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Revolutionary Paradigm for the Future Vision of Endodontics & Restorative Dentistry

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Surabaya, November 3rd – 5th, 2017

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ROOT CANAL RETREATMENT OF PERIAPICAL ABSCESSES ON MAXILLARY LATERAL INCISOR

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ABSTRACT
Failure in root canal treatment is caused by cleansing, forming, inadequate obturation and iatrogenic factor. The main causes of root canal failure are the presence of bacterial colonies in the apical portion of the root canal. Bacteria and its product will continue to develop in the root canal to the space of the periodontal ligament, thus stimulating the body defense mechanism resulting in periapical tissue damage. The purpose of this case report is to present a clinical case of endodontic retreatment of periapical abscess of the maxillary lateral incisor.

An 18-years old man was referred for root canal treatment of maxillary lateral incisor to the Department of Conservative Dentistry. He felt discomfort on his anterior upper left tooth and swelling on his palate for 3 days. The tooth was once treated root canal by the former dentist a year earlier. A clinical examination showed a composite restoration on tooth 822, sensitive to percussion and not sensitive to palpation, sinus tract on palatal side. A pre-operative radiograph revealed underfilled obturation and defused radiolucency with the diameter of 10 mm. Considering the clinical and radiograph findings, the diagnosis was chronic apical abscess et cause inadequate root canal treatment. Therefore root canal retreatment was decided to be performed.

Keywords: root canal retreatment, periapical abscess, healing process

Introduction
Teeth that have been treated for root canals and obturated can be reinfected. The main cause of root canal failure is the presence of bacterial colonies in the apical portion of the root canal. The most commonly found bacteria persisting in the treated root canal or in the persistent infection is E. faecalis. This bacteria has a unique ability to infiltrate the dentin tubules, resistant to extreme conditions (high pH) and limited nutrition.

The apical foramen which became the bacterial exit and its by-product from root canal to the periodontal space, this process can infiltrate microbial aggregation
and its products in the periradicular tissue and stimulate the body defense system to produce periapical or periradicular tissue damage. The main purpose of re-treatment is to remove material from the root canal and repair tissue damage caused by pathological or iatrogenic conditions.

Antimicrobial irrigation is used during root canal preparation and its aims to reduce bacterial populations effectively, although some bacteria still survive in lateral and accessory canals. Chlorhexidine is used as additional irrigation for root canal retreatment. Chlorhexidine is a positive charge hydrophobic and lipophilic molecule that can interact with phospholipids and lipopolysaccharides in bacterial cell membranes and can enter into bacterial cells through active and passive transport mechanisms.

Intracanal medication placement between visits can eliminate the remaining microorganism and can support the results of the treatment. Calcium hydroxide is selected as a root canal medication in the persistent periapical disease, it can use to control exudate to allow for healing and calcification processes.

Case

Eighteen years old male patient came to the conservation clinic with an anterior maxillary left tooth complaint, he felt uncomfortable and swelled on his gum about three days ago, the tooth was once root canal treated a year ago. Patients have experienced pain in the tooth and take antibiotics and pain relievers. Currently, the patient has no pain and the fistula has gone. The patient claimed no history of a systemic disease and currently have orthodontic treatment.

Clinical examination saw on the palatal part of the tooth 22 there is a composite crater (figure 1a). Vitality test is not sensitive, sensitive to percussion, and palpation is not sensitive. There is a fistula on the palatal portion of tooth 22 (figure 1b). The radiographic examination of the tooth 22 (figure 1c) shows an inadequate root canal filling, widened periodontal ligaments, lost of lamina dura and radiolucent features around the apical tooth 22 with an unclear boundary and a diameter of approximately 10 mm.

Figure 1. Clinical features (a) composite filling on the palatal portion of the tooth 22, (b) fistula on the palatal portion, (c) radiographic photo of tooth 22
Based on anamnesis, clinical examination and radiographic examination on the teeth 22, then the diagnosis of this case is a chronic periapical abscess et causa inadequate root canal treatment. The treatment plan this case is the root canal retreatment with composite resin restorations and fiber posts.

**Case Management**

On the first visit, access opening of the pulp chamber using a diamond bur. Performed gutta percha using the Hedstrom file. After the root canal cleaned from the filler material, radiograph made using K-file ISO # 20 along 22 mm (Figure 2a). Root canal preparation with ProTaper hand used until the F4 with a working length of 22 mm with irrigation at every turn of the file using EDTA and activated with endoactivator, then radiograph of the main gutta percha has taken by gutta-percha single cone ProTaper hand used F4 22 mm (Figure 2b). The root canal was irrigated with NaOCl 2.5% and activated with endoactivator, rinsed with sterile saline followed by irrigation using Chlorhexidine 2% and activated with endoactivator. Canals were dried using sterile paper point. Medication use of calcium hydroxide and covered with temporary fillings (Figure 2c).

