What is ideal: one or two visits of endodontic treatment on teeth with apical periodontitis?

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Abstract

Objective: The microbiological purpose of teeth endodontic treatment with apical periodontitis is to reduce microbes in order to achieve periradicular tissue healing and to prevent microbes' recolonization. These are obtained by antimicrobial measures, including chemo-mechanical procedures and intra-canal medication, along with root canal obturation.

Methods: Root canal system for teeth with apical periodontitis carried out in two visits in endodontic treatment and using calcium hydroxide as the intra-appointment medication achieved better microbiological status than the one-visit endodontic treatment.

Results: One of the problems in endodontic treatment is the treatment planning considerations, that is, whether to give treatment in one visit or two visits. Performing intra-appointment medication is an absolute measure to promote disinfection and ensure successful treatment.

Conclusion: Endodontic treatment should not be determined by the number of visits but should rather be based on the right diagnosis, selection of appropriate cases and the latest endodontic treatment techniques so that long-term treatment success can be obtained.

Keywords: Apical periodontitis, One or two visits endodontic treatment, Calcium hydroxide

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Introduction

Along with the advancement in knowledge, operators' expertise, instruments, materials and techniques, nowadays the success of endodontic treatment has increased with the percentage of success reaching as high as 97%. Endodontic therapy itself has two main purposes: A. Creating a good environment for healing by eliminating microbes from the root canal system and B. Preventing inflammation in periapical area.¹⁻⁵ The microbiological purpose of endodontic treatment on teeth with apical periodontitis is to reduce bacteria until periradicular tissue healing occurs and to prevent bacteria recolonization in the treated root canal.^{6,7} The first objective can be achieved through the antimicrobial steps, such as chemo-mechanical procedures and intracanal medications, while the second objective is achieved with canal root obturation. One of the most controversial endodontic problems is whether inter-visit medication is absolutely necessary to support disinfection and to revise the result of treatment.⁶

Based on the number of visits, endodontic treatment can be classified into two categories: one-visit endodontic treatment and multiple-visits endodontic treatment. In general, patients want their endodontic treatments completed in one visit.⁸ Endodontic treatment for one visit has several advantages, namely: A. Reducing the number of visits, B. Eliminating the possibility of microbial contamination between visits, C. Reducing the risk

of trauma, D. The root canal space can be immediately used for dowels retention, and E. It is easier for dentists to perform a root canal obturation because they are more familiar with the anatomy of the root canal.^{4,7-11} However, there are two things in the one-visit endodontic treatment that cause dentists to avoid this choice, such as the incidence of flare-up tends to be higher and long-term success is relatively low.^{5,9,11}

Methods

Generally, infection control protocol suggests two-visit treatment performing intracanal medication because root canal disinfection is vital to the treatment's success.¹¹ Decision to perform endodontic treatment with one or two visits depends on the pathological condition of the pulp and periradicular tissue. Several factors, such as experience and skill of the clinician, the occurrence of trans-operative complications, presence or absence of symptoms, and other factors, influence the decision. However, the decision ultimately depends on whether root canal infection exists or not.⁶ Morphological condition of root canal system complicates the disinfection stage using instruments and irrigant well. There are no shortcuts for the antimicrobial agent to work and control the infection. Even the most potential antimicrobial agent takes time to kill bacteria.¹¹

Long-term success of endodontic treatment

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determining the number of treatment visits. Optimal results depend on the ability of the treatment procedure to create conditions that support healing. The best environmental conditions of the root canal which allow the healing of periradicular include the lack of microorganisms and same conditions as in the case of vital pulps that have the potential to deliver 100% success. Thus, the clinician should perform the treatment protocol that is able to control the infection of the root canal and create a supporting environment for healing.¹⁰

