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CASE REPORT

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Surgical endodontic treatment of maxillary incisors: Case report

Moazzy I. Almansour

Department of Restorative Dental Science, Collage of Dentistry, University of Ha'il, Saudi Arabia

Correspondence
Moazzy I. Almansour, Department of Restorative Dental Science, Collage of Dentistry, University of Ha'il, Hail, Saudi Arabia.
Email: m.almansour@uoh.edu.sa

Abstract

This study aims to highlight the possibility of an effective endodontic surgical surgery when nonsurgical treatment of the right maxillary anterior teeth has failed. One year after the apicoectomy, the periapical lesion has completely healed, new bone has formed, and the patient is symptom-free.

KEYWORDS

anterior region, apicoectomy, endodontic surgery, mineral trioxide aggregate

1 | INTRODUCTION

Conventional endodontic therapy seeks to clear the root canal system of microorganisms and provide strong barriers to prevent root recontamination.[1] The entire root canal system must be cleaned, shaped, and filled in order for endodontic therapy to be successful. The presence of persistent bacteria (permanent infection) or reinfection in a canal that has recently been cleaned and sanitized (secondary infection) is frequently linked to failure factors in traditional root canal therapy.[2]

Failures of endodontic treatment can be attributed to extraradicular infections like periapical actinomycosis,[3] foreign body reactions that can be brought on by the extrusion of endodontic material,[4] the buildup of endogenous cholesterol crystals in the apical tissues,[5] and unresolved cystic lesions.[6] Success thus depends on a variety of variables and is confirmed during follow-up through clinical and radiographic evaluations.[4,6]

Retreatment may be the first therapeutic option for teeth that have undergone conventional treatment but still have a persistent periapical lesion. Accidents during conventional treatment may have a negative impact on outcomes by promoting the development of infections in inaccessible apical locations and necessitating surgical intervention.[7,8]

Nonsurgical endodontic therapy of periapical lesions is a frequent and reliable course of treatment due to its high success rate.[9] Nevertheless, there are good reasons for endodontic surgery.[10] When endodontic surgery is required in the posterior region, it is frequently delayed in favor of tooth extraction, implant placement, or deliberate replantation of mandibular premolars and molars.[11] Endodontic surgery is typically performed without hesitation when it is indicated in the anterior region. Anatomical features such the maxillary sinus and mandibular canal, as well as the restricted access to this area of the oral cavity and the inexperience of the operator, may be reasons to forego endodontic treatment in the posterior region.[12,13]

Endodontic surgery should not be avoided when it is the only option for saving the tooth. The surgical procedure, as well as the many anatomical structures, must, nevertheless, be fully understood.[14] Cone-beam computed tomography aids in outcome prediction and obviates issues.[12] Many authors advise sealing the root-end cavity after an apicoectomy.[14–16] Although the root-end filling stops microleakage, additional skills are needed. The time and materials required to prepare the retrograde cavity and produce the retrofill must also be taken into account.

Endodontic surgery is a popular procedure that increases many teeth's retention survival percentage when

endodontic treatment alone is insufficient.[17] The purpose of this study is to emphasize the potential for a successful endodontic surgical procedure when nonsurgical treatment of the right maxillary anterior teeth has failed.

2 | CASE REPORT

For treatment of teeth #13–23, a general dentist sent a 39-year-old male patient to the Hail Dental Centre. The periapical region of #13, 12, 11, 21, 22, and 23 included a radiolucent lesion, which he discovered. Teeth #12 and 22 both had internal root resorption and apical external root resorption. The patient underwent a clinical examination, a medical history interview, a radiographic evaluation, which comprised a panoramic radiograph of the jaws and periapical radiographs of the teeth numbers 13, 12, 11, 21, and 23. (Figure 1A, B).

The diagnosis was follows: #13–23 necrotic pulp with asymptomatic chronic apical periodontitis, apical external root resorption in #12, 22, open apex in #12, 22, internal root resorption #12.

Treatment Plan were considered as follows: Option I: Extraction and implant. Option II: Long term calcium hydroxide then obturation after the apex gets closed. Option III: One visit apexification with MTA. Option IV: Obturation using customized and thermo-plasticized gutta-percha (ObturaII). Periapical surgery if there is no healing.

