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Non-Surgical Endodontic Retreatment after Unsuccessful Apicectomy: A Case Report

SUMMARY

***Introduction*:** *Endodontic failure may arise mainly from persistent intra-radicular infection from remaining bacteria in the root canal. As a result, retreatment is the most appropriate way of dealing with failed cases. However, many clinicians choose to perform periapical surgery, on the grounds that it is simpler and has immediate results. The resected teeth with insufficient root canal treatment may fail again. In this case, orthograde retreatment can have favourable results. The aim of the present study was to describe a case, where an orthograde retreatment was applied in symptomatic upper premolars that had already resected.*

***Methods*:** *This case report describes the orthograde retreatment of upper premolars after unsuccessful apicectomy. A 32-year old female patient presented complaining of extra-oral fistula and intra-oral swelling associated with the upper left premolars. Radiographic examination showed that the premolars had received inadequate endodontic treatment and presented periapical radiolucency. An orthograde retreatment was performed in both of them.*

***Results*:** *After 15 days, the teeth were asymptomatic and the intra-oral swelling had disappeared. In addition, no exudate was found in the root canals and the extra-oral fistula was no more active. At a 3-year recall the region appeared normal.*

***Conclusions*:** *Orthograde retreatment is a treatment option in teeth with unsuccessful apicectomy and poor endodontic treatment.*

Keywords: Orthograde Retreatment; Apicectomy, unsuccessful

N. Economides, T. Vouzara

Aristotle University, Dental School
Department of Endodontology
Thessaloniki, Greece

CASE REPORT (CR)
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Introduction

Root canal treatment is an effective way of tooth preservation. Success rate of initial endodontic treatment has been found to reach even 97%[1]. Yet, endodontic failures are not uncommon in daily dental practice. Endodontically treated teeth may fail mainly because of intra-radicular or extra-radicular infection[2]. Another reason for failure, which cannot be related to microorganisms, is foreign-body reaction[2].

Intra-radicular infection is the most common cause for endodontic failure[2]. It can occur due to insufficient root canal cleaning and persistence of bacteria at the time of root filling[3], or due to re-infection caused by coronal leakage[4]. The most frequent microorganism, isolated in failed cases is *Enterococcus faecalis*, which is a species scarcely found in untreated root canals[5]. It is suggested that *E. faecalis* is inserted into the canal during root canal treatment[3,6,7]. In addition, *E. faecalis* can withstand intra-canal medication, even calcium hydroxide[8] and luck of symbiotic bacteria[3,9]. Therefore it is difficult to be eradicated after its settlement in the canal[2,3]. As far as coronal leakage is concerned, it can be attributed to coronal decay, tooth fracture, restoration fracture, restoration loss and late replacement of the temporary restoration by the permanent one[2,10].

A low percentage of endodontic failures happen because of extra-radicular infection[2]. Extra-radicular infection derives from bacteria that have entered periapical tissues and evaded host defence mechanisms[2]. The presence of these microorganisms cannot be detected

by the clinician or eliminated by intra-canal medicaments, as they are situated away from the apex[2].

In case of failure of the primary endodontic treatment, there are 2 possible choices: non-surgical retreatment or peri-radicular surgery. Sometimes, periapical surgery is preferred owing to the fact that it seems to be a simpler and quicker solution compared with retreatment. Unlike surgery, retreatment may involve a considerable difficulty in removing the coronal restoration or regaining access to the apex. As a consequence, many clinicians decide to perform an apicectomy instead of a retreatment. However, a number of cases have been reported in the literature, where endodontic failures after being treated by peri-radicular surgery, failed again and the problem was resolved by non-surgical retreatment of the resected teeth[11-16]. These cases strengthen the generally accepted aspect that endodontic failure results mainly from remaining bacteria in the root canal[2]. Thus, the efficient disinfection of the root canal with orthograde retreatment is a prerequisite for healing[2].

The following case report aims to present a case where a secondary orthograde treatment was performed in infected upper premolars that had been previously treated by apicectomy and retrofilled with amalgam.

Case Report

A 32-year-old female patient presented complaining of persistent extra-oral fistula and episodic intra-oral swelling in the area of her maxillary first and second left premolars. The patient's medical history did not reveal anything remarkable. The patient also reported that endodontic therapies had been performed in her first and second premolars by a general practitioner 5 years ago. Nevertheless, episodic pain and intra-oral swelling made her to visit her dentist a year later. He suggested her to undergo an apicectomy in order to cure the periapical disease. After the periapical surgery, teeth remained asymptomatic for 4 years. When the symptoms returned, the patient was referred to the endodontist.