In the vital pulp case, infection occurrence is limited only to the coronal part of the pulp which is exposed to the oral cavity. Vital tissue on the orificium of the root canal orifice after coronal pulp is removed indicates that the instrumentation and obturation can be performed in one visit, because there are no complications that can block the treatment process, such as calcifications, resorption and time limitations.¹⁰ In the case of pulp necrosis it is always indicated by root canal infection, especially if there are apical periodontitis lesions. Apart from iatrogenic factors, apical periodontitis cases have a direct correlation with the rest of the polymicrobial colony and the products of bacteria in the tubules dentinalis.^{10,11} In that case, there is a necrotic tissue in the pulp chamber and root canal orificium. Bacteria are not only in the main root canal but also attack the entire root canal system, including dentinal tubules, ramifications (apical and lateral) and the isthmus. Thus, it needs time to eliminate the bacteria maximally in the entire system. Instruments and irrigant usually cannot reach the bacteria in areas far from the main root canal. Thus, one visit disinfection is not appropriate. The antimicrobial agent needs to be left in the root canal system between visits so that they can diffuse into these areas and kill the bacteria that are not covered by the chemo-mechanical procedure.^{10,11} Flare-ups are reported to have a higher incidence in non-vital teeth. The incidence of flare-ups are also reported to be higher in the case of repeated treatments with apical periodontitis.^{5,11} After all, one-visit endodontic treatment has a disadvantage. Completing treatment in one visit needs longer time and causes fatigue on both parties and also acts as a stressor and induces temporomandibular joint dysfunction, especially if the patient has a history of temporomandibular dysfunction.¹¹

Results

Several clinical studies have evaluated the activity of chemo-mechanical preparation of intracanal antimicrobial agent that uses NaOCl as irrigant with concentrations ranging between 0.5 and 5% but most of them indicated that 40–60% of root canals

still contain bacteria that can be cultivated. Because the rest of the bacteria have proven themselves to be a bad effect on the results of treatment, applying inter-visit intracanal medication is recommended as an antimicrobial agent of chemo-mechanical procedures and for optimizing bacteria reduction.⁶ Calcium hydroxide pasta is optional for inter-visit intracanal medication to support disinfection before obturation.^{1–6}

Many controlled clinical studies have compared the success rates of endodontic treatment of teeth with apical periodontitis conducted in one or two visits. Most of the researchers suggested that the treatment of two visits or more with calcium hydroxide used as the intracanal medication yield a higher rate of success, 10–20% higher compared to the one-visit treatment. Other studies have reported that the combination of calcium hydroxide intracanal medications and chlorhexidine is recommended to reduce flare-up on retreatment cases of symptomatic teeth.^{6,10,11} Scientific evidence documenting the procedure for obtaining the best results of endodontic treatment is based on the disinfection of the root canal system maximally. Martins et al.² elaborate the following protocol to obtain reliable results, namely: comprehensive debridement, instrumentation and disinfection of the root canal conducted on the first visit, followed by applying calcium hydroxide agent into the root canal for a week and on the second visit carrying out the obturation of root canal system.^{2,9}

Discussion

A research conducted by Vera⁶ showed that the system of teeth root canal treated in two visits with dressing between visits using calcium hydroxide has achieved better microbiological status than the one-visit treatment. Calcium hydroxide is able to stimulate the healing of periapical through two mechanisms: the inhibition of Lipopolysaccharide (LPS), which triggers bone resorption activity and denaturation of its pro-inflammation mediators.²

Microbiological research suggested that there is a population prevalence of anaerobic gram-negative bacteria in the root canal system of necrotic teeth with apical periodontitis. One of the cell-wall components of gram-negative bacteria is LPS, a strong endotoxin which can cause severe toxic effects on the periapical tissues. LPS is reported to play an important role in the process of periapical bone resorption process, directly stimulating the secretion of prostaglandin E2 (PGE-2) and triggering osteoclasts formation. LPS also stimulates macrophages to release cytokines, such as tumour necrosis factor (TNF) and some interleukins (IL)

which are an important inflammatory mediator. Signs and symptoms such as spontaneous pain, pain on palpation and sensitivity to percussion were also connected to the presence of endotoxin in the root canal system.²

LPS is released from the bacterial cell wall during cell duplication and causes cell lysis cell, for example, bacterial death due to bacterial disinfection. Thus, endodontic treatment on tooth necrosis not only eliminates living bacteria but also inactivates the effect of toxins from bacterial endotoxins. The main source of the toxicity of LPS is lipid-A components. Martins et al.² suggested that a change in the structure of these components can inactivate the LPS as well. The ester bond in the lipid-A can be decomposed through alkaline hydrolysis using calcium hidrokside.

