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Case Study

# Nonsurgical Endodontic Retreatment After Failed Apical Surgery

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## Abstract

This case study describes a conservative (orthograde) endodontic retreatment procedure of the teeth which underwent apical surgery and yet they still presented a periapical pathology. Healing was achieved without any need for another endodontic surgical intervention. It proves the effectiveness of this alternative treatment, although sensitive to technical errors that can intervene due to the high difficulty of the large apical size of the root after resection.

**Keywords**: Nonsurgical Retreatment; Endodontic; Apical Surgery

## Introduction

The best implant is the natural tooth. To keep the natural teeth functional and without disease, endodontic retreatments are sometimes necessary. The most common scenario is failure of primary endodontic treatment, followed by surgical retreatment, when in fact an orthograde retreatment should be attempted, only this time by an endodontist [1,2].

In the case of surgical retreatments performed either a long time ago, when the conditions of microsurgery were not met, or even recent, but which do not comply with the principles for a successful evolution, failure appears, expressed by persistent apical pathology [3-5].

Fortunately, before condemning such a tooth to extraction, we have the possibility of orthograde, non-surgical retreatment after apicosurgery. If carried out according to the current principles of endodontic treatment, this second retreatment, has a significant rate of success, as high as 86%, like conventional orthograde root canal retreatment of previously nonsurgically treated teeth [6-9]. It would be the third attempt to save the respective tooth.

Our article aims to present this treatment approach, as a variant of conservative treatment, with multiple advantages for the patient who underwent apical surgery without success. Conservative and clinically efficient, it provides the premises for a successful outcome.

### Clinical case 1

A 32-year-old female patient was referred to our office for evaluation of tooth 26, first left maxillary molar. She was concerned about this tooth, as it was the cause for a „small abscess", as she called it.

Clinical examination revealed tooth 26 with a crown, a buccal sinus tract and a buccal scar (Figure 1b). When asked, the patient confirmed she underwent surgery some time ago, because the tooth was still painful after the endodontic treatment. After the apical surgery, a sinus tract developed, and the tooth was only slightly sensitive when biting. It was the same with the vertical percussion. The periodontal probing was normal. She provided a periapical radiograph (Figure 1a), which showed a cast post and a previous endodontic treatment. Also, there was a periapical radiolucency in relation to the mesio-buccal root. We removed the crown and the cast post and then took another radiograph with a gutta-percha cone through the sinus tract (Figure 1 b, c). The periapical radiograph revealed that the cause of the sinus tract was the mesio-buccal root. A large radiolucency was present related to this root. We decided to scan the tooth as we suspected a missed canal in this root. This was also confirmed by the cone-beam computed tomography (CBCT) axial section (Figure 1d). The buccal cortical bone was resorbed near the root, because of the sinus tract. We retreated the canals which were previously treated, by removing all the materials and mechanically reshaping and disinfect them, located the missed root canal and obturated with a resin-based sealer, Ah Plus (Dentsply) and continuous wave warm vertical compaction of gutta-percha. We did not use a bioceramic apical plug, as we observed on the CBCT axial section an apical round shape of the root canal and the apical orifices were no larger than 0.25 mm (Figure 1e). After 2 weeks the patient was able to return to our office and we observed that the sinus tract had disappeared (Figure 1f) and the patient stated that the tooth was no longer sensitive at all. After 6 months a periapical radiograph showed a remarkable healing process (Figure 1g).

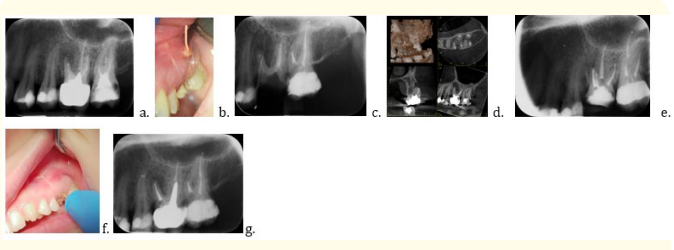


**Figure 1:** a: Preoperative radiograph b. sinus tract c. radiograph tracing the sinus tract d. preoperative CBCT e. postoperative radiograph f. clinical follow-up g. 6 month-follow-up radiograph.

