

**Single visit endodontics - A review**

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**Abstract**

The main aim of performing root canal therapy is to eliminate bacteria from the infected root canal system or remove inflamed pulp tissue and close it with a biologically acceptable filling material. If this treatment carries on properly, regardless of the number of visits, it will produce a favorable environment for healing. The recent advances in Endodontic technology bring the dentists as well as the Endodontist to carry out the root canal treatment in one visit. The question that we observe in this review article focuses on the long term prognosis of single and multiple appointment endodontic therapy for teeth with vital pulp, necrotic pulp, and apical periodontitis.

**Keywords:** Multiple visit root canal treatment, one-visit root canal treatment, apical periodontitis, periapical healing, postoperative pain.

**Introduction**

Over the past decade, nickel titanium rotary instrumentation, more reliable apex locators, ultrasonics,

microscopic endodontics, digital radiography, newer obturation systems, and biocompatible sealing materials have assist practitioners perform endodontic procedures more successfully and skillfully than ever before.

All of these advances increase the prevalence of single-visit Endodontics in the dental clinics and the rationale for this treatment regime are less stressful and only one anesthesia is needed, which makes it very well accepted by the patient, less time-consuming, reduces the risk of inter-appointment contaminations, less expensive and more productive for the clinician. Numbers of questions have been raised regarding the one visit endodontics:

Is the same outcome achieved when we used single visit regime rather than multiple visit for the most of the cases?

Is the healing rate is the same in Single and multiple-visit endodontic treatment for infected root canals?

Are there any differences between single and multiple-visit endodontic treatment in post-obturation pain?

The purpose of this paper is to review some arguments that are the basis for the efficiency and reliability of single visit root canal treatment.

Treatment protocol differences between single and multiple-visit endodontic treatment A major goal of nonsurgical root canal treatment (NSRCT) is the prevention or treatment of apical periodontitis, leading to the preservation of natural teeth. The presence of bacteria inside the root canal system results in the development of periapical lesions.[1]

Traditionally, root canal treatment was performed in multiple visits, with the use of extra disinfecting agents (intracanal dressing) besides the irrigants that is used during the cleaning and shaping procedure which mainly aims to reduce or eliminate microorganisms and their by-products from the root canal system before obturation.[2] The most intracanal dressing researched and widely used is the calcium hydroxide (Ca(OH)<sub>2</sub>) paste.[3] Calcium hydroxide a strong alkaline substance, which has a pH of approximately 12.5. In an aqueous solution, Ca(OH)<sub>2</sub> dissociates into calcium and hydroxide ions. The hydroxyl ion OH<sup>-</sup> is even smaller and can penetrate through dentin to the cementum. Calcium hydroxide works by a hydrolysis reaction in which the OH<sup>-</sup> ion cuts protein chains and bacterial endotoxin into pieces as it breaks chemical bonds. It does this by inserting water molecules between the carbon-carbon bonds (and breaking C-C bonds by the process of hydrolysis), the backbone of proteins and endotoxin. So if the pearls on a pearl necklace represent atoms and the string between the pearls represents C-C bonds, Ca(OH)<sub>2</sub> is like a pair of scissors that cuts the string (hydrolyzes the bonds) between the

atoms breaking the protein down into harmless non-functional pieces. It is a tissue solvent! It also kills bacteria and it dissolves the endotoxin (bacterial LPS).

However Ca(OH)<sub>2</sub> was not capable of eliminating all the bacteria, it helped to reduce the bacteria remaining in the canal after the irrigation.[3,4]

The concept of single visit root canal treatment is based on the entombing theory,[5] which the large number of microorganisms removed during cleaning and shaping[6,7] and the remaining bacteria entombed by the root canal obturation, therefore it will miss the essential elements to be survive nutrition and space.[8-10] In addition, the antimicrobial activity of the sealer or the zinc (Zn) ions of gutta-percha can kill the residual bacteria.[11,12]

Microbiological basis for endodontic treatment Carefully conducted electron microscopic studies have indicated that it is from within the confines of the root canal system that bacteria initiate and maintain periapical pathosis.[13-16]

An advanced anaerobic bacteriological technique has been conducted by S JÖGREN [17] to investigate the role of infection in the prognosis of endodontic therapy by following-up teeth that had had their infected canals were cleaned and obturated during a single appointment. Post-instrumentation samples were taken and the teeth were then root-filled during the same appointment. The teeth were followed for 5 years. They detected a number of bacteria in 22 of 55 root canals. Complete periapical healing occurred in 94% of cases that yielded a negative culture. They concluded that their findings emphasize the importance of completely eliminating bacteria from the root canal system before obturation. They add that this objective cannot be reliably achieved in a one-visit treatment because it is not possible to eradicate all infection from the root

canal without the support of an inter-appointment antimicrobial dressing.