Clinical examination showed an active extra-oral fistula corresponding with the area of upper left premolars and an intra-oral swelling apically to the premolars. Moreover, both teeth were tender to percussion. Radiographic examination revealed that there was a periapical radiolucency associated with the previously resected and retrofilled with amalgam apices of upper premolars. The quality of the initial endodontic treatments was poor (Fig. 1). The absence of sufficient intra-canal endodontic treatment in both teeth led to the decision of performing an orthograde retreatment in the both. Besides, the roots had already been shortened due to the previous apicectomy and the periodontal condition was not favourable so as to support a further periapical surgery.

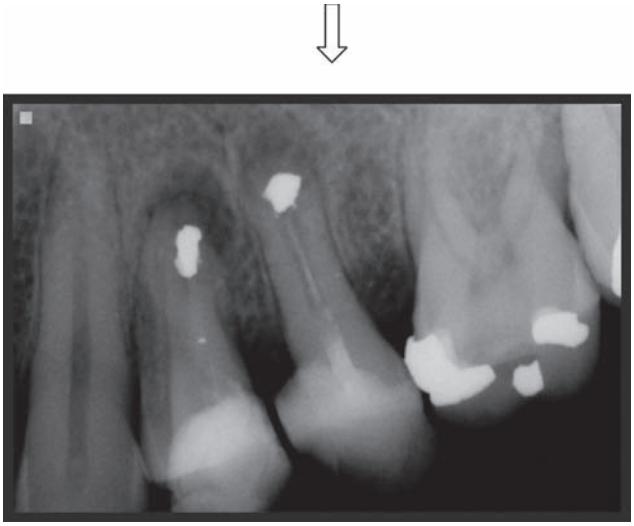

Figure 1. The maxillary left premolars present poor endodontic treatments and periapical radiolucencies, while their apexes have received apicectomied had been retro-filled with amalgam.

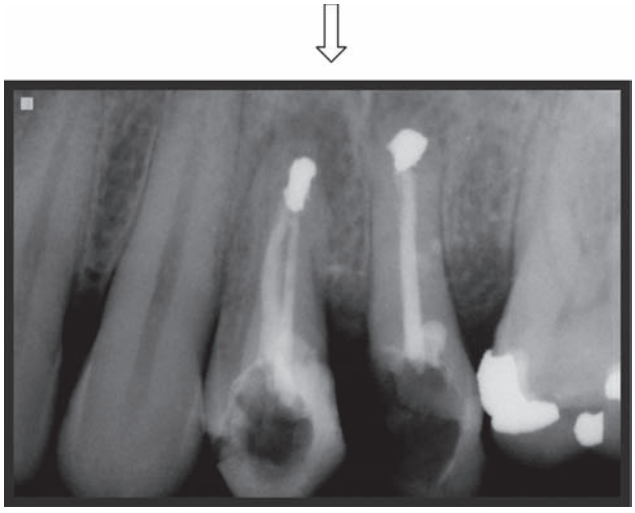

Figure 2. Radiographic appearance of premolars after the orthograde retreatment and the root canal obturation

A rubber dam was used to isolate the premolars. The coronal restorations of the premolars were removed so as the gutta-percha fillings to be exposed. The gutta-percha filling material was debrided with Gates-glidden burs, K-files and ProTaper micro-instruments by using a crown-down technique. The same equipment was used in the mechanical preparation of the palatal and buccal canal of the first premolar. As irrigation solutions, 2.5% NaOCl and 15% EDTA were used. During instrumentation, careful manipulation of micro-instruments averted the extrusion of amalgam retrofill into periapical tissues.

When chemo-mechanical preparation was completed and root canal cleanliness ensured for both teeth, the canals were dried with paper points and filled with $Ca(OH)_2$ paste by using a Lentulo-spiral paste filler. The access cavities were temporarily sealed with cotton pellets and zinc oxide eugenol temporary filling material. Finally, the patient was rescheduled for a next appointment.

After 15 days, the teeth were asymptomatic and the intra-oral swelling had disappeared. In addition, no exudate was found in the root canals and the extra-oral fistula was no more active. Thereby, root canals were obturated with gutta-percha and AH26 root canal sealer by using a lateral condensation technique (Fig. 2). The crowns were sealed with resin. At a 3-year recall there was a complete bone healing (Fig. 3) and the teeth had been permanently restored by fixed prosthodontics, and were in normal function.

