

Endodontics: single versus multiple visit

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Introduction

This article was written to guide endodontic clinicians making decisions regarding one visit versus multiple visit treatment. It is broken into two sections: single and multi-visit endodontic therapy. Written from two different clinical viewpoints, it addresses the indications, contraindications, advantages and disadvantages of each.

Single visit endodontic therapy: Omar Ikram

Much time has been spent investigating and researching the healing or maintenance of periapical health, commonly called 'success', of single visit versus multiple visit root canal treatment.

The consensus is that there is no significant difference in success rates of either treatment modality (Sathorn et al, 2005; Figini et al, 2008).

Given that there is no obvious difference in success rates between one or multiple visits, an analysis of the possible advantages of each protocol is appropriate.

The clinical presentation and the patient's individual circumstances should always be considered first and foremost in clinical decision making.

The practical advantages of multiple visit root canal treatment include:



Figure 1: Apparently 'simple' canal anatomy in LL7 (lower left second molar) that is amenable to treatment in one visit using the appropriate techniques. The patient was asymptomatic and did not have any contraindications to treatment

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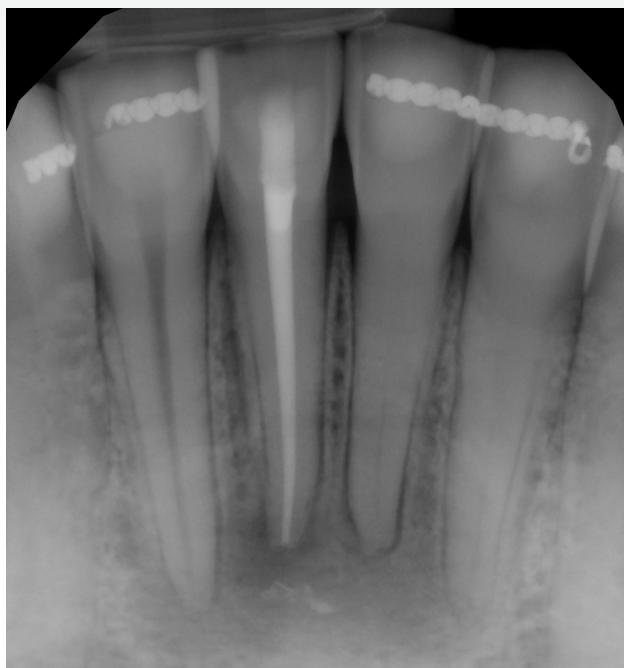


Figure 2a: Severe calcification in LL2 (lower left lateral incisor). LL2 is treatment planned for an orthograde root canal therapy attempt followed by surgery on LL2-LR1 for curettage, biopsy, and retro-fill of these teeth. This figure is prior to the non-surgical attempt to treat LL1



Figure 2b: After the unsuccessful attempt to locate the canal in LL1 and prior to attempting LL2. Both LL2 and LL1 are inherently challenging given the calcification. Multi-visit therapy is virtually assured. A CBCT was taken and a canal not visible in either of these teeth until the apical third (as in the 2D images provided)

- The antimicrobial benefit of calcium hydroxide
- The protein denaturing properties of calcium hydroxide, which aid pulp tissue dissolution when sodium hypochlorite is used as the irrigant
 - The opportunity to monitor clinical symptoms, soft tissue and or radiographic healing prior to obturation and definitive restoration
- Decreased operator and patient fatigue.

The practical advantages of single visit treatment include:

- Patient convenience
- Reduction of dental materials. The reduced number of visits also reduces the materials required and thus reduces costs
- Reduction of the potential for microleakage between treatment visits. With single visit root canal treatment, the definitive core restoration should be placed after shaping and canal disinfection under the rubber dam. This removes the need for temporary restorative materials and reduces the potential for coronal leakage between appointments.

With these advantages in mind, when would I consider providing a multiple visit or a single visit root canal treatment

for a patient? From most important to least important, factors to consider before deciding on single or multi-visit treatment include:

1. Anatomy of the tooth being treated
2. Skill of the operator
3. Experience using modern endodontic equipment
4. Radiographic size of the periapical lesion
5. Teeth with sinus tracts
6. Cracked teeth
7. Patient factors.

1. Anatomy of the tooth being treated

Success rates are highest if we can prepare and then close the access cavity definitively.

