

Single Visit Endodontics

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Introduction

Science and technology has left no stone unturned to make our lives easy. Like all other fields, technology has blessed the field of endodontics as well, leading to advent of various equipments like electronic apex locator, engine-driven or rotary nickel-titanium files, magnifying devices like loupes, microscope and many others. This has reduced the time required for root canal treatment promising better quality.¹

Endodontic treatment in multiple visits has been a traditionally accepted protocol .the rationale behind multiple visit endodontic treatment is the use of intra-canal medicament between dental visits, which aims to eliminate microbes and achieve optimum disinfection of the root canal system. The other reason behind multiple visit treatment was the amount of time required to complete the treatment in one visit. ¹ however, there are some demerits to the multi-visit root canal treatment like inter -appointment contamination, flare ups due to leakage in temporary filling causing pain or swelling, patient fatigue due to increased number of visits to dentist and

many others.² but performing the entire root canal treatment in one visit is not an accepted protocol and numbers of questions are raised regarding the one visit root canal treatment:

- Are the same results achieved when we use single visit treatment and multiple visits treatment?
- Is the healing rate same in single and multiple-visit endodontic regimen for infected canals?
- Is there any difference in post operative pain between single and multiple –visit endodontic treatment?¹

Clinical studies indicated that the equal success rate of single visit and multiple visit endodontic treatment.² growing favorable clinical experience and increasing numbers of favorable clinical research studies, single visit endodontics has moved away from being an empirical technique. It is now viewed as acceptable treatment procedure for certain, specific endodontic problems. ³ the ultimate question to be answered in terms of endodontic success is how well the root canal system is disinfected and sealed. Then it can be done with thorough instrumentation, irrigants, and intra-canal medicaments in

multiple visits or with optimized single visit disinfection and obturation protocol.³

Single visit root canal treatment is defined as “the conservative and non-surgical root canal treatment of an involved tooth consisting of complete chemo-mechanical preparation and obturation of root canal system in one visit.” Ashkenaz⁴

However, not every case can be treated in single visit. Some cases definitely need inter-appointment medicament to decrease the microbial count and initiate periapical healing. Thus it becomes mandatory to have thorough knowledge to understand which case can be done in single-visit and which will require course of time to heal and seal.⁴ This article will acknowledge us with enough knowledge to judiciously carry out successful single visit root canal treatment.

Indications and contraindications

Indications for single visit endodontics:

- Uncomplicated vital teeth.
- Physically compromised patients who have to make an effort to come to the dental clinic.
- Medically compromised patients who require antibiotic prophylaxis and sometimes alteration in the medication they take.
- Fractured anteriors where esthetics is a concern.
- Apprehensive but cooperative patient
- Patients who require sedation or operation room.
- Uncomplicated non vital teeth with sinus tract
- Patients needing full mouth rehabilitation
- Iatrogenic /unintentional pulp exposure
- Root canal treatment for prosthetic or restorative purpose-intentional root canal therapy
- Teeth with sub-gingival caries or multiple walls missing where isolation and sealing is a problem.
- Uncomplicated re-treatment cases.²

Contra indications for single visit endodontics

- Acute alveolar abscess cases with pus discharge.
- Patients who have acute apical periodontitis with severe pain on percussion
- Painful non vital tooth with no sinus tract.
- Asymptomatic teeth with apical lesion and no sinus tract.
- Cases with procedural difficulties like calcified canals, curvatures, extra canals.
- Patients with tmj disorders and inability to open the mouth.
- Teeth with limited access.
- Complicate re-treatment cases.²

Advantages and disadvantages

Advantages

- Patient comfort: Due to reduced number of visits to : dentist and administration of local anesthesia only for once.
- No inter appointment pain: Single visit endodontics eliminates the flare-ups caused because of leakage of the temporary cement
- Familiarity of the canal anatomy

Multiple visits would require re-familiarization leading to loss of time and frustration but this is avoided in single visit treatment.

- Immediate coronal seal and enhancing esthetic results.

Disadvantages

- Tiring for the patient: Due to prolonged mouth opening
- Flare up: If flare-up occurs it is easy to treat the tooth which has temporary filling rather than permanent restoration
- Not possible in all cases
- Difficult cases like calcified canals, severe curvatures, weeping canal, may require more time and subsequent visit
- Inexperienced clinician may not be able to carry out successful root canal treatment in one visit.²

Criteria for single visit endodontics

Clinical experience: It is very important to have enough experience of many root canal treatments in order to carry out single visit treatment. It should not be carried out with the thought of completing the case in any way. The basic principles of endodontic treatment of thorough debridement of root canal system and optimum obturation should never be overlooked. Unfortunate procedural problems like instrument separation and perforation may occur during the procedure and one must then promptly take the decision to convert the case in multiple visits.

