Removal of metal post and core followed by endodontic retreatment and endodontic surgery of tooth with failed endodontic treatment

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ABSTRACT

Background: Dental elements can be maintained when the endocrine retreatment is adequately indicated. The growth of endodontic techniques and materials has minimized the indication of surgical procedures even for teeth with intracanal posts.

Case Presentation: A 34-year-old male patient related uncomfortable sensation and swelling under his upper lip associated with maxillary right central incisor tooth. After radiographic examination, the presence of a smoothly tapered post and an over-extended root canal filling associated with a periapical radiolucency and radiolucency on the distal part of the coronal third of the maxillary right central incisor tooth was discovered. The mesial margin of the crown did not fit well.

Conclusion: Understanding the patients, treatment- and tooth-related prognostic predictors can assist the clinicians in appropriate case selection for apical surgery against treatment alternatives.

Keywords: Metal endodontic post, endodontic retreatment, apicoectomy, retrofilling.

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Background

Teeth treated in conventional ways, which presents persistent periapical lesion, may have retreatment as the first therapeutic alternative. In particular, accidents during conventional treatment may have the negative effect over success, contributing to infection establishment in inaccessible apical areas, requiring surgical intervention [1,2]. Failure factors in root canal conventional treatment are frequently related to the presence of residual bacteria (persistent infection) or reinfection in a previously disinfected canal (secondary infection) [3]. Scientific evidence indicates that some factors may be associated with the unsatisfactory outcome of well-treated cases. They include microbial factors, comprising extraradicular and intraradicular infections, and intrinsic or extrinsic nonmicrobial factors [4].

Parendodontic surgery comprehends a set of procedures recommended in periapical diseases treatment when traditional endodontic therapy does not obtain favorable outcomes. Periapical surgery indications are root canal obliteration impeding endodontic instrumentation access to the apical region; endodontic material apical extrusion impeding radiolucent lesions repair and/or causing clinical symptoms; unsuccessful endodontic treatment and retreatment impossibility due to prothesis; and root perforation impeding root canal hermetic sealing. We present a case of periapical lesion removal and the third apical sealing to allow soft and hard tissue regeneration [5].

Case Presentation

A 34-year-old male patient was referred to the Department of Conservative Dentistry and Endodontics with pain and labial swelling in the upper anterior region. A patient gave a history of trauma to front teeth more than 11 years ago. At that time, the maxillary right and left central incisors had root canal treatment followed by placement of post crowns. The maxillary right lateral incisor was missing, and space was closed by movement of right maxillary canine. The patient complained of uncomfortable sensation and swelling under his upper lip associated with maxillary right central incisor.

His medical history was noncontributory. In clinical examination, the oral hygiene and general periodontal status were fair, and soft tissue revealed a firm labial swelling over maxillary right central incisor. The maxillary central incisors were restored with the metalo-ceramic crown. Radiographic examination revealed that the maxillary right central incisor had an over extended root canal filling associated with a periapical radiolucency and it was radiolucent under the mesial crown. Periapical review was shown in Figure 1. The radiograph showed a presence of smoothly tapered posts in maxillary central incisors. The patient was instructed regarding the risks inherent to the technique of intraradicular post and core removal and the possible failure in endodontic retreatment due to anatomical and bacterial problems within root canals, or diverse

causes. Moreover, the probability of a new para endodontic surgery still existed. The patient decided to undergo the aforementioned treatment, as his first choice, before an osseointegrated dental implant.

Treatment was initiated by removal of the crown and intraradicular post and cores by using the ultrasonic tip with Ruddl of the maxillary right central incisor (Figures 2 and 3). The next step was re-do root canal treatment. Gutta-percha points and endodontic cement was easily removed (utilizing Gates Glidden drills, and hand instrumentation with Hedstrom files), since they present a soft consistence and lack of condensation. There were no exudates from the canals. Instrumentation was performed by Flexo-File (Dentsply, Maillefer, Switzerland) #15–40, using step-back technique. The irrigant (2.5% sodium hypochlorite) was delivered carefully and passively. After chemomechanical preparation of root canal system, the canal was dried with absorbent paper points and filled with non-setting calcium hydroxide paste (Metapex, Meta Biomed Co. Ltd., Chungcheongbuk-do, South Korea) was dispensed into the canal. Access cavity was sealed with the cavity (Cavit W, 3M ESPE, Germany). A second appointment was scheduled for the subsequent week; the root canal systems of maxillary right central incisor were obturated with Roth's 801 sealer and warm lateral condensed gutta-percha with formed cones (Figure 4). The temporary post crown was cemented with TempBond™ (Figure 5). During the post-operative follow up, the patient reported the same sensation, and the tooth was tender to percussion