In general, the extraction of a root canal treated teeth due to a failure of the shaping, disinfection and obturation is relatively rare in comparison to removal due to fracture (Vire, 1991; Salehrabi and Rotstein, 2004). However, when failure of root canal treatment occurs, the most common reason is unlocated anatomy (Nair, 2004; Siqueira, 2001).

If the canal(s) is easier to locate and clean, then single visit treatment might be a possibility. If the anatomy is complex, I

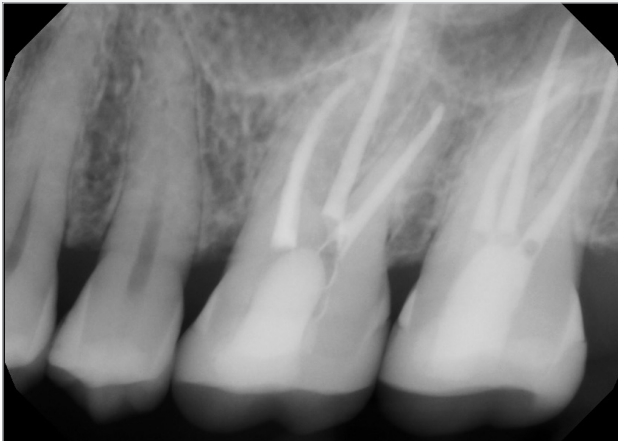


Figure 3a: UL6 (upper left first molar) was previously treated and has been chronically tender to chewing for many years. CBCT revealed four canals obturated. The decision was made to attempt retreatment in one visit if possible. Access revealed coronal leakage under the previous build up as a result of an unset composite and lack of adaptation of the composite along the pulpal floor

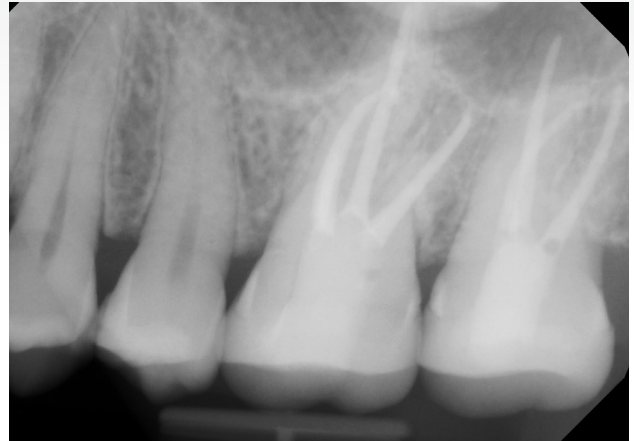


Figure 3b: Postoperative radiograph after retreatment that was accomplished in one visit. The patient's symptoms resolved immediately

would be more inclined to schedule a multiple visit treatment – with the aim of the first visit being to locate and negotiate this complex anatomy and then see resolution of signs and symptoms.

2. Skill of the operator

To be able to carry out root canal treatment in a manner that is efficient and of a good standard, the operator needs to negotiate the anatomy. In single visit root canal treatment, operator and patient fatigue are often high.

To be able to complete single visit treatment, I have found that a chair time of approximately two hours on a conscious patient is usually the maximum for most able-bodied patients.

For single visit treatment to be an option, the operator needs to be able to perform all the treatment within this approximate time.

To be able to shape, disinfect and obturate with three or more root canals in this time frame the skill of the operator must be extremely high.

3. Experience using modern endodontic equipment

There are some teeth that can be treated with low-level magnification, but the magnification and illumination of an operating microscope speeds up treatment.

Use of a motor driven root canal preparation system also reduces preparation time.

If a cone beam scan is taken prior to treatment then this may also help reduce the time spent looking for extra canals, such as lingual canals in lower incisor teeth, or second mesiobuccal canals in upper molar teeth.

4. Radiographic size of the periapical lesion

Teeth with periapical lesions above 5mm in diameter have a reduced success rate (Ng et al, 2011) and therefore it is my preference for these to be treated over multiple visits so that the clinical or radiographic healing can be evaluated during the treatment.

If healing is not occurring, then the patient is free to decide whether to persist with treatment and possible apical surgery after filling the canals, or to proceed with extraction. By doing this, the patient can make an informed choice before definitive filling of the canals and restoration of the tooth.

5. Teeth with sinus tracts

Teeth with sinus tracts have a lower chance of radiographic healing (Ng et al, 2011). It is helpful to see healing of these after shaping and disinfection of the root canal system prior to filling the canals and restoring the tooth definitively.

