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Abstract

The purpose of this article was to illustrate an alternative approach to non-surgical management of teeth with failed surgical retreatment. The patient presented with complaint of severe pain after endodontic treatment of the maxillary right lateral and central incisors, which has not been reduced by periradicular surgery. Radiographic examination revealed the poor quality of both the endodontic and amalgam root-end fillings, which were associated with periapical lesions. Non-surgical endodontic retreatment was performed while the root-end amalgams were left. The case was considered as open-apex teeth; therefore, MTA plugs were placed to ensure obtaining a hermetic seal. Follow-ups of 6 years post-procedure revealed clinical disappearance of the symptoms, and radiographs established complete healing of the lesions without removing the root-end amalgams. The treatment was successful in this case, while avoiding re-surgery has led to preserving root length. Nonsurgical endodontic retreatment may provide an alternative to the more complicated option of re-surgical treatment.

Keywords: Case report, Endodontic retreatment, Endodontic surgery, Mineral trioxide aggregate, Oral surgery

Introduction

Although extraction and implant replacement has increasingly become more popular than surgical and nonsurgical endodontic retreatment of a failed root canal therapy (RCT),(1) maintenance of natural dentition in a healthy condition remains the prime concern in dentistry.(2) Microorganisms and their by-products in the root canal system result in apical periodontitis. Therefore, the success of RCT relies on appropriate cleaning, shaping and sealing the root canal system. However, RCT sometimes fails to provide success; in such cases, nonsurgical endodontic retreatment should be the first option and, when appropriate, followed by endodontic surgery.(3) Consequently, before performing endodontic surgery, the etiologic factors of failure should be identified to focus the treatment, and neutralise or eliminate

them.(4) The indispensable goal of endodontic surgery is to ensure adequate sealing of the contents within the canal, preventing later egress of bacteria and endotoxin into the periradicular tissues.(5)

Torabinejad et al. performed a systematic review to compare the outcomes of nonsurgical and surgical endodontic retreatment. They concluded that while endodontic surgery offers more favorable initial success, nonsurgical retreatment provides a superior long-term outcome which improved with increasing recall time.(6) Kvist and Reit explained the situation by late failures in surgically treated teeth as well as slower healing dynamics in non-surgically retreated teeth.(7) It should always be kept in mind that a surgical approach to a poorly filled root requires orthograde filling prior to surgery, anyhow. Furthermore, the treated root becomes shorter after endodontic surgery, and re-surgery is not usually recommended.

Retreatment of a symptomatic tooth with a retrograde amalgam is considered a challenge in endodontics.(2) Although amalgam has been widely used as a root-end filling material for many years,(8) its marginal adaptation and biocompatibility have been highly questionable since other biomaterials have proved to be better alternatives.(9) It has been demonstrated that amalgam does not offer a perfect apical barrier against the encroachment of fluids or microorganisms (10) in addition to its relative cytotoxicity.(8)

With introduction of biocompatible materials, currently, the preferred materials for root-end filling are the ones that promote tissue regeneration, such as mineral trioxide aggregate (MTA) which has proved successful as a root-end filling material.(9, 11)

This article suggests a new approach to retreating teeth that have failed RCTs and surgical retreatments with retrograde amalgam fillings and reports a patient whose failed endodontic surgery was successfully managed with non-surgical endodontic retreatment using MTA apical plug without removing the retrograde amalgam.

Case Report(s)

A 38-year-old woman presented for evaluation of maxillary right central and lateral incisors. Her medical status was noncontributory. The patient presented with

episodes of severe pain. RCT had been performed on the teeth by a general practitioner (Figure 1-A), who performed surgical retreatment shortly afterwards because of the symptoms.

Clinical examination revealed that the maxillary right central and lateral incisors were severely sensitive to percussion and were associated with class I mobility. Intra-oral radiographic examination revealed a diffused radiolucency surrounding the resected root ends (Figure 1-B). Both previous RCTs and surgical attempt appeared to not be within acceptable standards and radiographically visible defects were noticed.

The diagnosis was apical periodontitis, and based on the clinical and radiographic findings, the pathological condition was considered to be a result of poor-quality endodontic (re)treatments. Therefore, restoration removal and nonsurgical endodontic retreatment was decided to be performed. The patient agreed with the treatment plan and informed consent was signed by her. Following isolation, a crown remover was used to remove the previous crowns, afterward the root canal filling materials were removed by Gates-Glidden (Dentsply Tulsa Dental, Switzerland) and Hedström files (Dentsply Maillefer, Ballaigues, Switzerland). During instrumentation, the canal was irrigated with copious amount of 5.25% sodium hypochlorite. The procedure was repeated until no intra-canal filling material was visible. The reverse-filled amalgam was left untouched.

Then, a periapical radiograph was taken to validate complete removal of endodontic filling materials. The root canal system was subsequently obturated with ≈4 mm apical plug of Root MTA (Salamifar, Tehran, Iran) and a post space was left. Postoperative radiograph shows uniform radiopacity of the MTA (Figure 1-C). A sterile cotton pellet moistened with distilled water was inserted and the access cavity was sealed temporarily with Cavit (3M ESPE, Seefeld, Germany).

