Single visit vs. multiple visits for endodontic treatment: A review

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ABSTRACT:

TOPIC: Single visit vs. Multiple visits for endodontic treatment: A review

AIM: To explore various aspects of single and multiple visits for endodontic treatment like criteria selection, complications and success rates.

OBJECTIVE: To compare the effectiveness of single and multiple-visit RCT and assess the difference in short- and long-term complications between single and multiple-visit RCT.

BACKGROUND: Root canal treatment (RCT) or endodontic treatment, is a common procedure in dentistry. The main indications for RCT are irreversible pulpitis and necrosis of the dental pulp. The success of RCT depends on a series of variables such as post operative pain, sensitivity, infection, swelling and overall condition of tooth.

REASON FOR RESEARCH: To understand various aspects of single and multiple visits and their advantages and disadvantages for a better criteria selection of patients.

INTRODUCTION:

Root canal treatment or endodontic treatment, is a common procedure in dentistry. The main indications for RCT are irreversible pulpitis and necrosis of the dental pulp caused by carious processes or dental trauma. The goal of root canal treatment is to avoid apical periodontitis. Root canal treatment is a procedure performed to remove organic tissue and pathogenic bacteria from the root canal system by means of mechanical instrumentation associated with irrigation[1].After drying, the space is filled with cement andgutta-percha, rubber-based material. The placement of a safe coronal seal completes the RCT procedure.Root canal treatmentcan be done using two approaches; first, completing the treatment in multiple-visits and second is by completeing the entire access opening, cleaning and shaping and obturation in a single sitting. Which of the two approaches has the higher success rate and least complication is often debated upon by dentists.

Root canal treatment can be followed by numerous short-and long-term complications. The most common short term complications include Iimmediate postoperative inflammation of periradicular tissues associated with pain. The main long-term complications include the persistence of inflammation or sinus track, pain, and an absence of radiographic healing. Several studies comparing radiographic healing and intracanal medication were compared but the results were conflicting and inconclusive.

The aim of this review is to compare both the success rates and post operative complication levels of both; single visit and multiple visit treatments.

INDICATIONS FOR ENDODONTIC TREATMENT: The two main causes for root canal treatment are irreversible pulpitis and necrosis of the dental pulp caused by carious processes or dental trauma. The other causes include Deep caries cavity, Chipped or cracked tooth or elective treatment (for added retention of crowns)[1].

SINGLE VISIT TREATMENT: Single visit treatment is an approach where in access opening, cleaning and shapingwith intermittent irrigation and obturationis done in a single sitting. The selection criteria is limited and the specific in nature.

SELECTION CRITERIA FOR SINGLE VISIT ENDODONTICS:

OLIETS CRITERIA:

- Positive patient acceptance
- Sufficient time to complete procedure
- Absence of acute symptoms required drainage
- Absence of anatomic obstacles and procedural difficulties

Other common reasons for single visit treatment

1. Presence of pain
2. Uncooperative patient
3. Patients requiring full mouth rehabilitation
4. Physically disabled patients who cannot come to dental clinics frequently
5. Uncomplicated vital teeth
6. Patients in whom sedation is required
7. Fractured anterior or bicuspid teeth where esthetics is the concern.
8. Teeth with accidental/mechanical pulp exposure.
9. Intentional root canal therapy.
10. Vital pulp exposures due to caries or trauma with symptomatic pulpitis.
11. Teeth requiring immediate post placement, where esthetics is the concern.
12. Non vital teeth with sinus tract[3,4,5].

SINGLE VISIT TREATMENT CONTRAINDICATIONS:

1. Teeth with anatomic anomalies for e.g. calcifiedand curved canals.
2. Patients with allergies.
3. Acute alveolar abscess cases with pus discharge.
4. Patients who are unable to keep mouth open for long duration for e.g. TMJ disorders.
5. Symptomatic non vital teeth and no sinus tract.
6. Asymptomatic non vital teeth with periapical pathology and no sinus tract.[5,6]

STEPS IN SINGLE VISIT TREATMENT:

1. **ACCESS OPENING AND CLEANING AND SHAPING:**
   Access opening done using a round and tapered fissure bur till a "drop" is felt indicating that the pulp chamber is entered. Cleaning and shaping is done using finger files or rotary files with intermittent irrigation.

2. **IRRIGATION TECHNIQUE FOR SINGLE VISIT TREATMENT:**

Irrigation is done frequently to remove and loosen debris and microorganisms and to ensure that the debris are not pushed out the apex. Thus, this helps in flushing, lubrication, and smear layer removal. The most commonly used irrigants include:

1. EDTA (Ethylene diaminetetraacetic acid) (17%)
2. Chlorhexidine 0.2%
3. Sodium hypochlorite 5.25%
4. Citric acid 50%
5. Distilled water[2]

IRRIGATION SEQUENCE: The irrigation sequence similar for both single visit and multiple visit approaches[2].