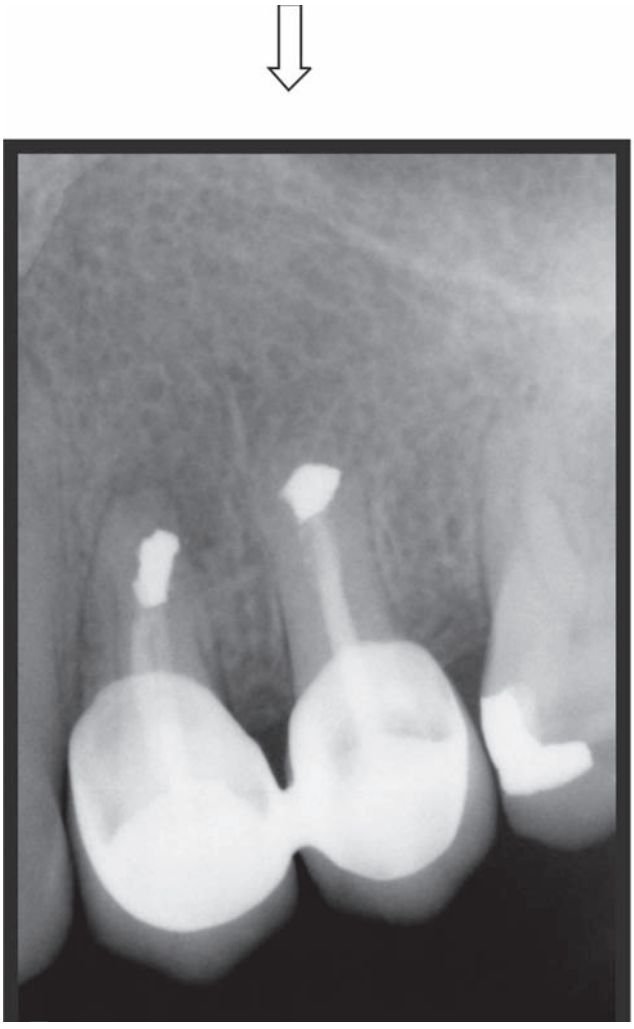

Figure 3. At a three-year recall the bone healing has almost been completed

Discussion

Generally, the success rate of retreatment is considered to be lower than the success rate of primary endodontic treatment[17]. Yet, it is also deemed that if access to the apical foramen is not inhibited by canal blocks, retreatment can have a similar result with primary endodontic treatment[17]. More specifically, the outcome of secondary endodontic treatment has been reported to be successful in 74-77% of cases[3,17]. Negative prognostic factors are the pre-existence of a periapical lesion, the quality of previous treatment[17,18], the quality of the coronal restoration[17] and the occurrence of iatrogenic errors[18]. Positive prognostic factor is the use of sophisticated equipment, like a dental operative microscope[18].

Furthermore, the success rate of periapical surgery fluctuates between 40% and 92.5% according to the results of several studies[18-21]. The outcome of endodontic surgery is negatively affected by the size of the lesion[18], whereas it is enhanced by the use of modern instruments and materials, such as dental operative microscope, ultrasonic and MTA[18]. On top of that, endodontic surgery has better results in cases where a non-surgical retreatment precedes than in cases where periapical surgery is the first choice [18]. Moreover, re-surgery presents lower success rate than the first-time surgery[18,22].

Although it is speculated that periapical surgery may have higher initial success rate compared with retreatment, this result is reversed during the elapse of time. It means that periapical surgery is more successful than retreatment on the short-term (1-4 years follow-up)[18,21], whilst retreatment is equally[21] or more successful[18] than periapical surgery on the long-term (>4 years follow-up). This could be explained by the fact that retreatment is a conservative way of treatment, which needs more time to cause healing than periapical surgery does, or by the assumption that lesions may relapse a long time after surgery[21].