Jr-Siqueira¹⁰ conducted in vivo testing of the effect of various concentrations of sodium hypochlorite, chlorhexidine at 2% and calcium hydroxide. They concluded that irrigation liquid was not effective against LPS and that dressing the root canal with calcium hydroxide can deactivate the cytotoxins effect of endotoxin.^{2,10} Martins et al.² tested the ability of calcium hydroxide to denature the mediators of pro-inflammatory triggered by LPS. They suggested the ability of calcium hydroxide to denature the IL-1 α , TNF- α , and calcitonin gene-related peptide (CGRP) ranged between 50% and 100%. Research carried out by Martins et al.² showed that the use of calcium hydroxide for root canal dressing is able to reduce the expression of matrix metalloproteinase (MMP), one of the main class of enzymes responsible for the degradation of extracellular matrix components.² This finding confirms the concept that currently used instrument, irigan and techniques are not sufficient to disinfect the root canal system optimally in one visit and the use of two visits to treat with antimicrobial agents is required to maximize the reduction of bacteria before obturation.⁶

Conclusion

Endodontic treatment, both in one visit and in two visits, can cause flare-ups. Furthermore, both

do not yield a high success rate and healing rate compared to one another but the system of root canals with apical periodontitis treated in two visits with inter-visit medication using calcium hydroxide has achieved a better microbiological status compared the one-visit treatment.

The end success of endodontic treatment should not be determined by the number of visits but should rather be based on the right diagnosis, selection of appropriate cases and the latest endodontic treatment techniques so that long-term treatment success can be obtained.

Conflict of Interest

The authors report no conflict of interest.

References

1. Peters LB, Wesselink PR. Periapical healing of endodontically treated teeth in one and two visits obturated in the presence or absence of detectable microorganisms. *International Endodontics J* 2005;35: 660-667.
2. Martins JNR, Saura M, Pagona A. One appointment endodontic procedure on teeth with apical periodontitis: is this a criterion for success? a literature review. *Rev Port Estomatol Med Dent Cor Maxillofac* 2011;52: 181-186.
3. Yilmaz Z, Ozdemir HO, Gorduyus O. Evaluation of single and multiple visit root canal therapy: a randomized clinical cases. *Clinical Dentistry and Research* 2012;36: 59-63.
4. Shahnaz N. Management of post endodontic pain following single visit endodontics: a review. *Int J dent health sci* 2015;2: 396-405.
5. Jorge PV, Javier JE, Fabian OA. Frequency of postoperative pain in one versus two visit endodontic treatment. *Endodontic Practice* 2015: 8.
6. Vera J, Jose FS, Domenico R. One versus two visit endodontic treatment of teeth with apical periodontitis: a histobacteriology study. *J Endodontic* 2012;4: 1-13.
7. Jose F, Jr-Siqueira, Isabela NR. Optimising single visit disinfection with supplementary approaches: a quest for predictability. *Aust Endodontic J* 2011;37: 92-98.
8. Monica DS. Dokter gigits perceptions of single and multiple visit root canal treatment: a survey in Florianopolis Brazil. *RSBO* 2014;11: 14-19.
9. Ricucci D, Jose FS. Endodontology, an integrated biological and clinical view. *Quintessence Pub* 2013: 184.
10. Jr-Siqueira JF. Treatment of endodontic infections. *Quintessence Pub* 2011.
11. Amy W, Chengfei Z, Chunhung C. A systematic review of nonsurgical single visit versus multiple visit endodontic treatment. *Clinical Cosmetic and Investigational Dentistry* 2014;6: 45-56.

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