Figure 1. Shows the sequence of irrigants used for single visit treatment

3. **OBTURATION AND POST ENDODONTIC RESTORATION:**
   Obturation is done using lateral or vertical compaction technique. The post endodontic restoration is done using GIC or temporary restoration and crowns can be given which can be either all metal, metal ceramic or all ceramic.

MULTIPLE VISIT:

Multiple visit treatment is a safer and more commonly accepted method of root canal treatment. Multiple visit endodontic treatment is performed in the same sequence of events as that of single visit but they are carried out in 3-4 appointments to help reduce chances of error and infection.

SELECTION CRITERIA FOR MULTIPLE VISIT TREATMENT:

1. Allow time for lessening of symptoms such as pain
2. Tooth with doubtful prognosis can be easily assessed
3. Positive effects of the inter canal medicaments during appointments
4. Reduction of post-operative pain
5. Patient or doctor time constrains [3,5,6]

STEPS IN MULTIPLE VISIT ENDODONTIC TREATMENT:

The sequence of events for the treatment is same as that of single visit treatment. The main difference between the two is the room for error. The quality of each step much be precise in case of single visit treatment due to limited room for error. Due to time between the appointments, the room for error is wider as corrections can be made.

Success of any root canal treatment whether it is single visit or multiple visit depend upon case selection and the way we are performing the root canal treatment procedure. There are certain complications which can arise during the treatment or after the treatment e.g.

POST OPERATIVE COMPLICATIONS:

According to the European Society of Endodontics criteria regarding the endodontic treatment results are the following[9]:

1. At least one year after completion of Endodontic treatment success is represented by:

   a. Total absence of specific clinical symptoms (pain, swelling, fistula)
   b. Tooth is functional
   c. Radiological image lacks any pathological elements

2. Failure is represented by: Occurrence of periapical lesions, or preexisting one increased in volume that within four years pre-existing periapical lesion remained the same or has decreased in size without be completely disappear[8].

   a. Radiological signs of root resorption or hypercementosis.
   b. There is a contradiction between clinical symptoms and radiological.

POST OPERATIVE COMPLICATIONS DUE TO IRRIGATION:

A.Immediate severe pain
B.Immediate oedema of neighbouring soft tissues
C.Possible extension of oedema over the injured half side of the face, upper lip, infraorbital D.region Profuse bleeding from the root canal
E.Profuse interstitial bleeding with haemorrhage of the skin and mucosa (ecchymosis)
F.Chlorine taste and irritation of the throat after injection into the maxillary sinus
G.Secondary infection possible
H.Reversible anaesthesia or paraesthesia possible [1,2]

POST OPERATIVE COMPLICATIONS OF OBTURATION:

Gutta-percha:
The most common core material worldwide is gutta- percha. It has a history of usage in dentistry of well over a century and is chemically considered a polyisoprene (a crystalline polymer). In its clinical formulations, it comprises approximately 20% of total volume with the remainder mostly zinc oxide and proprietary additives. Gutta-percha has a low degree of toxicity when compared with other components used in endodontic obturation and has withstood the test of time in clinical usage [11].

Eugenol:
Eugenol is a phenol derivative and a major component of the numerous formulations of sealers that incorpo- rate this liquid into a zinc oxide powder for placement with a solid core obturation. Most ZOE sealer cements are cytotoxic and invoke an inflammatory response in connective tissues[12]. As a component, the liquid exhibits an inhibition of sensory nerve activity. Because of its long-time use as a sedative or anodyne in dentistry, eugenol has been an integral component in modern dental therapeutics. It is also currently recognized that if misused, eugenol can be highly inflammatory and destructive.

Calcium hydroxide:
Calcium hydroxide sealers are relatively new to the marketplace and have been promoted for their ability to stimulate repair. These claims have yet to be proven. Rather, the inclusion of calcium hydroxide should be assessed for its efficacy in creating a

long-term seal of the root canal space and its inflammatory effects on periapical tissues. In one study, calcium hydroxide reported this initial toxicity was due to the formation of a very small amount of formaldehyde as a result of the chemical setting process[13]. They described the release of formaldehyde as thousands of times lower than conventional formaldehyde containing sealers such as N2, and stated that after setting there was little toxic effect.

REASONS FOR ROOT CANAL FAILURE:

1. Multiple root canals

Sometimes a tooth may have multiple root canals. A root canal may be missed and not cleaned and sealed. Also, the canal may not be cleaned and sealed to its full length. This happens if the length of the root canal is not measured correctly. As a result, bacteria harboring the uncleaned root canal will proliferate and cause infection of the entire root canal system[7]

2. Root perforation

An endodontic file is used to clean the root canal before sealing it with a suitable material. It looks like a needle and is engaged into the root canal. The file, if it misses the root canal, will perforate the side of the tooth, creating an opening. If the opening is not sealed, bacteria will enter through it and cause secondary infection of the tooth[6].

3. Filing beyond the root length

If the endodontic file reaches beyond the root length, the bacteria within the root canal will be transported to the periapical area (area surrounding the root) causing infection of the periapical area. In this case, a periapical surgery is needed to eliminate the infection[8].

