

Single-Visit Versus Multiple-Visit Root Canal Treatment- A Review Article

Dr. Pradnya V. Bansode¹ Dr. Seema D. Pathak², Dr. M. B. Wavdhane³,
Dr. Shirish Khedgikar⁴, Dr. Priyanka P. Birage⁵

¹Professor And Head of Department, (Department Of Conservative Dentistry And Endodontics, GDC & Hospital, Aurangabad/ MUHS, INDIA).

²Associate Professor, (Department of Conservative Dentistry And Endodontics, GDC & Hospital, Aurangabad/ MUHS, INDIA)

³Associate Professor, (Department of Conservative Dentistry And Endodontics, GDC & Hospital, Aurangabad/ MUHS, INDIA)

⁴Lecturer, (Department of Conservative Dentistry And Endodontics, GDC & Hospital, Aurangabad/ MUHS, INDIA)

⁵Third Year Post-Graduate Student, (Department Of Conservative Dentistry And Endodontics, GDC & Hospital, Aurangabad/ MUHS, INDIA).

Corresponding Author: Dr. Pradnya V. Bansode

Abstract: Conventional endodontic treatment require multiple visits, but according to some researchers single-visit treatment is superior and advantageous. Single-visit endodontic treatment and multiple-visit endodontic treatment both have their advantages and disadvantages. Endodontic treatment performed in either single- or multiple visit can be followed by numerous short- and long term complications. One of the short term complications include postoperative pain and flare-ups.

Endodontic treatment used to take multiple visits to complete, required a considerable amount of time to complete the treatment. The use of contemporary endodontic techniques and equipment, such as use of rubber dam, magnifying devices, electronic apex locators, engine-driven rotary nickel titanium files, and so forth, not only increases the success rate of endodontic treatment but also, shortens the time needed for the treatment. Endodontic treatment may therefore be completed in a single visit.

This paper is a review of single-visit versus multiple-visit endodontic treatment.

Keywords: Flare up, Multiple visit endodontics, Post obturation pain, Single visit endodontics, Temporomandibular disorders

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I. Introduction

Endodontic treatment, or root canal treatment, entails the removal of the dental pulp and subsequent cleaning, shaping and obturation of the root canals of a tooth. The key to endodontic success was described by Gutmann as the debridement and neutralization of any tissue, bacteria, or inflammatory products within the root canal system [1]. Although these principles were applied when performing endodontic treatment, the success rate of endodontic treatment in its early days was not high[2]. With the advance of knowledge and skills and the use of up-to-date material and equipment, endodontic treatment nowadays has become a viable treatment to save the tooth, with a high rate of success. The overall success rate has been reported as being as high as 97% [3] This paper will review in detail about single versus multiple visit endodontics.

II. Multiple visit endodontic treatment

Endodontic treatment once necessitated multiple visits, as it required a considerable amount of time to complete [4].

Some dentists believe that the traditional multiple-visit protocol has a long history and a high clinical success rate, preferring to provide multiple-visit endodontic treatment to their patients. Multiple-visit root canal treatment is accepted as a safe therapy[5]. However, the rationale for multiple-visit endodontic treatment is being questioned

Mechanical debridement combined with antibacterial irrigation (0.5% sodium hypochlorite) can render 40–60% of the treated teeth bacteria-negative (Bystro'm&Sundqvist 1983, Sjo'gren et al. 1997). In addition to mechanical debridement and antibacterial irrigation, dressing the canal for 1 week with calcium hydroxide has

been shown to increase the percentage of teeth with negative bacterial count to around 70% (Law & Messer 2004).

The regimen including calcium hydroxide dressing between appointments should provide a higher healing rate, because bacteria are further reduced. Thus, the healing rate of multiple-visit treatment should be higher than single-visit treatment (without calcium hydroxide dressing). The biological benefit of multiple-visit treatment is that bacterial load can be further reduced by an antibacterial dressing between appointments.

Calcium hydroxide is currently acknowledged as the best intracanal medicament in endodontic treatment procedures. It is effective against most endopathogens but has a limited activity against *Candida albicans* and *Enterococcus faecalis*. Leonardo et al recommended the addition of other substances to the paste to increase or maintain the paste consistency of the material which does not harden or set in the root canal, to improve flow, maintain pH of calcium hydroxide, to improve radio-opacity, to make clinical use easier and not alter the excellent biological properties of calcium hydroxide itself.[6]

A patient in severe pain with or without swelling, should not experience long visit treatment. Treatment in such patients should be directed toward alleviating pain, with obturation of canal postponed.