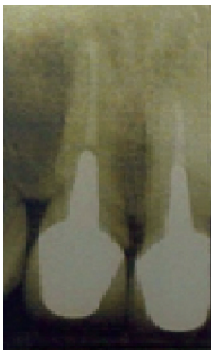


Figure 1. *Periapical radiograph shows an over extended root canal filling associated with a periapical radiolucency.*

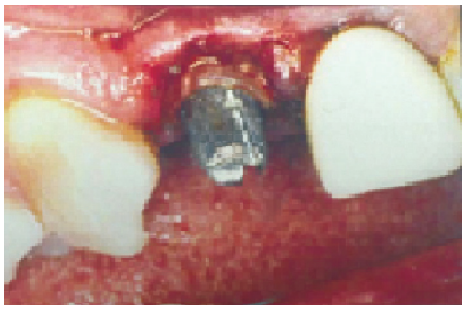


Figure 2. *The crown was sectioned and removed.*



Figure 3. *Post removal using the Ruddel system.*

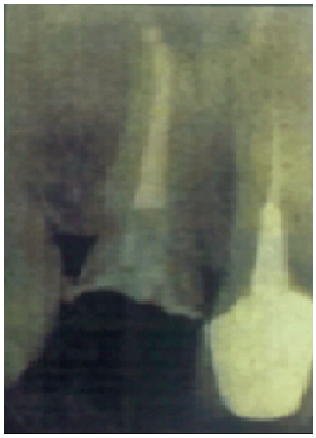


Figure 4. *Post operative radiograph after treatment.*



Figure 5. *Temporary post crown.*

(presence of pathological inflammation involving the periodontal ligament).

To perform the surgical procedure, supraperiosteral and subperiosteal anesthetic techniques were adopted. Under local anesthesia lidocaine, 2% with 1:80,000 epinephrine (Xylocaine; Dentsply, OK), full-thickness mucoperiosteal flaps were raised in the area of a maxillary right central incisor with the vertical incision from the distal of the right maxillary canine to the distal of the maxillary left central incisor. On the reflection of the flap, there was a defect in the cortical plate associated with the apex of the root. The tissue in the defect was removed by curettage and sent for histological examination to the Department of Oral Pathology (Figure 6). Hemostasis was obtained with the assistance of sterile compresses impregnated with ferric sulfate (Astringedent; Ultradent Products, South Jordan, UT). The apical 3 mm of the root was resected. The retrograde cavity was prepared with CT 5 ultrasonic tip (Hu Friedy, Chicago, IL). The retro preparation was performed in the long axis of the root using ultrasonic inserts (Apical Surgery set; Satelec, Mérignac, France) to a depth of 3–4 mm (Figure 7).

The prepared cavity was dried with sterile paper points and re-inspected to verify that the canal walls were free of debris. The retrograde cavity was filled with Super ethoxy benzoic acid (EBA) (a reinforced zinc oxide cement; its liquid contains 32% eugenol and 68% ethoxy benzoic acid). The filling was smoothed with a fine grit diamond-finishing bur. The flap was sutured with ETHILON 5-0 sutures. The material was then inserted into the cavity and compacted with a condenser. A series of increments was introduced into the canal and packed to fill the cavity. Radiographs were taken immediately after the operation to check the quality of the obturation (Figure 8). The flap was sutured with a resorbable Vicryl 4/O suture (Figure 9).

The patient was given post-surgery guidelines for care and prescriptions for analgesics. Review appointment was scheduled after one week for suture removal and soft tissue healing assessment. At the review appointment a week later (Figure 10), the patient reported no problem, and on examination, the soft tissues appeared to be healing well (Figure 11). The sutures were removed, and the histopathological examination of the biopsied tissue had shown the lesion to be a periapical granuloma.

