with blood clot. In this case, the guided tissue regeneration was disregarded, once the osteotomy was conservative and the surgical store had 5 walls, factors that proffered 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.

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 extravasated 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


