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Single visit vs multiple visit endodontic treatment

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Abstract

Since endodontics became a recognised speciality, there has been much discussion over how many treatment sessions are necessary to complete root canal therapy. A short-term medication, such as calcium hydroxide, is administered during the interval between the cleaning and shaping session and the obturation appointment as part of multiple-visit therapy. A single-visit root canal has several benefits, including the ability to reduce the need for subsequent anaesthetic operations, gingival damage from the administration of rubber dams, and the possibility of inter-appointment leaking through interim restoration. Preoperative discomfort and pulpal infection are two factors that influence the treatment result and decide the best treatment strategy, such as a single or multi-visit course of action.

Keywords: Single, multiple, visit, endodontic treatment

Introduction

Root canal therapy (RCT) involves the extraction of organic tissue, debris, and harmful microorganisms from the root canal system through the use of mechanical instruments, accompanied by extensive irrigation with disinfectant solutions^[1].

Single-visit root canal treatment aims to complete the processes of instrumentation, disinfection, and obturation within a single appointment. In contrast, multiple-visit root canal treatment typically involves performing the majority of instrumentation during the first visit, followed by obturation in a subsequent appointment, with disinfection occurring through irrigation in both sessions. Additionally, a disinfecting agent is often placed within the canals between visits to further decrease bacterial populations^[2].

Although single-visit treatment presents clear benefits over traditional multiple-visit approaches—such as fewer appointments, elimination of the need for repeated anesthetic administration or rubber dam application, and avoidance of interim restorations—it may pose certain disadvantages concerning both short-term and long-term treatment outcomes^[3].

Root Canal Treatment

Root canal treatment (RoCT), also known as endodontic therapy, is a prevalent procedure within the field of dentistry. This treatment becomes necessary when the dental pulp sustains irreversible damage. The success of root canal treatment is determined by the absence of symptoms such as pain, the lack of radiographic evidence indicating damage to the surrounding bone and supporting structures, and the absence of clinical signs of infection in the gums, such as swelling or the presence of a sinus tract^[4].

The procedure may be conducted in a single session or over multiple appointments. Initially, the tooth is isolated from saliva using a rubber dam, after which an opening is created in the crown of the tooth with a drill to access and remove the damaged pulp. Following this, the canal is disinfected and subsequently sealed with a filling material^[5].

Historically, root canal procedures often required two or more visits, during which a medicated substance was placed in the canals between appointments to eliminate any residual bacteria. However, contemporary practices increasingly favor single-visit treatments that do not involve the use of interappointment medications^[5].

Two or More Visits Approach

Prior to the obturation process, the elimination of residual bacteria or the prevention of their repopulation within the root canal system is achieved through the application of an interappointment dressing. Historically, root canal therapy was conducted over several appointments, utilizing additional disinfecting agents, known as intracanal dressings, alongside the irrigants employed during the cleaning and shaping phase. This approach primarily aims to diminish or eradicate microorganisms and their byproducts from the root canal system before the obturation stage [6].

The most extensively researched and commonly utilized intracanal dressing is calcium hydroxide (Ca(OH)₂) paste. This compound is characterized by its strong alkaline nature, with a pH of approximately 12.5. In an aqueous environment, calcium hydroxide dissociates into calcium and hydroxide ions. The hydroxyl ion (OH⁻) is particularly small, allowing it to penetrate through dentin to reach the cementum. The mechanism of action of calcium hydroxide involves a hydrolysis reaction, wherein the hydroxyl ion cleaves protein chains and bacterial endotoxins by disrupting chemical bonds. This process occurs as water molecules are inserted between carbon-carbon bonds, effectively hydrolyzing these connections and dismantling the structural integrity of proteins and endotoxins [7].

To illustrate, if the pearls on a necklace symbolize atoms and the string connecting them represents carbon-carbon bonds, calcium hydroxide functions akin to a pair of scissors that sever the string, thereby hydrolyzing the bonds and reducing the proteins to non-functional fragments. Additionally, calcium hydroxide is effective in killing bacteria and dissolving endotoxins, specifically bacterial lipopolysaccharides (LPS). However, it is important to note that while calcium hydroxide significantly reduces the bacterial load remaining in the canal post-irrigation, it does not completely eradicate all bacteria [8].

In certain clinical scenarios, a multiple-visit treatment approach may be warranted, particularly if the patient is unable to endure prolonged chair time, if the dentist lacks sufficient time to perform the procedure to the necessary standard, or if the canal remains filled with blood, hindering adequate drying [9].

Single-Visit Approach

The objective is to eradicate the majority of bacteria within the root canal system in a single appointment, thereby achieving a three-dimensional filling that deprives microorganisms of both nutrients and the necessary environment for survival and reproduction [10].