Under Rubber dam isolation, teeth #13, 12, 11, 21, 22, 23 were excavated from caries and accessed. During canal instrumentation using hand files, some pale yellowish fluid was continuously draining from the canals. The canals were irrigated with 2.5% sodium hypochlorite solution and medicated by non-setting calcium hydroxide paste for antimicrobial consideration; then the teeth were temporarily closed with glass ionomer cement.

At the second visit, chemo-mechanical debridement was completed in this visit. The master apical files (MAF) for teeth #12, 22 were #90 with no apical seat, and #80 in teeth #11, 21. However, the MAF in teeth #13, 23 were #60 with good apical constrictions.

Vertical compaction using heat carrying instrument (System B) was used for obturation #13 and 23. Customized gutta-percha were used in #12, 11, 21, and 22, in addition thermo-plasticized gutta-percha (Obtura II) was used for obturation of internal resorption in tooth #12 as shown in Figure 2.

Post-fabrication were started in the third visit, cementation of cast post and core using zinc phosphate cement for teeth #13–23 were done at fourth visit.

After follow-up for 6 weeks, sinus tracts in area #12, 22 were not subsided and slight pain on percussion had started. Because of the upper anterior teeth #13–23 needs surgical crown lengthening for restorative purposes, endodontic periapical surgery was planned at the same time.

Endodontic periapical surgery in conjunction with surgical crown lengthening were implemented for teeth #12, 11, 21, 22. Apicoectomy of 3 mm from the root apex and retrograde filling using MTA were performed as shown in Figure 3.

Patients were examined clinically and radiographically at intervals immediately after periapical surgery, 1 month later, 3 months later, 1 year, and 2 years. A dentist who was treating the patients at the time of the visit performed the clinical and radiographic evaluations.

3 | DISCUSSION

Endodontic surgery entails the excision of damaged periapical tissue in order to create the perfect conditions for tissue health, regeneration, and the formation of new tooth structural support.

When performed for the first time, endodontic surgery has a success rate of between 78 and 91%[17] but is less successful in retreatment situations where there is a periapical lesion.[7] From a purely pathological standpoint, when a periapical lesion presents as a radiolucent lesion on a radiograph, the clinicians are not aware of the histology condition of the lesion at the time of treatment. 10% of all periapical lesions also need surgery in addition to endodontic treatment. Additionally,

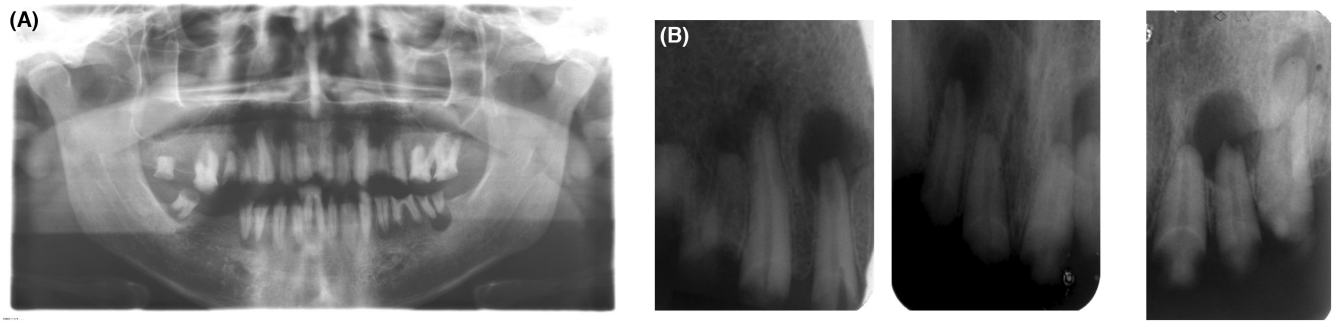

FIGURE 1 (A, B) Preoperative panoramic and periapical radiographs showed periapical lesion of maxillary anterior teeth.

