

Non-surgical Endodontic Retreatment in Periapical Abscess: A Case Report

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ABSTRACT

Endodontic failure affects the teeth and surrounding tissues. This is a case of a 62-year-old female with a chief complaint of pain and swelling occurring frequently in the upper left teeth for 6 months. The tooth was treated a year ago. Nonsurgical endodontic retreatment was carried out and observed for 4 months. The size of the lesion reduced significantly during the healing evaluation. This case report aimed to show the management of a non-surgery endodontic retreatment in periapical abscess using a rotary instrument.

Key Words: endodontic retreatment, periapical abscess

INTRODUCTION

Endodontic retreatment is a procedure performed on teeth that have previously undergone root canal treatment. Many factors can cause the failure of root canal treatment. Common attributable causes of failure are imperfect obturation, root perforation, external root resorption, periodontal and periradicular lesions, overfilling, presence of root canals left behind, periapical cysts, the loss of a broken instrument in the root canal, perforation of the base of the nasal foramen and coronal leakage.¹

Periapical lesions generally represent an inflammatory response to the invasion of the microorganisms and their products to the root canal. The failure of root canal treatment caused by the presence of periapical lesions requires root canal retreatment with the aim of removing bacteria and preventing further contamination by obturation of the root canal with biocompatible material and good coronal closure.²

Previously treated teeth with persistent periapical lesion can be treated with non-surgical or endodontic surgery, provided that the teeth can be restored, the periodontal tissue is healthy, and the patient wants to preserve the teeth. When decisions are made to preserve the teeth, the dentist and patient can choose the treatment with the most favorable long-term results. The dentist should provide the patient with all the alternative treatments options. When the final decision is made, the patient signs an informed consent as proof of his consent to the treatment selected.³

When the choice is a non-surgical endodontic retreatment, the goal is to first access the pulp chamber and then remove the materials from the root canal space. It is important to follow the disassembly procedure. The root canal can be re-shaped, disinfected, and obturated in a manner that allows periapical healing. Strategies, techniques,

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and technology implemented in the procedures can produce successful results.⁴

This case report aims to show the management of a non-surgical endodontic retreatment of the upper second premolar in periapical abscess using rotary instrument.

CASE REPORT

A 62-year-old female patient came to the Department of Conservative, Faculty of Dental Medicine of Universitas Airlangga with a chief complaint of pain in the upper left second premolar. The tooth was treated about 1 year ago. It began to feel uncomfortable 2 months after the treatment. Six (6) months before retreatment, a white lump occasionally appeared in the gum.

The patient has no medical history. Clinical examination revealed that the porcelain fused to the metal crown was intact and has a good marginal fit. There was a fistula and redness in the buccogingival (Figure 1). There was pain during percussion test. Radiographic examination showed that the root canal looked straight, periapical radiolucency was limited to diffuse and radiopaque appearance of gutta-percha point only reached half of the root canal length (Figure 2). The diagnosis was necrosis of pulp with periapical abscess.

After detailed clinical and radiographic examination, endodontic therapy was suggested. The patient was informed of the procedure and the informed consent was signed.

On the first visit, the tooth was isolated with a rubber dam and access opening was prepared. Filling materials was retrieved with Protaper retreatment file (Dentsply Maillefer, Baillagues, Switzerland). Glide path use K-file #10.

The working length of the canal was estimated as 23mm by apex locator (Root ZX, J. Morita Corp, Tustin, California, USA). A radiographic confirmation was performed (Figures 3 and 4). The root canal was prepared using an endo motor (VDW connect, Germany) applying Mtwo™ single length technique with rotary movement

(ISO#25/06). The canal was then irrigated sequentially with 2.5 % NaOCl (sodium hypochlorite) – distilled water – 17% EDTA – distilled water, on each change of the file. This was followed by a trial of gutta-percha point and a periapical radiograph was taken for confirmation (Figures 5 and 6). The root canal was again irrigated and agitated with an EndoActivator system kit (Dentsply Maillefer, Baillagues, Switzerland), dried with an endo suction aspirator and paper points. After cleaning, the root canal was dressed with calcium hydroxide paste (Any Paste, MD Plus, Korea) to kill bacteria in the root canal space. Access opening was temporarily sealed with a temporary filling material (Cavit, 3M ESPE, Seefeld, Germany).