Also the operator should be capable of completing the case within a limited time span of one to one and a half hour, as beyond this time patient and operator fatigue may occur.⁴

Patient co-operation: For the clinicians who are newly practicing one visit treatment should begin with co-operative patients. As one gains confidence then the non-cooperative cases can easily be completed in single visit.⁴

Well trained dental assistant: A well-trained dental assistant plays a major role to perform the treatment in one visit. As, an assistant helps in placement of the rubber dam, passes the intracanal enlarging and filling instruments and materials, and many other unnoticed help is provided by them.⁴

Accessibility: Always start practicing one visit regimen on teeth which are easy to access like anteriors then one can move towards difficult to access teeth.⁴

Anatomic variations: Failure in treatment will occur if the clinician fails to find the additional canals and unusual anatomic variations than usual occurrence. The eye of a spy will find the unexpected and then we will treat the tooth successfully.⁴

Calcified canals: A good pre-operative radiograph will be alarming signal for the dentist to expect calcified canals, curved canals and many other things. Dentist can then

plan the treatment according to difficulty in successfully negotiating the canal and meticulous disinfection of the root canal system.⁴

Pulpal status : In an infected vital pulp due to a carious exposure, the infection is normally found only at the wound surface, where there is a localized inflammatory response. This means that more apically, and in particular in the most apical portion of the tissue, bacterial organisms are usually not present. The aim of root canal treatment here is to maintain sterile apical conditions in order to optimize the healing potential. Here, it should be easy to perform an aseptic extirpation of the pulp thorough biomechanical preparation in one treatment session and finish with a root filling.¹

On the other hand, if the pulp is necrotic and complicated by apical periodontitis, there is ample evidence that a significant dentin infection exists. The presence of an apical lesion tells us that the tooth is non vital. A red flag should go up when treating these teeth in a single visit. Teeth with apical lesion which have been left open for a long time are not ideal for single visit endodontics. An asymptomatic tooth with a lesion has the potential to turn into a phoenix abscess. It would be better to treat these teeth under antibiotic coverage, thorough debridement and proper inter-visit medicament. This disease condition requires more than one treatment session.⁴

Clinical symptoms: Single visit root canal treatment should not be done in acute alveolar abscess cases. Patients with severe pain, tenderness and swelling are better treated in multiple visits.⁴

Presence of a sinus tract: The sinus tract acts as a safety valve and prevents the build-up of pressure and so, teeth with sinus tract can safely treated in one session.⁴ **Oliet's** criteria for case selection include:

- Positive patient acceptance

- Sufficient available time to complete the procedure properly
- Absence of acute symptoms requiring drainage via the canal and of persistent continuous flow of exudates or blood.
- Absence of anatomical obstacles (calcified canals, fine tortuous canals, bifurcated or accessory canals) and procedural difficulties (ledge formation, blockage, perforations, inadequate fills).⁵

Biologic basis of single visit root canal treatment

The idea of treating the case in one visit is based on entombing theory. According to this theory the maximum amount of bacteria and disease causing factors are eliminated during the biomechanical preparation and irrigation of the root canal system while the remaining microorganisms are entombed by the root canal obturation. Thus the remaining microbes will be cut off from the nutrition. The anti-bacterial activity of the sealer or zinc ions present in the gutta percha will kill the remaining microflora.⁶

Important factors to effectively provide treatment in one visit

Pain control and anesthesia : Painless treatment calms the patient thus, creating a way for the operator to carry out the complex protocol with ease and also saves the time. Pre-operative analgesics, anti-inflammatory, anti-anxiolytic drugs will cause pain free operation and less post operative pain. Long acting anesthetic agents; like bupivacaine or etidocaine, 4% articaine are crucial to carry out painless single visit root canal treatment. Additional uses of intra pulpal anesthesia, intra ligamentary injections are valuable adjuncts to achieve successful anesthesia.²

Isolation: Isolation is the key for success of treatment in one visit. Use of rubber dam has many advantages like:

1. Good access to field of operation

2. Immediate elimination of saliva, blood and many hindering factors and the optimum infection control is achieved.
3. Patient protection from ingestion of irrigating solutions and aspiration of debris and instrument.
4. Overall efficiency is improved.

Hence the application of rubber dam is mandatory to deliver best possible outcome of treatment in one visit.²

Access cavity preparation: The rationale for this is to create a straight line path for the canal orifice and the apex. The entire carious enamel and dentin from the coronal part of the tooth is removed thus limiting the coronal ingress of microbes. Use of new burs will save the time for access preparation. Use of ultrasonic's to modify the access cavity and explore the additional and a calcified canal is really helpful in conserving the remaining tooth structure and also a time saver.⁷

Shaping and cleaning: the rationale for this is the complete elimination of vital or necrotic pulp tissue, microorganisms and their byproducts from radicular part of the tooth .complete disinfection of the root canal system is ensured.