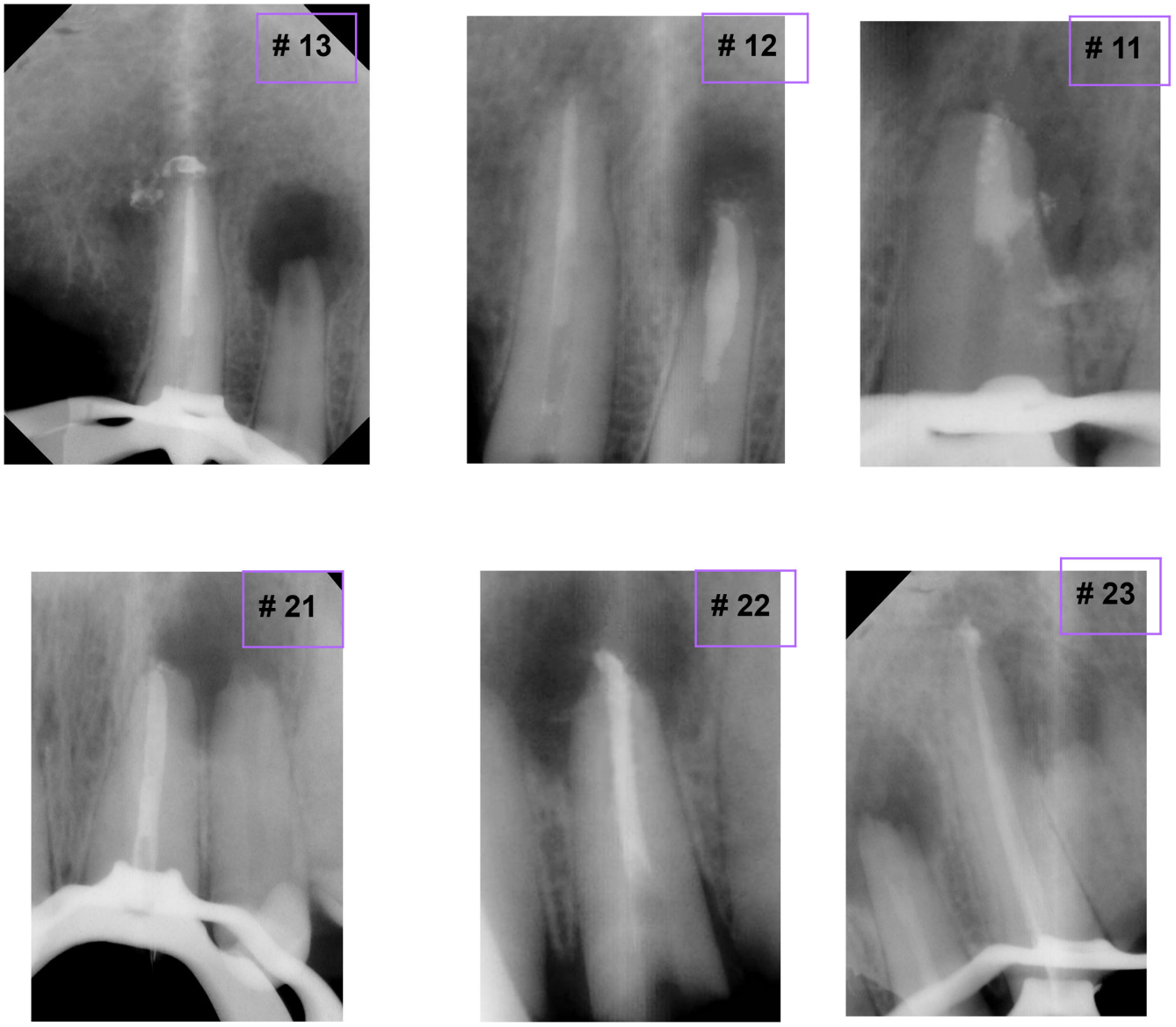

FIGURE 2 Periapical radiograph showed conventional root canal obturation with warm vertical compaction using heat carrying instrument (System B) for #13 and 23, Customized gutta-percha for #12, 11, 21, and 22 and thermo-plasticized gutta-percha (Obtura II) for #12.

surgical endodontics is the best option for treating failed re-treatment instances caused by apical transportation or procedural errors, particularly if they have post restorations. Furthermore, nonsurgical endodontic therapy cannot guarantee 100% success due to the complexity of the canal structure.