After a week, the patient returned to the Dental Hospital of Universitas Airlangga for check-up. There were no complaints of discomfort.

The clinical examination on the second visit showed that there was no pain in palpation and the percussion test result was good, and so was the temporary restoration. The fistula also disappeared and the gingiva was normal (Figure 7).

The temporary restoration was removed. The root canal was cleaned with the irrigants, and the EndoActivator (Dentsply Maillefer, Baillagues, Switzerland). After cleaning, the root canal was obturated with single cone technique using gutta-percha point (25/06) and resin-based paste sealer (AH Plus, Dentsply Maillefer, USA) (Figure 8). Subsequently, the access cavity was filled with temporary filling. The obturation was confirmed by periapical radiography (Figure 9). The patient was instructed to return one week later for check-up.

On the third visit, the patient was asymptomatic, with no pain on palpation. The percussion test result was good. The temporary restoration was good, no fistula and the gingiva was normal.

After rubber dam isolation was carried out and temporary filling was removed, 2/3 of gutta-percha point was removed and the root canal wall smoothed using a



Figure 1. Initial clinical appearance.



Figure 2. Initial radiographic appearance.

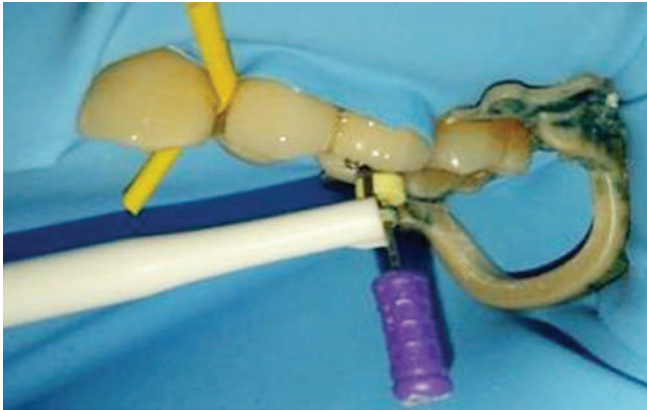


Figure 3. Working length measurement.

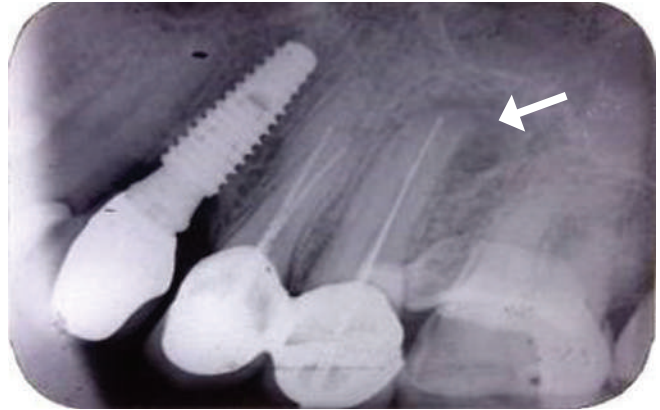


Figure 4. Working length confirmation.



Figure 5. Result of root canal preparation.

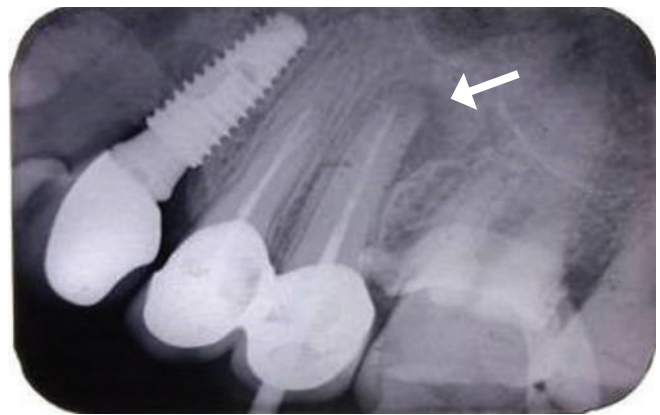


Figure 6. Confirmation of gutta percha point trial.