It was previously mentioned that intra-radicular infection is responsible for the majority of endodontic failures[2]. Taking into consideration that intra-radicular infection is caused by remaining bacteria in the root canal, it can be inferred that the first choice should be the non-surgical retreatment[2,21]. Certainly, there is a low possibility that failure may occur because of extra-radicular infection[2]. In this case, the suggested treatment is periapical surgery, as intra-canal medication cannot be effective[2,21]. Nonetheless, extra-radicular infection cannot be diagnosed without the means of surgery[2]. Thus, taking into account that intra-radicular infection is the most common cause for failure and extra-radicular infection cannot be easily detected, it is proposed that clinicians ought to begin with retreatment in case of an endodontic failure[2]. Periapical surgery should be implemented when retreatment fails, primary treatment or retreatment cannot

be performed, retreatment has unfavourable prognosis, and a biopsy is necessary[2].

The present case report describes a case of upper premolars with failed periapical surgery, which were successfully treated with orthograde retreatment. To the authors' best knowledge, several similar cases have been published during the last 30 years[11-16]. Kleier[11] reported a non-surgical retreatment of maxillary central incisors, which had been previously resected and retrofilled with amalgam. The case was considered to be successful, though the follow-up period was short (18 months). Chalfin et al[12] stated 3 cases where periapical surgery was not successful, because undiscovered root canals had caused endodontic failure. Retreatment, which included the previously undetected canals, was the treatment of choice in this case. Recall time was soon in this case as well (6-12 months).

The importance of apical stop in the success of endodontic retreatment was pointed out by Fava in 2001[13]. A maxillary premolar which had already undergone 2 conservative and 2 surgical failures was cured with non-surgical retreatment and calcium hydroxide apexification. Calcium hydroxide was used not only to disinfect the root canal, but also in order to promote the formation of an apical barrier before the final root canal obturation. This procedure targeted to fix the open apex, exposed dentinal tubules and root resorption caused by periapical surgery. A sufficient recall period (>2 years) ensured the success of this case. Similarly, Sedgley and Wagner[14] mentioned the orthograde retreatment and apexification of the mesial canals of a mandibular molar, which had formerly received unsuccessful endodontic treatment, retreatment and apicectomy. Review time was adequate in this case, too (5 years).

Caliskan[15] retreated 90 failed teeth with periapical radiolucencies. 11 teeth had received periapical surgery in the past and 5 of them were submitted in an apexification procedure. 5 cases out of 11 presented complete healing, and 2 out of 11 showed partial healing after 8-20 months. Finally, Kusgoz et al[16] described a case where an orthograde retreatment was performed in a mandibular lateral incisor, which had earlier been resected. The tooth did not respond to conventional intra-canal medication with calcium hydroxide and needed to be treated with an intra-canal triple antibiotic paste. What is more, MTA was used to obdurate the apical part of the canal in order to eliminate the possibility of extrusion of the filling material through the resected apex. A 30-month follow-up time interval confirmed the success of the case.

In the present case, there was clear evidence that intra-canal infection was the reason for failure, as both premolars had received inadequate initial treatment. Consequently, orthograde retreatment was thought to be the treatment of choice. The appliance of strict endodontic protocol safeguarded the efficient disinfection of the root canals. In addition, the radiographic assessment showed that the quality of the retrograde filling was satisfying and therefore it was decided that it could be retained in the root apexes and used as an apical barrier for the orthograde filling material. This element is crucial for the success of orthograde retreatment, as it creates an apical stop and ensures that the instrumentation and obturation do not exceed the working length. It should be added that a 3-year follow-up is believed to be a safe time period regarding evaluation of the success of the case.

It is obvious that if peri-radicular surgery is performed instead of retreatment, while there is solid evidence of intra-radicular infection, unfavourable results are expected. On the contrary, surgically treated cases that fail because of persistent bacteria in the root canal can be successfully treated by non-surgical retreatment. However, Ricucci and Siqueira[23] reported a case where endodontic treatment, apicectomy and orthograde retreatment did not manage to cure the responsible teeth due to complex root canal anatomy. Eventually, a second peri-radicular surgery after the orthograde retreatment promoted healing. Hence, considerable preservations are expressed whether a sole orthograde retreatment after failed apicectomy can always be effective. It is claimed that in cases with intricate root canal anatomy, non-surgical retreatment may need to be combined with a further surgical treatment in order to be successful[23]. Besides, retreatment can improve the outcome of the following peri-radicular surgery[18,23].

Conclusions

Orthograde retreatment can be an efficient therapeutic option in case of failed peri-radicular surgery, provoked by remaining intra-canal microorganisms. Nevertheless, careful case selection should take place before the final decision.

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Correspondence and request for offprints to:

Economides Nicolaos
Aristotle University
Dental School
Department of Endodontology
Thessaloniki, Greece