If a sinus tract does not heal or improve after eight weeks, I will generally re-medicate the canals. If it fails to heal after this, discuss the option of apical surgery with the patient further, if it is appropriate, or the possibility of extraction.

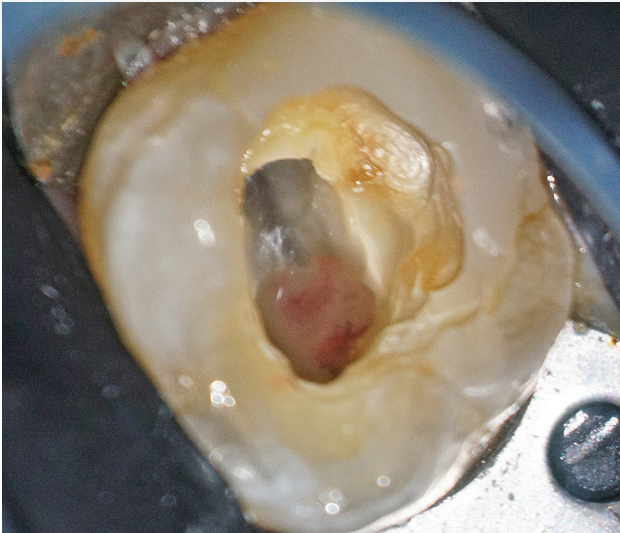


Figure 4: Purulent drainage (from the palatal canal of this upper molar), which is an absolute contraindication for single visit endodontic treatment (image courtesy of Dr Ikram) upper right lateral incisor can be seen



Figure 5: Coronal fracture through the distal marginal ridge of this lower molar that reaches the pulpal floor. Such a fracture is a clear indication for extraction (image courtesy of Dr Ikram)



Figure 6: Severe bleeding upon access of this molar tooth. An inability to stop the bleeding in such irreversibly inflamed clinical cases is an absolute contraindication to one visit treatment (image courtesy of Dr Ikram)

6. Cracked teeth

Due to the unpredictable nature of treating cracked teeth, my preference is to see resolution of the symptoms before filling the canals and restoring the tooth. Therefore, these are the teeth that I almost always treat over multiple visits.

7. Patient factors

Patients lead busy lives, often travel long distances to the

practice, and can have special medical needs. These are often under researched, with regards to their influence on the treatment we provide and yet play a big role in the patient's preferences.

If the patient requires antibiotic cover, intravenous sedation, general anesthetic or is travelling a long distance, my preference is to treat the patient in a single visit. On the other hand, if the patient has difficulty sitting still for long appointments – such as those with Parkinson's disease, chronic back pain or when treating pediatric patients – my preference is to perform root canal treatment over multiple visits, to reduce length of chair time.

All these considerations are part of the treatment planning process, but should never compromise our goal to provide the best care (Figures 1-6).

Multi-visit endodontic treatment: Tyler Neal and Richard Mounce

A decision must be made in every endodontic case as to whether the procedure can be completed in one visit or requires multiple visits. This decision can be complex, as while there are few absolute contraindications to one visit treatment, there are a larger number of arguable and relative clinical contraindications.

Aside from clinical considerations, the diagnostic skills and clinician experience, as well as the patient's ability to tolerate the procedure, all impact the visits required.

This second section of the article will review the absolute and relative contraindications

to single visit treatment and address the preparation and expertise needed to optimise the number of visits. Such optimisation should increase possible one visit treatment, increase healing and clinical success, and diminish flare-ups that might otherwise result.

One visit therapy is optimal for more important reasons than simply patient convenience. Fewer visits equate to fewer injections. In addition, single visit therapy eliminates repeated coronal access.

Repeated access runs the risk of excessive and unnecessary tooth structure removal, leading to longer term fracture risk. In addition, each additional access increases iatrogenic risk (perforation, separated files, canal transportation etc).

Contraindications

As mentioned, there are few, if any, absolute contraindications to one visit treatment, but these include:

- Apices that cannot be made clean and dry in one visit
- Preoperative fluctuant swelling
- Preoperative numbness especially in the lower arch
- A lack of patient cooperation when a second visit would allow optimal treatment either by referral possibly with IV or oral sedation. More specifically, if a patient has severe preoperative percussion sensitivity, fluctuant swelling, cellulitis, numbness, induration, among other possible scenarios and combinations of these entities, there is an undue risk of severe pain, worsening swelling and infection with possibly fatal consequences in rare cases if endodontic therapy is provided in one visit.