Figure 7. Clinical examination at the second visit.

penetration and calibration drill. Trial insertion of the fiber post was made and confirmed by radiograph (Figures 10 and 11). Fiber post (LuxaPost, DMG, USA) was inserted with self adhesive dual-cure composite resin cement (PermaCem 2.0 Self-Adhesive, DMG, USA) to fill the space used for the access opening (Figures 12 and 13). The old restoration still had a good marginal adaptation. There were no crack

lines and the tooth was still in good condition. Therefore, the new restoration was not necessarily required.

On the 4th (one week later) and 5th visits (4 months later), the patient was still asymptomatic with no pain on palpation. The percussion test result and the core build up were good. There was no fistula and the gingiva was normal (Figures 14 and 15).



Figure 8. Obturation.

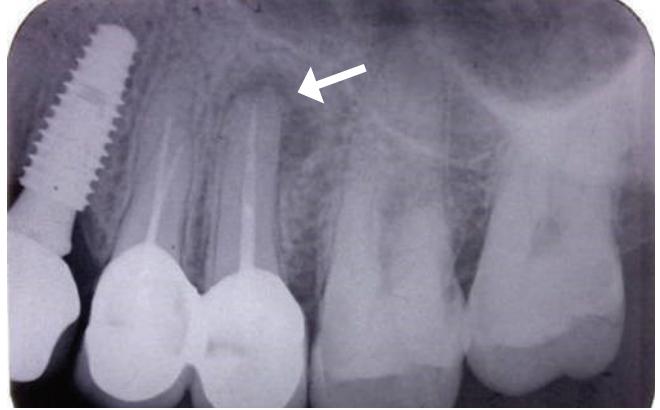


Figure 9. Confirmation with periapical radiograph.

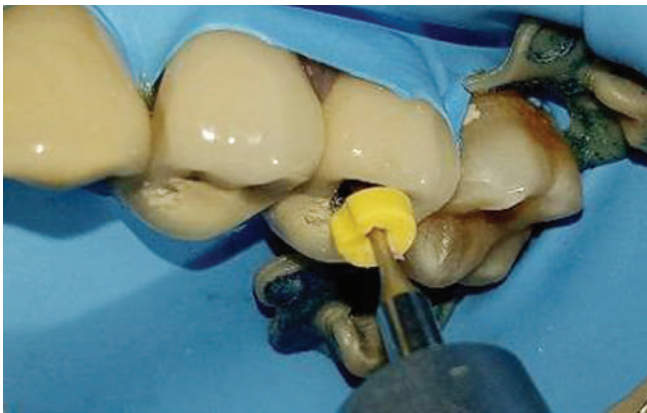


Figure 10. Gutta perca point removal.



Figure 11. Confirmation of fiber post trial.



Figure 12. Fiber post insertion and core build up.



Figure 13. Confirmation of fiber post insertion and core build up.

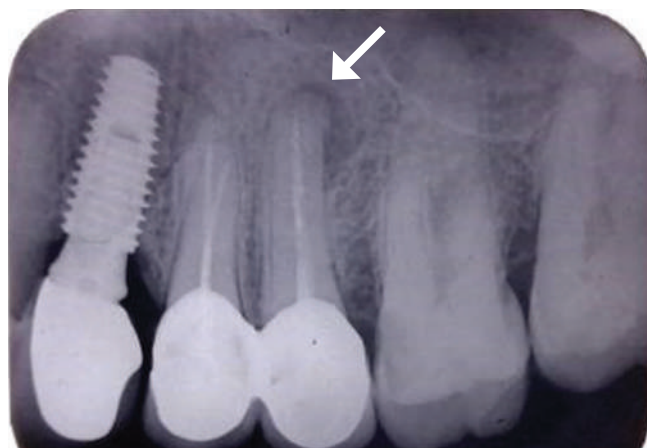
DISCUSSION

There are three (3) evaluation criteria used in assessing a successful endodontic treatment: clinical; radiographic; and histological.