![Figure 2. Radiographic photo of tooth 22 (a) master file #20 (b) main gutta (c) calcium hydroxide medication](image)

On the second visit (2 weeks after the first visit) there was no subjective complaint. On clinical examination, the fistula is absent, percussion and palpation are negative, the radiographic appearance of smaller lesions (Figure 3). On the second visit (2 weeks after the first visit) there was no subjective complaint. Temporary fillings then dismantled and done root canal irrigation using 2.5% NaOCl and activated with endoactivator, and rinsed with sterile saline and then re-irrigated with Chlorhexidine and activated with endoactivator. Root canal filling was done using gutta-percha Protaper hand used F4 throughout the working length with single cone technique and using MTA fillapex as a sealer, covered with temporary fillings using GIC. On the third visit (2 months after the second visit) control was performed. No subjective complaints of the patient, Clinical examination revealed negative percussion and palpation. Radiographically, the size of the periapical lesion decreases (Figure 4a). So it can be continued the final restoration of composite resin with fiber post. Gutta-percha retrieval with fiber Kleer along 17mm (Figure 4b), then does a trial installation of fiber posts.
Cementation of fiber posts using bêêeese (resin cement) and light cured for 20 seconds and then cut to 2 mm above the osfice (Figure 4c) and do restoration with composite resin (Figure 4d).

Figure 3. Radiographic of tooth 22 revealed smaller lesions

Figure 4. Radiographic and clinical photo of tooth 22 (a) smaller lesions, (b) gutta percha retrieval along 17 mm, (c) fiber post cementation, (d) final restoration with composite resin

Discussion

Based on anamnesis, subjective examination, objective and radiographic images concluded that the diagnosis, in this case, is chronic periapical abscess et causo inadequate root canal treatment. In this case, the teeth 22 had been treated for the root canal a year ago, but the root canal treatment performed was inadequate, resulting in periapical abnormalities due to bacteria and its toxin entering the periodontal tissues causing periapical tissue inflammatory reaction and progressing into an abscess. An abscess is a collection of pus located within a sac formed in tissue caused by a process of infection by bacteria, parasites or other foreign bodies. An abscess is a body reaction that aims to prevent infectious agents from spreading to other body parts. Pus is a collection of dead local tissue cells, white blood cells, infectious organisms or foreign objects and toxins produced by abscesses for drainage.

In this case, root canal retreatment was chosen to eliminate the infected bacteria that cause infections as clinically access control and orthograde filling can be performed, the rest of tissue can still be restored, and the periodontal tissue is healthy. The radiograph revealed that periapical lesion is less than 10 mm, the filling material was not performed perfect length and the patient is still young so that the immune reaction of the body is expected to quickly localize the infection and the healing process is expected to occur more quickly.

In failed root canal treatment, the number of E. faecalis bacteria to be 9 times more than primary infection. At pH 11.5 E. faecalis bacteria will die. However,
the buffering capacity of dentinal tubules makes pH 11.5 difficult to reach. *E. faecalis* can withstand the root canals with calcium hydroxide medicaments more than 10 days by utilizing proton pumps into cells that have a low pH so that the pH balance is maintained.4

Use of additional 2% chlorhexidine irrigation aims to kill persistent bacteria because it has a broad spectrum of antimicrobial, substantive properties, and low toxicity. Chlorhexidine is very effective against gram-positive and gram-negative bacteria and facultative anaerobic bacteria. Its effectiveness is based on the interaction of positively charged molecules with the phosphate group on the wall of microbial cells that are negatively charged. This will affect the cell’s osmotic balance. Increased permeability of cell walls can facilitate chlorhexidine molecules into bacterial cells.5,6

Calcium Hydroxide selected for this case, according to Athanassiadis (2007) calcium hydroxide has the advantage of being bactericidal, assisting healing and repair tissue, high pH can stimulate the formation of fibroblasts, neutralize acidic pH, stop internal resorption, inexpensive and easy to use.7 The ability of calcium hydroxide to kill microorganisms is divided in two ways, first, chemically calcium hydroxide can work by destroying the cytoplasmic membrane by direct contact with hydroxyl ions, suppressing enzyme activity, disrupting cellular metabolism and inhibiting DNA replication. Calcium hydroxide also can be used to control the exudate of the tooth with persistent periapical abnormalities. According to Heithersay, high concentrations of Ca ions cause precipitated contractions, resulting in reduced blood flow to the capillaries. The result will affect the reduction of the amount of plasma fluid that comes out into the tissues as a result of the inflammatory reaction. With the reduction of plasma fluid out into the tissues so that this condition allows the healing and calcification process.8

Single cone technique used as root canal filling method and MTA Fillapex is used as a sealer in this case because it can bind very well with the dentine, thereby preventing leakage in the periapical, otherwise the MTA content in this material will support the healing and formation of the hard tissue of the lesions.9,10

**Conclusion**

In this case, root canal retreatment of the chronic periapical abscess which the etiology inadequate root canal treatment, not hermetic obturation can be done and has a successful outcome. The success criteria were characterized by loss of symptoms and clinical sign such as negative of percussion and palpation, with radiographic features seen as tissue repair of radiopaque in lesions, as well as a smaller size of a lesion from 10 mm to 4 mm.
References