The principle underlying single-visit root canal therapy is the entombment theory, which posits that a significant number of microorganisms are eliminated during the cleaning and shaping process, while any remaining bacteria are encapsulated by the root canal filling material, thus lacking the vital resources for sustenance and space. Furthermore, the antimicrobial properties of the sealer or the zinc ions present in gutta-percha can effectively eliminate any residual bacteria [11].

One of the primary benefits of single-visit endodontic procedures is the mutual desire of both practitioners and patients to minimize chair time. Additionally, this approach is often more cost-effective in various assessments and may offer greater convenience for patients suffering from temporomandibular disorders, who may find prolonged treatment sessions intolerable [12].

Single- Vs Multiple-Visit Root Canal Therapy Preoperative Pain

The evaluation of preoperative pain is an essential consideration in determining whether to proceed with single-visit or multiple-visit root canal treatment (RCT). In cases where patients present with severe pain, with or without accompanying swelling, it is advisable to avoid extended appointments. This caution is warranted due to the strong correlation between preoperative pain and postoperative discomfort. Consequently, the initial treatment should focus on alleviating pain and may be restricted to access and instrumentation, with obturation postponed until a later visit. [13].

It is crucial to understand the duration that a patient can endure during a dental appointment, as this influences the treatment approach. Additionally, offering multiple-visit therapy to patients experiencing significant pain enables clinicians to monitor symptom improvement during the follow-up appointment. This attention to symptom resolution reflects the clinician's empathy and commitment to patient care, which is a valuable interpersonal skill that complements the clinical rationale for multiple-visit treatment. A systematic review indicated that while the radiographic success rates for single- and multiple-visit RCTs were comparable, patients undergoing multiple visits reported a significantly lower incidence of analgesic use [14].

Infection Status

Any infection-related clinical signs, including as swelling and the presence of purulent discharge from the sinus tracts or root canal spaces, must be taken into account when choosing between single-visit and multiple-visit therapy. Providers can evaluate the impact of therapy on infected tissues and guarantee symptom clearance before the root canal space is obturated by using multiple-appointment RCT [15].

Pulpal and Periapical Diagnoses

It might be difficult to include periapical and palmar diagnoses in the decision-making process. There is presently a lack of agreement on how these diagnoses affect clinical outcomes. When choosing between single-visit and multiple-visit endodontics, a practitioner might be greatly aided by the establishment of pulpal and periapical diagnoses [16].

A one-visit method could be suitable for essential teeth, such as teeth with pulpitis with or without apical periodontitis. Researchers hypothesize that because essential teeth frequently have a relatively uncontaminated canal system and a superficially affected pulp, a single visit can enable more efficient care [17].

Case Complexity

The intricacy of the case at hand may influence the decision between a single-visit or multiple-visit therapeutic approach. A history of complications associated with local anesthesia can complicate treatment and may require a multiple-visit strategy. Specifically, achieving effective pulpal anesthesia in a tooth diagnosed with symptomatic irreversible pulpitis, often referred to as a "hot" tooth, poses significant challenges and may necessitate additional forms of anesthesia, including periodontal ligament, intrapulpal, or intraosseous injections [18].

While these methods can be effective, the duration of pulpal anesthesia in such situations is often limited to approximately 30 to 45 minutes. Furthermore, the time needed to adequately anesthetize a tooth with symptomatic irreversible pulpitis can

considerably extend the duration of the procedure. Therefore, in cases presenting these challenges, it is advisable to consider a multiple-visit root canal treatment approach^[19].

Restorative Concerns

Restorative considerations, including anterior aesthetics, challenges related to isolation and sealing, as well as pre-prosthetic factors, significantly influence the choice between single-visit and multiple-visit therapy. Complex crown fractures involving anterior and bicuspid teeth, along with horizontal crown fractures at the gingival margin of anterior teeth, often necessitate aesthetic evaluations. In such scenarios, unless other complicating factors are present, it is advisable to opt for single-visit root canal treatment (RCT) to enable the prompt placement of a temporary crown, thereby restoring the tooth's form, function, and aesthetics^[20].

Effective isolation and the subsequent sealing of the canal system to avert reinfection are critical for the success of RCT. Generally, both objectives can be accomplished; however, in cases where there is subgingival breakdown, absent coronal walls, or full-coverage restorations with decay extending beneath the margins, achieving adequate isolation and sealing becomes particularly difficult. In these instances, single-visit therapy should be considered to minimize the risk of contamination between appointments and to prevent flare-ups^[20].

Conflict of Interest

Not available

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