Clinical evaluation for succesful endodontic treatment: no tenderness to percussion or palpation; normal tooth mobility; no evidence of subjective discomfort; tooth with

normal form; function and esthetics, no signs of infection or swelling, no sinus tract or integrated periodontal disease, minimal to no scarring or discoloration.

Radiographic criteria: normal or slightly thickened periodontal ligament space; reduction or elimination of previous rarefaction; no evidence of resorption; normal lamina dura; a dense three-dimensional obturation of the canal space.



Figures 14 and 15. At 5th visit: no fistula appearance and periapical lesion was smaller on radiographic photo.

Histological criteria: absence of inflammation; regeneration of the periodontal ligament fibers; presence of osseous repair; repair of cementum; absence of resorption; and repair of previously resorbed areas.⁵

Causes of endodontic failure include, among others: inadequate obturation (canals are poorly cleaned and shaped); leakage of coronal seal; missed canals; overextension of the root canal filling material; complications of the procedure (ledges, perforations, broken instruments).

In general, the causes of endodontic treatment failures are directly or indirectly related to the presence of bacteria in the root canal system.⁵

In the case presented, underfilling was the principal factor for the endodontic failure. Almeshari, Alshammari, and Main wrote in a study in 2018 that most endodontic treatment failures were caused by underfilling (39.5%).⁶ In another study, the percentage of underfilling causing endodontic failures was more than 33%. Underfilling occurs due to poor preparation, inaccurate measurement of the working length, and poor irrigation that makes the cleaning process ineffective. The presence of an infected pulp tissue, necrotic tissue, bacteria and their by-products become irritants to the periradicular tissue.

In cases where the diagnosis is an endodontic treatment failure, four treatment options are available: endodontic retreatment; endodontic surgery followed by retrograde filling; tooth extraction; and “do nothing”.^{7,8}

Patient-related factors are important in the decision to save or extract teeth:

- Is the patient tolerant enough with the treatment options? For example, the patient with a history of using drugs to treat osteoporosis and certain types of cancer may be at risk for jaw-related osteonecrosis. For these patients, it is often recommended to avoid extraction surgery.
- Does the patient smoke or have diabetes? This condition can affect the result of root canal treatment and implant.

- Does the patient have the motivation and resources needed to maintain teeth or replace them with implants?
- Can the patient tolerate long treatment times?
The dentist must answer these questions to help patient make the best care decisions for special situation.⁸

The procedure for endodontic nonsurgical retreatment can be grouped into five:

- Disassembly;
- repair of existing perforations;
- access to missed anatomy;
- shaping and disinfection of the root canal system; and
- obturation.^{7,8}

The survival rate of five (5) years retreatment cases was reported to be 89%.⁹ The success rate of endodontic retreatment with periapical lesion cases was estimated to be no more than 70%.⁶ Endodontic surgery is indicated to teeth that have persistent lesion and have failed root canal retreatment with success rate around 27.84%-80%.

The goal of an endodontic retreatment is to access the pulp and root canal, remove the root canal filling material, debris, and microbacteria, do a good cleaning and shaping, and fill the root canal according to the working length to get a healthy periapical tissue.