Disadvantages of multiple visit root canal treatment

Disadvantages like inter appointment contamination and flare ups caused by leakage or loss of temporary seal, prolonged time taken leading to patient fatigue, operator fatigue, inability to provide esthetic restorations in time in case of traumatically damaged crowns and discontinued treatment leading to failures [7].

Moreover, the tooth may also be susceptible to reinfection through the temporary filling and dressing during the interim period in case of multiple visits.

Single visit endodontic treatment-

The concept of a single-visit root canal treatment was described as early as the 1880s [8]. The treatment techniques used at that time were very primitive, and the success rate of single-visit root canal treatment was low. The single-visit treatment was brought back in the 1950s by Ferranti who advocated the use of diathermy for pulpal disinfection and hydrogen peroxide for irrigation [9]. This treatment differed significantly from today's techniques. However, Ferranti was able to describe how the most important criteria for achieving successful results were, in fact, the proper shaping and cleaning of the canals.

In 1970, Tosti reported a satisfactory result in his clinical study using a single-visit approach, although the sample size of his study was small.[10]

The concept underlying single-visit techniques, as described by Oliet, is that there is no difference in the treatment criteria to ensure a successful result between multiple-visit and single-visit treatment [11]. The criteria include an accurate diagnosis, proper case selection, and the use of contemporary endodontic techniques. Single-visit endodontic treatment is indicated when both operators and patients want to save chair side time and prefer that anesthetic be administered only once [12].

The materials and equipment used in endodontic treatment have dramatically changed over the past 20 years. It is not uncommon to relate contemporary endodontics with proper rubber dam isolation, magnifying devices, newer sealants and obturating materials, electronic apex locators, crown-down approaches, engine-driven rotary nickel titanium files, ultrasonic instrumentation, the copious use of disinfectants and chelating agents, and the latest digital or computer-aided radiographic imaging and three-dimensional (3D) obturation techniques[13]. Although the materials and equipment differ significantly, the principles remain more or less same.

Indications of Single Visit Root Canal Treatment-

1. Uncomplicated vital teeth, vital pulp exposures due to caries or trauma with symptomatic pulpitis.
2. In physically challenged patients [14].
3. In patients having apprehension for treatment and requiring sedation for root canal treatment.
4. Fractured anterior teeth with pulpal involvement and no periapical lesion or teeth with recent trauma where esthetics is the concern [15].
5. Non vital teeth with sinus tract where chances of post treatment flare up are less[15].

Contraindications For Single Visit Root Canal Treatment -

1. Non vital tooth having acute inflammation; single-visit endodontic treatment should not be recommended.
2. Single-visit endodontic treatment should not be performed in teeth with weeping canals.
3. Teeth with anatomic anomalies for e.g. calcified and curved canals.
4. Teeth with limited access.
5. Symptomatic non vital teeth.
6. Asymptomatic non vital teeth with periapical pathology and no sinus tract [15].

7. For most of the re-treatment cases.
8. Patients who have temporomandibular disorders and/or who cannot endure long treatment period are not suitable for single-visit endodontic treatment.

Advantages Single Visit Root Canal Treatment -

There are a number of advantages to single-visit endodontic treatment.

- 1] The reduced number of appointments.
- 2] It reduces the need for repeated episodes of antibiotics in patients with cardiovascular diseases or for medically compromised patients where premedication is needed.
- 3] The reduced number of appointments allows clinicians to manage office time efficiently. Materials needed for separate visits (disposable bibs, suction tips, anaesthetic and irrigation needles and rubber dams) are saved. Medico legal risk is reduced: The likelihood of cross contamination is minimized [16]
- 4] Single-visit endodontic treatment reduces patient discomfort and risks associated with local anesthesia. It also reduces the episodes of pain and anxiety that may arise from each appointment.
- 5] Single visit endodontic treatment minimizes the possible chance of iatrogenic errors (eg, perforation, ledging, stripping, and extrusion of antimicrobial irrigants due to longer exposures in instrumentation procedures).
- 6] With single-visit treatment, there is no need for provisional restoration between appointments and thus no bacterial contamination through the leakage beneath the provisional restoration.

Disadvantages Of Single Visit Root Canal Treatment -

Single-visit endodontic treatment, however, has some disadvantages.

- 1] Completing treatment in a single appointment may involve time restraints and causes fatigue in both the clinician and the patient.
- 2] Difficult cases like calcified canals, severe curvatures, weeping canal, etc. may require more time and more number of visits.
- 3] If flare-up occurs, it is difficult to establish drainage through obturated tooth.

III. Discussion

For many years, dentists have practiced single-visit endodontics on vital and nonvital teeth. However, a significant number of clinicians do not perform single visit treatment for various misconceptions.