## Clinical case 2

A 43-year-old female patient was referred to our office for evaluation of tooth 21, maxillary left central incisor. She reported that the tooth was painful lately, also it underwent surgery some time ago. On clinical examination, after we removed the provisional restoration, the tooth was sensitive to vertical percussion and buccal palpation. The periodontal probing was slightly greater than the normal limits. The periapical radiograph revealed the two central incisors, both resected, but the right one with a beveled section and the left one with a nonbeveled section (Figure 2a). The roots were extremely short and the part of the root implanted in the bone was quite small. A periapical lesion was present in relation to tooth 21. Because the existing root canal filling was radiographically evaluated to be inadequate, it does not seal the entire endodontic system (incomplete, non-homogeneous), we decided for nonsurgical retreatment followed by orthograde placement of an apical mineral trioxide aggregate (Angelus gray MTA) plug, followed by Ah Plus sealer (Dentsply) and warm gutta-percha compaction (Figure 2b). The CBCT imaging was not considered necessary in this case, as both the diagnosis and the cause for it were quite obvious. 5 years later the lesion was completely healed, but a lateral radiolucency in relation to tooth 11, right upper central incisor, developed (Figure 2c). We advised the patient to have it investigated. However, she decided against any intervention. The patient returned to our office 8 years after the treatment of the tooth 21, because the right central incisor was painful this time. The periapical radiograph revealed tooth 21 still without signs of pathology, but the lateral lesion of tooth 11, maxillary right central incisor, increased. It was found that it was fractured (Figure 2d) and had to be extracted. 11 years after the retreatment of tooth 21, it was fractured as well (Figure 2e).

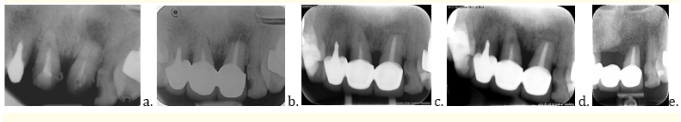


**Figure 2:** a. preoperative radiograph b. postoperative radiograph c. 5 years follow-up d. 8 years follow-up e. 11 years follow-up.

## Discussion

Surgical treatment involves the sectioning of a part of the apical area of the root. The apical third is the most difficult to shape and disinfect. Access to this endodontic region of the root canal

may be one of the causes. Endodontic anatomy, often with sharp curvatures, prevents effective debridement. In addition to these, there is also the not so rare situation, when the main canal can divide into lateral canals or apical delta. The biofilm present at this level cannot be removed unless adjuvant endodontic techniques such as irrigant activation are applied. Sometimes, however, access to this part is iatrogenically blocked by the compaction of debris, ledges, or the fracture of endodontic instruments. All this leads to persistent pathology and/or symptomatology, resulting in endodontic surgery. Although it may have even greater rates of success in the short term than the non-surgical one, nevertheless, performed improperly, the failure is maintained [10,11].

A new retreatment, but non-surgical, can rectify this situation, with the mention that this time we must deal with a tooth that no longer has the specific conical apical part, but looks like a truncated cone, with a large apical diameter, sometimes the section is even oval, if the resection took place in the part of the canal with this shape. In addition, the length is shorter and a treatment plan regarding the implantation of this tooth must be well made, if there is also a tooth involved in a prosthetic restoration.

It is therefore obvious that several issues arise in the endodontic treatment of such teeth. To begin with, it is the step when we must remove all the previous obturation materials, not a simple matter, considering the danger of their sliding over the wide apex.

Another one would be the establishment of the working length, which by periapical radiography can lead to errors if the apical section of the root was beveled. This can be overcome by using the electronic apex locator, but also some endodontic files with a diameter adapted to the apical diameter, to avoid errors. Then, it is essential to determine the apical diameter as precisely as possible, to avoid overfilling with obturation materials. This is also important for establishing the obturation technique, as a diameter greater than 0.55-0.60 mm requires obturation with special bioceramic materials apical plug, as they set in moist environments and have excellent sealing properties [12-15].

Endodontic irrigation must be carried out with good control of the penetration depth of the cannula to avoid hypochlorite extrusion.

Another aspect of these resected teeth that show persistent pathology relates to another anatomical aspect, namely the missed canals. By omitting them, apical periodontitis develops, which will not be solved by surgical treatment and most definitely it is not an indication for it, but only by accessing that missed canal [16,17].

Unfortunately, sometimes resection of these teeth worsens their endodontic configuration. Thus, an eventual configuration of joining root canals, easier to deal with, will turn into one with separate foramina and open isthmuses, which are quite difficult to seal. It is the frequent case of the mesio-buccal root of maxillary molars, but also of the mandibular incisors.

CBCT is once again of great use, as it provides valuable and accurate information both for diagnostic purposes, especially for missed canals, but also for visualizing the type of horizontal section of the root and adapting the treatment plan accordingly [18-21].

## Conclusions

This method of endodontic reintervention after apical surgery offers a chance to teeth that would otherwise have no prospects of functionality.

The main indications refer to resected teeth with missed canals or those with unsatisfactory pre-existing root canal treatment, when a resurgery would be a failure, because it would not address the cause of persistent pathology.

Although more difficult to achieve, with the challenges posed by a large apical diameter and short root length, if the endodontic principles of treatment are strictly followed, evolution is one of long-term success.

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