There are a lot of techniques that may be used to remove root canal filling material: ultrasonic instrument; rotary instruments; solvent; gates glidden drill; or hand instrument.¹⁰

In the case presented, a rotary instrument ProTaper Retreatment was used. This system consisted of three files that removed and cleaned the root filling in the following parts:

- D1 (30/0.09) cleaned the coronal;
- D2 (25/0.08) cleaned the middle; and
- D3 (20/0.07) cleaned the apical portions of the root canal

These files, made from nickel-titanium alloy instrument having a specific design of cross-section, works with rotation, penetration, and removal movements, were designed specifically to remove the root canal filling material. The file did not bind the root canal walls and could be used to complete the cleaning action.¹¹ When the root filling were removed, a cleaning sequence was made with irrigants using EndoActivator™, a sonic irrigation system, through acoustic streaming and cavitation, to eliminate bacteria from the root canal system. This system improves penetration of irrigants into root canal, eliminates dentin, debris, and smear layer to achieve greater cleaning effect (Chaudry, 2017).

The use of Calcium hydroxide is the most appropriate intracanal medicament for tooth with periapical lesions. It can remove microorganisms and promote repair by controlling the inflammatory action resulting from hygroscopic action, calcium proteinate bridge formation, phosphidase inhibition, neutralizing osteoclasts acid products (acid hydrolases and lactic acid), inducing cellular differentiation (alkaline phosphatase activation and calcium dependent ATPases) and neutralization of exotoxin.¹²

The treatment outcomes were classified into three (3) categories defined below:

- healed: the absence of any clinical signs or symptoms and normal periapical tissue with an intact periodontal ligament space and lamina dura;
- healing: the absence of any clinical signs or symptoms and periapical radiolucency still present but reduced in size;
- nonhealing: the presence of signs or symptoms and/or the emergence of new periapical radiolucency or unchanged or enlarged periapical radiolucency.¹³

Healing process occurred when the irrigants and medicaments have eliminated the microorganisms and their by-products so that there were no irritants in the periradicular tissue. The osteoprogenitor cell that can differentiate to the more specialized bone-forming cells, ie., osteoblast, could have stimulated the secretion of bone matrix in the area of the lesion, so the size of the lesion decreased after cleaning and shaping.¹⁴

Endodontically treated teeth often have full coverage restoration. The dentist must decide whether to take off the coronal restoration or maintain it by preparing access through the previous restoration. Eliminating the previous restoration with the purpose of reuse is unpredictable. Oftentimes, restorations are only considered when it is necessary to replace a tooth. The simplest approach is usually to prepare access through an existing restoration, even though this has risks of damage that may require a new restoration. Therefore, it would be best to clearly explain to the patient the risks during a retreatment as this may necessitate crown debonding or crown damage, which will require new restoration.^{8,15}

In situations where the crown is present within the condition of crown margins are intact and no recurrent carries, an attempt to perform the retreatment through an access opening in the crown may be performed. If the retreatment is successful and the crown is retained, the access opening must be restored with a core and permanent restorative material.

In the case presented, the replacement of the restoration was not carried out because the old one was still good. The use of the right instruments to create an endodontic access through many types of restorations, the percentage of crown that could be saved is high, so replacement is not necessary.

Creating an access cavity through porcelain-fused-to-metal (PFM) restoration, like in this case, did not significantly affect its overall strength characteristics. The fiber post insertion in this case allowed the tooth to receive the pressure so that it was evenly distributed along the roots.

The characteristics of fiber posts have greater advantages over metal posts, among others: good elastic behavior; more uniform distribution of strains along the root; color compatible with aesthetics; no corrosion; no laboratory stage; no need for additional preparation internally at the root; can be used in direct restorations; onlay; ceramic laminate; and total crown, possibility of removal and resealing of a new post in case of post failure, rarely-occurred fractures, so it is more profitable to reuse the remaining teeth, some post systems have high translucency and light transmission features, which can help in the photopolymerization of an adhesive and sealing.¹⁶

CONCLUSION

Endodontic retreatment using non-surgical techniques significantly improves a patient's quality of life and chewing ability, is more economical than surgical retreatment and achieves a relatively higher success rate. Strategies, techniques, and technology implemented in the procedures can produce successful results in non-surgical retreatment.

At healing evaluation, the size of the periapical lesion reduced significantly during the follow-up period.

Statement of Authorship

All authors participated in data collection and analysis, and approved the final version submitted.

Author Disclosure

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