A leaky apical seal that allows the egress of bacteria and their poisons is the main cause of periapical lesions. Only the effect of the leaking is removed by periradicular curettage of the damaged periapical tissue. Therefore, if the root end is not resected, it is possible that the periradicular lesion will return after being removed. A 3-mm root-end amputation eliminates all lateral canals and apical ramifications, reducing the likelihood of reinfection and failure.

Due to its perfect characteristics, MTA was selected in this instance over other materials as a retrograde filler material. The capacity to boost the root strength of fragile plants, simple and moisture-free application, good seal, and biocompatibility were all important features. Additionally, over a longer period of time, fresh cementum was discovered on the material's surface.[18] MTA as the root-end filling material produced a high success rate in a two-year follow-up research.[19]

Bacterial infection is nearly always the primary cause of endodontic failures. Finding the source of the ongoing infection is the first step in managing a failing root canal filling.[20] As a result, orthograde retreatment may be the preferred course of treatment. The bacteria may be located within a previously missing or uninstrumented part

of a root canal, penetrating via a leaky coronal repair and root filling.

The growth of granulomatous tissue made up of lymphocytes, plasmocytes, some polymorphonuclear cells, macrophages, eosinophils, multinucleated giant cells, fibroblasts, and new capillaries causes periapical granulomas, which are chronic inflammatory processes that manifest as a lesion around the tooth's apex. They develop as a result of endodontic failures, infected root canals, or severe caries that affects the pulp.[21,22] Manual examination can show that root apices are fenestrated through the cortical plate, and cysts may have been present in this instance. After considering the patient's medical history, the effectiveness of the nonsurgical endodontic treatment, and the patient's participation, periapical surgery was started.

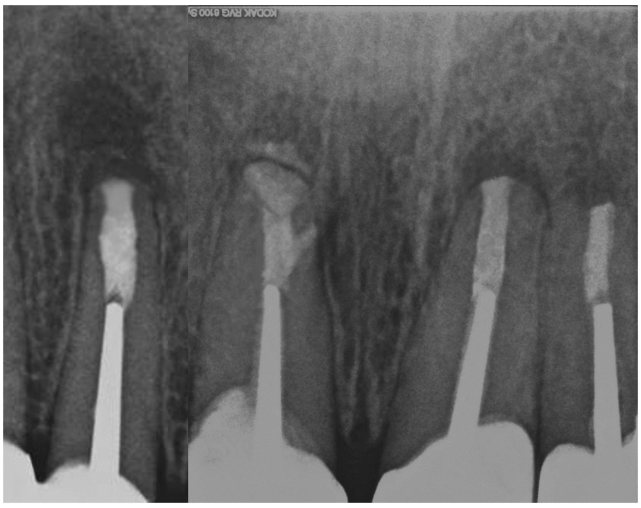

FIGURE 3 Periapical radiograph after surgery and MTA Placement.

Studies show that resecting the apical 3 mm and preparing the 3 mm root-end during periapical surgery reduces 98% of the apical ramifications and 93% of the lateral canals.[1,23] The essential shortcomings of the conventional rotary bur type of preparation were addressed in this work using the ultrasonic retro preparation approach.[24] This method substantially facilitated preparation perpendicular to the long axis of the root since the ultrasonic tip's size was lowered, making it simpler to insert into the crypt. The patient was advised to refrain from eating for at least the first 4 h after surgery since a radiograph taken 5 months after the procedure showed that the MTA decreases and solidifies as a hard structure in around 4 h in a humid environment.[25] One to 7 days after the reparative treatment is recommended for the placement of the final restoration.[26] This case describes how, after a year of follow-up, teeth with extensive periapical lesions and recurrent complaints might be treated with periapical surgery using MTA (Figure 4).