The patient was visited after one week and reported cessation of the symptoms. She was referred to a prosthodontist for crown restoration. Clinical and radiographic examinations at 6 years revealed no sign/symptoms of infection/inflammation and the tooth fulfilled the normal function.

Figure 1-D shows the periapical radiograph which reveals complete periradicular healing in presence of amalgam root-end fillings.

Discussion

Many authors agree that endodontic retreatment should be the first option when signs and symptoms of periapical pathoses seem to have an intra-canal

origin;(3, 12) endodontic surgery would be recommended only if the endodontic retreatment has failed or is impossible.(12) The success of periradicular (re)surgery depends, in part, on the root-end filling material.(13) Researchers have demonstrated that whereas root-end amalgam filling may be successful on a short-term basis, its long-term prognosis may not be as favorable.(14) In the presented case, the patient had previously undergone an endodontic surgery and the root-end was poorly filled by amalgam, and consequently, the periapical lesion persisted. Although the root-end filling material was amalgam, it has been decided to leave it untouched in the first place, unless the non-surgical endodontic retreatment would fail. The rationale was that poor endodontic treatment contributed to bacterial colonisation which could possibly be treated by mere endodontic retreatment. Besides being less invasive and more comfortable to the patient, the treatment plan had the additional advantage of root length preservation. Moreover, re-surgical attempts amplify the chance of scarring and loss of the local blood supply.(2)

The egress of bacteria and their byproducts into the periradicular tissues results in irritation of tissues and prevents healing. Root-end filling materials should then eradicate any remnants of bacteria and seal the root canal.(5) Insufficient apical seal has been suggested as a major cause of endodontic surgical failure.(15) Today, MTA is the biomaterial of choice for root-end filling; it was introduced to endodontics with the intention of creating an effective seal between the root canal system and the periradicular tissues.(16) Compared with other root-end filling materials, MTA have shown less leakage (17) as well as excellent biocompatibility (18-19) and periradicular healing.(9, 11) MTA can also create an apical plug.(20) The present case was considered as an open-apex tooth because the wide apical portion of the root resembled that of teeth with open apices; however, previous amalgam root end fillings provided a matrix. The MTA plug was placed to create a hermetic seal.

Another interesting aspect of MTA is that it can increase the pH of the environment to 12.5.(21) Studies have shown that in a high pH, the calcium ions released from MTA form hydroxyapatite.(22-24) This quality may explain the favorable sealing ability and biocompatibility of MTA. The alkaline environment may also help eradicating *Enterococcus Faecalis* which is a persistent organism that plays a major role in the etiology of persistent periradicular lesions after RCT. Even the most resistant species of microorganisms such as *E. Faecalis* have been shown to survive only limited periods of time in a high pH. (25).

Conclusion

The main goal of all endodontic treatments, whether surgical or non-surgical, is to eradicate bacteria and their byproducts from the root canal system, and to create a hermetic seal between the canal and the periradicular tissues. In this case, a failed surgical retreatment was successfully managed by orthograde non-surgical retreatment of the teeth with MTA apical plug.

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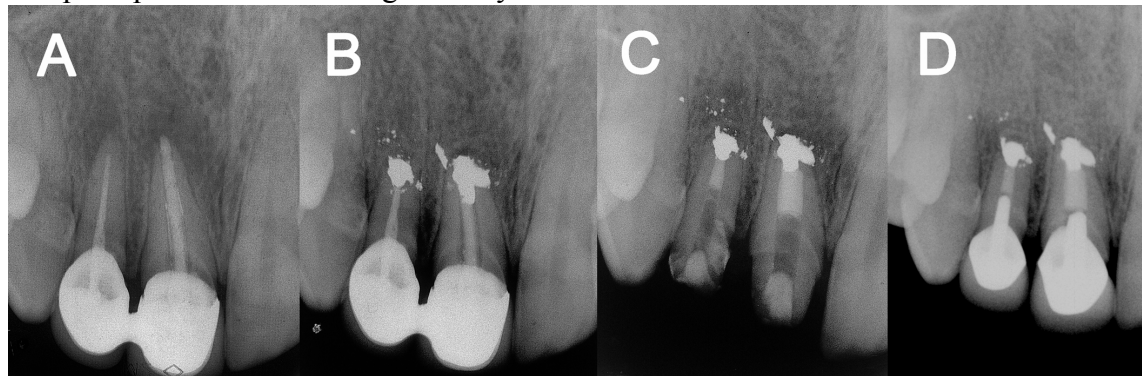
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Illustrations

Illustration 1

Figure 1

A) Periapical radiograph illustrating periradicular radiolucency after initial root canal therapy; B) Periapical radiograph showing periradicular radiolucency after surgical retreatment with retrograde amalgam fillings; C) Periapical radiograph taken immediately after non-surgical endodontic re-treatments; and D) Periapical radiograph demonstrating complete periradicular healing after 6 years



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