Several reports have further drawn attention to the possibility that some bacterial species may establish themselves in the body of the inflammatory process.

Bacterial elimination Debridement of the root canal by instrumentation and irrigation is considered the most important single factor in the prevention and treatment of endodontic diseases and there is a general agreement that the successful elimination of the causative agents in the root canal system is the key to health.[18] Sodium hypochlorite (NaOCl) irrigation plus mechanical instrumentation rendered 33% of the canals bacteria-free after the first appointment.[19] Even with the most modern instrumentation techniques (using of a rotary instrumentation technique) attainment of complete bacterial elimination would be farfetched.[6,20,21] Although irrigation with NaOCl provides a number of features attractive to root canal therapy, it appears that it is not possible to attain complete bacterial elimination by this adjunctive measure. Therefore intracanal medication, specially calcium hydroxide, has been widely used in attempts to kill any bacteria remaining after instrumentation and irrigation. The effectiveness of Ca(OH)<sub>2</sub> in completely removing bacteria in infected root canals in less than 4 weeks is under debate.[22- 24] Khan et al.[25] tested the hypothesis that Ca(OH)<sub>2</sub> denatures IL- 1 alpha, TNF- alpha, and CGRP. Human IL- 1 alpha (0.125 ng/mL), TNF- alpha (0.2 ng/mL), and CGRP (0.25 ng/mL) were incubated with Ca(OH)<sub>2</sub> (0.035 mg/mL) for 1- 7 days. At the end of the incubation period, the pH of the samples was neutralized, and the concentrations of the mediators were measured by immunoassays. The analyzed data indicated that Ca(OH)<sub>2</sub> denatures IL- 1 alpha, TNF- alpha, and CGRP by 50- 100% during the

testing periods (P < 0.001). They concluded that denaturation of these proinflammatory mediators is a potential mechanism by which Ca(OH)<sub>2</sub> contributes to the resolution periradicular periodontitis.

Postoperative pain Postoperative or intraoperative flare- up and pain are often the measure of the success or failure of single visit treatment, although pain during treatment has been proved to have no effect on long- term outcomes. Postoperative pain at the mild level is common in root canal treatment which may be the result of over- instrumentation, over- filling, passage of medicine or infected debris into the periapical tissues, damage of the vital neural or pulp tissues or central sensitization.[14] The preponderance of the research to date has shown no significant difference in postoperative pain has been found when one- visit RCT was compared with two- visit treatment, especially in teeth with vital pulps.[9,13,26- 29]

Healing rate of single- versus multiple- visit endodontic treatment for infected root canals The simplest way to compare both treatment options is to analyze them using a healed or not healed outcome. The short- or long- term follow- up of the bone radiographic image and size of the lesion is the most commonly used technique to evaluate the healing, usually based on the PAI score developed by Orstavik et al.[30] The number of studies that compare both techniques for a legitimate and credible follow- up time are not many compared to the mature evidence base that supports the using or not of intracanal medicines.[4]

Numerous studies evaluating the effectiveness of single- versus multiple- appointment root canal treatment have been published, which reported no significant differences in effectiveness (healing rates) between these two treatment regimens.[14,31- 33] Unfortunately, endodontic treatment success is often

poorly defined. As mentioned earlier, postoperative or intraoperative flare-up and pain were the only measure of the success or failure used to evaluate single visit treatment. According to Spangberg;<sup>[34]</sup> Clinical treatment results can be compared by following a clearly defined criteria for successful outcome or failure.

### Conclusion

In dentistry and medicine the standard by which treatment methods are compared is the long-term outcome. The aim of the endodontic therapy to achieve the resolution of the disease means elimination of the etiology, which means elimination of bacteria. Therefore every time we can get free microorganisms canals we can perform single visit root canal treatment. Based on the reports presented in this overview, the canals with vital pulps can in principle be regarded as free of bacteria at the initiation of treatment. Thus, provided a strict aseptic technique is utilized and enough time is available for all treatment steps to be performed optimally, the permanent filling of the canal may take place on the first visit.

In teeth with necrotic pulp and apical periodontitis and with the complex anatomy of teeth and root canals creates an environment that is a challenge to the complete cleansing in single visit therefore the multiple appointment procedure maybe is more effectiveness to achieve more bacteria negative Canals. In addition to killing bacteria, intracanal medicaments may have other beneficial functions. Calcium hydroxide neutralizes the biological activity of bacterial lipopolysaccharide and makes necrotic tissue more susceptible to the solubilizing action of NaOCl at the next appointment. Regardless of the number of sessions, an effective bacteriological control is mandatory. The biologic concerns should always be a priority.

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