4 | CONCLUSION

When traditional endodontic therapy is found to be ineffective, the dentist must take alternative therapies into account. Nonsurgical retreatment is not an option for

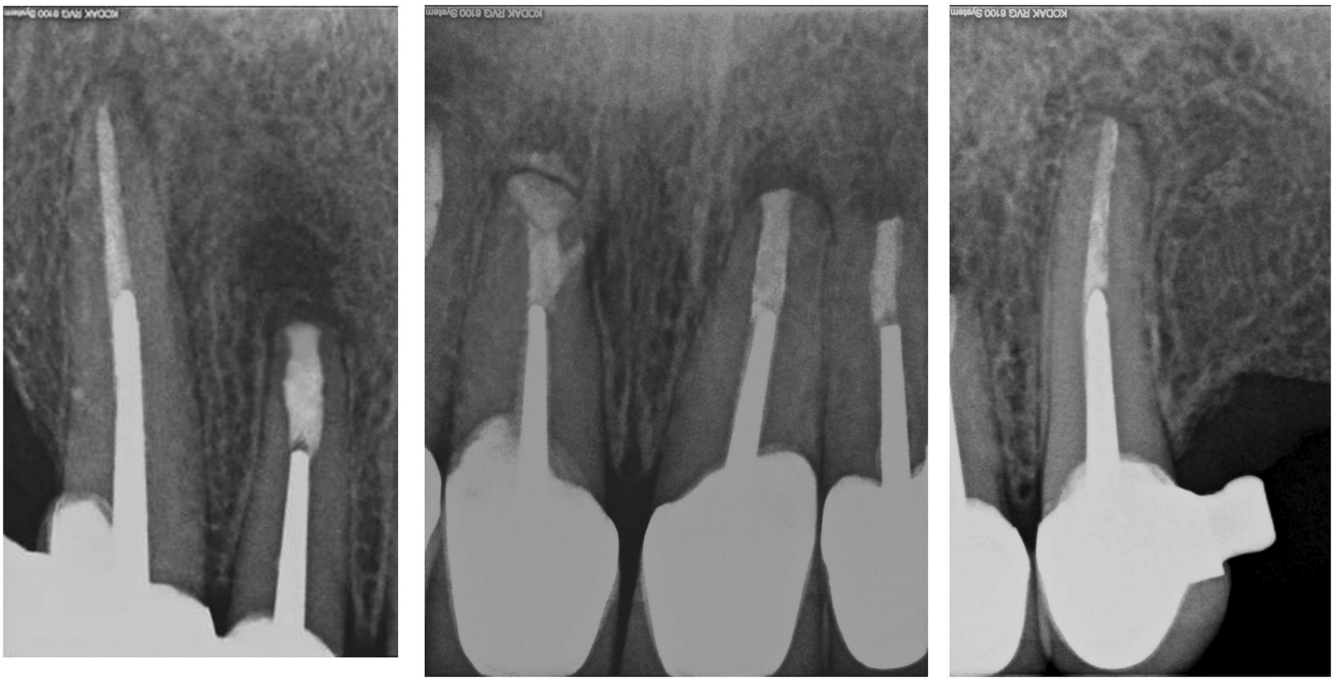

FIGURE 4 Periapical radiograph showed healing of periapical lesion of the of maxillary anterior teeth: 1 year after treatment.

all failures. Clinicians must balance risk and reward and understand that, on occasion, a patient may benefit from surgery or extraction. With the correct case selection and operator skill, periradicular surgery can be a predictable, economical option to tooth extraction and tooth replacement.

4.1 | Clinical Significance

Endodontic surgery can be used as a solution in situations where the standard endodontic therapy is inadequate. Materials- and surgical-related technologies are continually being improved upon in order to make them easier to use and increase success predictability.

AUTHOR CONTRIBUTION

The author listed is the sole author.

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None.

CONFLICT OF INTEREST

The author declares no conflict of interest.

DATA AVAILABILITY STATEMENT

The datasets generated and/or analyzed during the present study are not publicly available as ethics approval was granted on the basis that only the researchers involved in the study could access the identified data but are available and accessible from the corresponding author on reasonable request.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

ORCID

Moazzy I. Almansour https://orcid.org/0000-0003-0918-112X

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