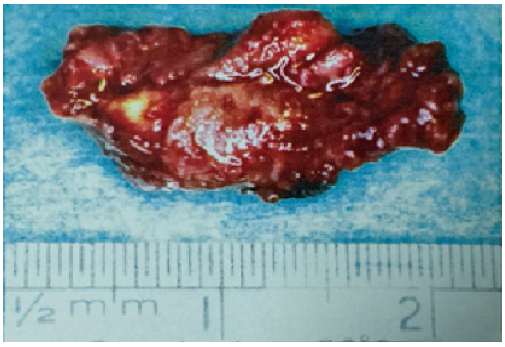


Figure 6. *The tissue in the defect area.*



Figure 7. *The retrograde cavity.*



Figure 8. *Satisfactory retrograde fill.*

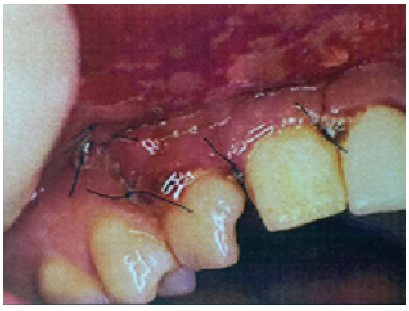


Figure 9. *Flap designs, suture technique, and soft tissue management.*



Figure 10. *Reduction in the size of the lesion.*



Figure 11. *Post surgical treatment.*

Discussion

The etiology of periapical (periradicular) periodontitis is microbial: intra-radicular microorganisms induce an inflammatory and immune response within the periradicular tissues, resulting in bone destruction [6]. Contamination of the periradicular tissues by microorganisms and root-filling materials may compromise healing [7].

A mandatory requirement of root canal therapy is that the obturation and restoration of the tooth must seal the root canals both apically and coronally to prevent leakage and percolation of oral fluids and to limit recontamination of disinfected canals. Surgical endodontics is indicated to obtain an apical seal. Apicoectomy (apicectomy/root-end resection) with retrograde obturation is a widely applied procedure in endodontics when all efforts for the successful completion of orthograde endodontic therapy have failed [8]. Apicoectomies were performed in lingo-buccal bevel in a 45-degree related to tooth long axis. This procedure could decrease the crown–root ratio and also increase the apical leakage, due to the permeability of the dentinal tubules that are more exposed by the bevel angle [9], but a beveled resected root is necessary for good visibility. Ultrasonic instruments are used for the class I cavity preparation.

Surgical endodontics is a good method for the treatment of teeth with periapical lesions that do not react to conventional root canal treatment or when orthograde treatment is not feasible [10]. A wide range of success rates for surgical endodontics has been reported (44%–95%) [11]. Systematic reviews compare the outcome of non-surgical root canal retreatment and surgical endodontics [12,13]. The data from this limited evidence suggest that although surgery may offer a more favorable outcome in the short term, non-surgical retreatment offers a more favorable long-term outcome [12,13].

A retrograde filling is necessary to fill the apical canal space and to obtain a three-dimensional seal between the periodontium and root canal system. In this clinical case, the chosen treatment was apicoectomy with curettage and planning, because it was found that the filling was well compacted, and then it was chosen to apply retrograde filling (Super EBA).

Super-EBA was developed in the 1960s; it was originally manufactured by Staines in England. Super EBA shows high compressive strength, high tensile strength, and neutral pH and low solubility. A comparative study of the solubility of some root-end filling materials done by Poggio et al. [14] in 2007 showed that intermediate restorative material, Super-EBA, and mdineral trioxide aggregate showed no signs of solubility in water. Reinforced zinc oxide-eugenol cement (Super EBA) has become an alternative to amalgam, and it is accepted as an effective root-end filling material.

It has also been shown to have good sealing characteristics. An *in vitro* microleakage study done by Yaccino et al. [15] in 1999 suggested that fast set or regular set super-EBA used in various consistencies may be acceptable as root-end fillings. It adheres well to tooth structure even in moist conditions. Reports show a good healing response to super-EBA with minimal chronic inflammation at the root apex. But super-EBA is radiolucent and technique sensitive. The eugenol content of super-EBA may be a source of irritation to the tissues [14].

Conclusion

Understanding the patient-, treatment-, and tooth-related prognostic predictors can help the clinicians in appropriate case selection for apical surgery against treatment alternatives. These factors should be considered in the process of decision making. Apical surgery is the option to save a tooth with apical pathology that cannot be managed by conventional, non-surgical endodontics.

Acknowledgement
None

List of abbreviations
EBA Ethoxy benzoic acid

Consent for publication
Informed consent has been obtained from the patient to publish this case report in a medical journal.

Ethical approval
Ethical approval is not required at our institution for publication of a case report in a medical journal.

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Summary of the case

Patient (gender, age)	1	Male, 34 years
Final Diagnosis	2	Acute apical abscess
Symptoms	3	Pain and labial swelling in the upper anterior region
Medications	4	None
Clinical Procedure	5	Treatment was initiated by removal of the crown and intraradicular post and cores by using of ultrasonic tip with Ruddl® of the maxillary right central incisor
Specialty	6	Endodontics