Advent of newer rotary file systems ensures the complete removal of pathogenic agents of the root canal system. Meticulous irrigation of the areas which are in-accessible to instrument ensures the optimum biomechanical preparation.⁷

Approaches for optimized single-visit disinfection (OSD)

Sodium hypochlorite (NaOCl)

Final rinse with chlorhexidine

MTAD

Iodine potassium iodide (IPI)

Sonic or ultrasonic activation of NaOCl and

Photodynamic therapy (PDT)

All these approaches are recommended for application following chemo-mechanical preparation, preferably after smear layer removal.³

Sodium hypochlorite (Naocl)

Naocl in concentrations between 2.5 and 6 % should be used during the whole cleaning and shaping procedure. Pulp chamber should be used as a reservoir of fresh irrigant. Once the mechanical preparation is finished and a master apical file is determined, the protocol of irrigation should start with the activation of fresh naocl in each canal.⁸

Final rinse with chlorhexidine (CHX): The rationale behind the use of a final rinse with chlorhexidine is to take advantage of substantivity that is prolonged antibacterial action with 2% chlorhexidine.⁸

Final rinse with MTAD: Mtad is a commercial product for root canal irrigation and consists of a mixture of a tetracycline isomer (doxycycline), citric acid and a detergent (tween 80). Mtad has a low ph (2.15) due to the presence of citric acid and is recommended for smear layer removal after chemo-mechanical preparation with naocl as irrigant. In addition to participating in smear layer removal by chelating calcium ions, tetracycline also has antibacterial effects against several endodontic pathogens. Moreover, this antibiotic exhibits substantivity in calcified tissues, generating a residual antibacterial effect. As with chx, this residual effect might enhance disinfection after preparation and potentially eliminate the need for an interappointment medication.⁹

Final rinse with iodine potassium iodide: In ipi, potassium iodide is used to dissolve iodine in water, but it is iodine that is responsible for the antibacterial activity. Iodine potassium iodide (iki) has a rapid antiseptic action against a wide range of microorganisms, low toxicity, hypoallergenicity, and a very high probability of eliminating microorganisms including *e. Faecalis* even

when the contact time is as short as 10–15 min. Its low cytotoxicity and high antimicrobial properties give merit to its use as an endodontic irrigant. Iodine is a strong oxidizing agent which reacts with free sulfhydryl groups of bacterial enzymes, resulting in disulfide linkages and disruption of bacterial cell wall. Iki also acts by way of its vapors and has been shown to have long distance bactericidal effects. These properties are important adjunct to complete the disinfection of root canal system in single visit endodontics.¹⁰

Ultrasonic activation of Naocl: Ultrasound seems to exert its antibacterial and cleaning effects (along with naocl) through acoustic streaming and cavitation, in addition to warming and moving the irrigating substance to areas of complex anatomy. Acoustic streaming and cavitation may disturb and cause de-agglomeration of endodontic biofilm, flushing out the detached bacterial cells from the canal or rendering the resultant planktonic bacteria more susceptible to the possibly enhance antibacterial effects of warmed naocl. Cavitation may produce a transient weakening of the bacterial cell wall and cytoplasmic membrane, making the bacteria more susceptible to naocl. Thus, passive ultrasonic irrigation has the potential to reduce bacterial population.¹

Photo activated disinfection therapy: PDT, or photo activated disinfection, utilizes light of a specific wavelength to activate a non-toxic photoactive dye (photo sensitizer) in the presence of oxygen. The transfer of energy from the activated photo sensitizer to available oxygen gives rise to formation of highly reactive oxygen species that kill microorganisms by damaging essential cellular molecules. Diode laser systems have been widely used in pdt because they are easy to handle, portable and cost-effective. Because this technique does not promote root canal enlargement, it has been recommended as a supplementary disinfecting approach to be used following

chemo-mechanical preparation and has significantly reduced the number of e.fecalis.¹²

Obturation: main objective of obturation is to have a three dimensional and fluid tight seal with a suitable material so as to prevent percolation and micro-leakage of periapical exudate into the root canal space and also to prevent re-infection by completely obliterating the apical foramen and other portals of communication to peri-apical tissues. With the emergence of newer systems of obturation like thermo-plasticized obturation system three dimensional obturation can be achieved thus promising a better treatment result in one visit.⁷

Conclusion

With the expanding horizons of technological advancements, single visit endodontics is creating a way for maximum dentistry in minimum visits. The new paradigm of quick treatment should not deviate from biologic principles of optimum disinfection of the root canal system, only then the long term successful results of single visit endodontics will be fetched.

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