Case dependent, in some of the aforementioned scenarios, incision and drainage may be required prior to initiation of endodontic therapy, or the tooth might be best extracted, especially in the presence of a rapidly spreading fluctuant infection among other conditions.

Consultation with an oral surgeon in these clinical situations is often beneficial. Caution and clinical judgement are advised. When evaluating a case, it is critical to manage patient expectations, one aspect of which is one versus two visit treatment.

Obviously, the greater the number of complexities and risks, the greater the probability of requiring two visits. For example, in a patient with limited opening, one who cannot be fully reclined, severe calcification, tooth rotation and

tipping, severe canal curvature, open apices, trauma cases, crown or bridge access, a history of local anaesthesia challenges, severe dental anxiety, among a host of other clinical and patient related factors, the possibilities for two visit treatment increases, especially as the experience level of the clinician decreases.

Patients who tell of previous procedural difficulties, especially related to an inability to obtain profound local anaesthesia should be heard and taken seriously.

While all of the above are relative issues, and often managed efficiently in the hands of a specialist, it is not always clear to the clinician preoperatively to what degree any of these issues will ultimately combine or conspire to make the treatment better approached in one visit or more.

Case considerations

Aside from the above parameters, several additional case types lend themselves to multiple visits:

- Complex retreatment
- Some trauma cases
- Combined orthograde and surgical procedures.

While managing dental trauma is beyond the scope of this article, complex retreatment is noteworthy.

Separated files, calcified canals, missed canals, perforations, iatrogenic misadventures (especially canal transportations of all types), removal of previous canal filling materials, and access through crowns and bridges, post removal etc will all take longer and require optimal disinfection techniques relative to first time orthograde techniques in irreversibly inflamed vital cases.

Complicating complex retreatment is the degree and duration of coronal leakage. Long-term coronal leakage is correlated with highly organised bacterial biofilm that is significantly more challenging to remove than vital inflamed pulp.

As a result, disassembly of the previous root canal, remediation of the iatrogenic issues internally within the tooth, optimising disinfection, and obturation of the canal system may require two visits instead of one.

Recently, the 'zero apicoectomy' technique has been introduced that advocates completion of the orthograde treatment, curettage of the apical lesion, biopsy, and flap closure, without apicoectomy and retrofill, all in one visit.

The technique requires a judgement that the orthograde treatment is adequate and, with apical curettage, likely to heal. While the technique is controversial in some quarters, initial case reports and research are encouraging.

In addition, some clinicians have advocated for multiple applications of calcium hydroxide in cases with a sinus tract, fistula, or a radiographic present periapical lesion, as alluded to by Dr Ikram in the first section of this article.

Diminution of the lesion and/or closure of the fistula is used as a condition for case completion and an indication that healing is occurring.

While the concept is clinically sound, and will not cause harm, there is no literature-based proof that this multi-visit approach is optimal to ensure healing of the case.

In any event, optimal clinical results have their genesis in a comprehensive preoperative examination, assurance of restorability, a pulpal and periapical diagnosis, informed consent, use of a surgical operating microscope, ultrasonics, activated and copious irrigation, and placement of a coronal seal under the rubber dam.

From the specialist viewpoint, the above steps are the standard of practice, and ultimately the legal standard of care.

Starting a case without these capabilities and skills inherently limits the possibilities for successful treatment and will necessarily take longer than using these principles and organisation from the start of the case.

Said differently, in the right hands, using the right equipment and concepts, the vast majority of cases can be treated in one visit, as Dr Ikram mentioned.

Recognising those cases that should be broken into more than one visit – mostly to improve the level of canal disinfection through canal location, remediation of previous iatrogenic problems, resolution of infection and swelling, and provision of a coronal seal at the time of treatment – will make both single and multiple visit treatments as successful as possible.

Summary

This article has presented the case for single visit and multi-visit endodontic treatment.

Emphasis has been placed on preoperative diagnosis, possessing the correct clinical skill sets and technology to manage single visit treatment where appropriate and profound local anaesthesia.

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Ikram O, Neal T, Mounce R (2021) Endodontics: single versus multiple visit. Clinical Dentistry 1(6): 57-63