Myths associated with single visit endodontics

There are three major reasons that patients once refused endodontic treatment and often chose tooth extraction instead: cost, fear of pain, and time. With so many advantages and few disadvantages, why don't more clinicians practice single-appointment endodontics? Reasons include widespread belief in myths associated with such treatment.

Myth No.1: Postoperative pain is greater when endodontic therapy is completed in a single visit, especially in nonvital teeth.

Fact:

Overwhelming evidence shows that postoperative pain resulting from treatment of vital or nonvital teeth does not differ among patients treated in a single visit or in multiple visits.

The reported findings on postoperative pain differed between studies.

Many studies like study done by Wang C et al. showed no significant differences in pain after single-visit and multiple-visit treatment.[17]

Study done by Risso PA et al, surprisingly described more postoperative pain developing with conventional multiple-visit treatment.[18]

Study done by Oginni A reported significantly more postoperative pain for single-visit treatment [19].

Myth No.2: There is less healing when endodontic therapy is completed in a single visit, especially in non-vital tooth.-

Fact:

One-year follow-up time is the soonest possible to determine whether or not the lesion has healed (Ørstavik 1996).

No studies demonstrated a statistically significant difference in healing rate (therapeutic efficacy) between single- and multiple-visit treatment.

In a systematic review done by C. Sathorn found that single-visit root canal treatment appeared to be slightly more effective than multiple visit, i.e. a 6.3% higher healing rate[20].

No significant difference in radiographic evidence of healing between singlevisit and multiple visit treatment was seen by study done by Paredes-Vieyra J [21]

Myth No.3 : Post operative flare up is greater when endodontic therapy is completed in a single visit.

Fact:

Postoperative pain or swelling are collectively described as flare-up, which is probably one of the most concerning issues that dentists practicing single-visit treatment must deal with.

Trope defined flare up as "intolerable pain and/or swelling " .

Akbar et al in his study found that there was no significant difference in the flare-up rate between single and multiple visit groups[22]

Myth No.4: Canals are cleansed if an antibacterial medicament such as Ca(OH)₂ 'is left in the tooth.

Fact :

Efficacy of calcium hydroxide in controlling bacterial colonization has been debated.

Studies have reported that the clinical outcome of multiple-visit endodontic treatment was better for teeth treated with the intracanal calcium hydroxide than for those with root canals left empty [23].

Despite the high alkalinity antibacterial properties of calcium hydroxide, some bacteria species, such as *E. faecalis* and *Candida albicans*, have been found to be resistant to it. It is therefore generally considered that nonsetting calcium hydroxide should be used as a supplement to antibacterial irrigations.

Complete elimination of bacteria is not strictly necessary, and maximum reduction of bacteria and effective canal filling may be sufficient in terms of healing, rather than complete eradication.

Moreover, the tooth may also be susceptible to reinfection through the temporary filling and dressing during the interim period in case of multiple visits because of microleakage.

Gesi et al stated that with proper use of aseptic operating procedures, proper instrumentation, and filling, an inter-appointment dressing with calcium hydroxide does not seem to influence outcome.[24]

MYTH No.5: Multiple-visit endodontics is safer than single-visit endodontics, and multiple visits mean more careful treatment.

Fact:

For patients at the risk of contracting bacterial endocarditis AHA recommends as many procedures as possible during antibiotic prophylaxis. By limiting these patients to single appointment they are at less risk of contracting endocarditis and of having an allergic reaction to the antibiotic.

The small chance of a toxic reaction from medication (analgesics, antibiotics, or anesthetic) is reduced by not using them repeatedly (at multiple appointments) an by using a smaller dose (enough for one appointment)

Myth No.6: Patients do not mind multiple appointments and are likely to object to the fee if the procedure is completed in a single visit.

Fact :

Aside from cost, there are two other major barriers to patients visiting the dentist: fear of pain and time required.

Completing root canal therapy in one appointment limits fear of pain to one incident and decreases the time required (the number of appointments and total treatment time). Patients are more likely to, accept single-visit treatment.

Myth No.7: After obturation, treating a flare-up is complicated; therefore, treatment should not be completed at the first appointment.

Fact:

Fear of a post obturation flare-up prevents clinicians from performing single-visit endodontics, but such flare-ups generally are less common than inter appointment flare-ups.

Most flare-ups can be treated with occlusal reduction, analgesics, and antibiotics. In the unusual event that a problem continues, apical trephination (fistulization) can be performed. If the canals are cleaned and filled properly, a need to remove filling material is rare. Whether obturation is performed in a single visit or after multiple visits, removal of gutta-percha (if necessary) usually is straight forward.

IV. Conclusion

If the incidence and intensity of post-obturation pain and the long-term success rate for single-visit and multiple-visit endodontic treatments are similar, single visit treatment can be considered to be the more comfortable and efficient option.

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