4. Crack in the root of the tooth

A small crack at the root of the tooth may remain undetected till the completion of root canal treatment. The crack will allow bacteria to enter the root canal causing infection[7].

5. Microleakage

After root canal treatment, a suitable restorative material is used to fill the access cavity in the tooth. If the tooth is not properly restored or the material is unsuitable, marginal leakage may occur(marginal gap is the gap between the restorative material and the tooth) causing ingress of bacteria and fluid into the root[8].

6. Root fracture

The root is so brittle after the pulp dies that it can fracture during root canal treatment. Assessment of the tooth prior to treatment is important to prevent such complication. In this case extraction of the tooth is advised. Endodontic surgery can be done to remove the fractured root but it has poor prognosis.

SINGLE VISIT VS. MULTIPLE VISIT TREATMENT:

The debate between single visit multiple visit is a long argued topic. According to Amy Wai- lee Yong et al [14] the success rate of single-visit and multiple-visit endodontic treatments had no significant difference. There was also no statistical difference in the prevalence of postoperative pain between two treatment groups. This is also supported by Wong AW et al [15] who did a Meta-analysis on 47 clinical studies, and the results showed that the postoperative complications of the single-visit and multiple-visit endodontic treatment were similar. Furthermore, neither single-visit endodontic treatment nor multiple-visit treatment had superior results over the other in terms of healing or success rate. He also performed a clinical trial that came up with the same results. This is further confirmed by Rajesh singla et al who also said the the complications do not depend on the approaches, rather they depend on the precision of treatment.[17]Omar Yousef also performed clinical trials and came up with the conclusion that post operative pain does not significantly vary for single vs. multiple visit treatment approach.[18]

CONCLUSION:

The debate on single visit vs. Multiple visit endodontic treatment is one that's withstood time without a conclusion. The success rate and the amount of post operative complications depend on the selection criteria and the patient's conditions. They depend on the skill set of the clinician and the preparation techniques. The success rate and prevalence of postoperative pain of single-visit or multiple-visit treatment had no significant difference.

REFERENCES:

[1] Frequency of postoperative pain in one- versus two-visit endodontic treatment Drs. Jorge Paredes Vieyra, Francisco Javier Jimenez Enriquez, and FabiánOcampo Acosta evaluate the incidence of postoperative pain in one- versus two-visit root canal treatment of necrotic teeth with apical periodontitis after a 1-year healing period/ volume 8 issue 1

[2] 1-2-3 steps in endodontic irrigation By Philippe Sleiman, DDS, DUA, MSc, PhD, FICD: Endo tribune US edition 2008

[3] Single Visit Endodontic Therapy: A Review Ahmed F, Thosar N*, Baliga MS and Rathi N Department of Pedodontics and Preventive Dentistry, SharadPawar Dental College, India *Corresponding author: NilimaThosar, Department of Pedodontics and Preventive Dentistry, SharadPawar Dental College, Wardha-442004, Maharashtra, India Received: March 10, 2016; Accepted: June 04, 2016; Published: June 06, 2016: Austin journal of dentistry

[4] Single versus multiple visits for endodontic treatment of permanent teeth (Review) Figini L, Lodi G, Gorni F, Gagliani M This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in TheCochrane Library 2008, Issue 1

[5] L.B.Peters and P.R.Weselink,Periapical healing of endodntically treated teeth in one and two visits obturated in the presence or absence of detectable microorganisms.IEJ 2002,35,660-667

[6] .M.Trope ,Flare up rate of single-visit endodntics, IEJ,1991,24,24-27

[7] Oliet S. Single-visit endodontics: A clinical study. J Endod.1983; 9: 147-152.

[8] Trope M, Delano EO, Orstavik D. Endodontic Treatment of Teeth with Apical Periodontitis: Single vs. Multivisit Treatment. J Endod. 1999; 25: 345-350.

[9] Wahl MJ. Myths of single visit endodontics. Gen Dent. 1996; 44: 126-131

[10] Tsesis I, Rosen E, Taschieri S, Telishevsky Strauss Y, Ceresoli V and Del Fabbro M (2013). Outcomes of surgical endodontic treatment performed by a modern technique: an updated meta-analysis of the literature. Journal of Endodontics 39(3):332-339.

[11] Wong AW, Zhang S, Zhang CF and Chu CH (2015b). Perceptions of single-visit and multiple-visit endodontic treatment: a survey of endodontic specialists and general dentists in Hong Kong. Journal of Investigative and Clinical Dentistry 2015:1-9. doi: 10.1111/jicd.12154.

[12] Yoldas O, Topuz A, Isci AS and Oztunc H (2004). Postoperative pain after endodontic retreatment: single- versus two-visit treatment. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology 98(4):483-487.

[13] Sathorn C, Parashos P and Messer H (2009). Australian endodontists' perceptions of single and multiple visit root canal treatment. International Endodontic Journal 42(9):811-818.

[14] Treatment outcomes of single-visit versus multiple-visit non-surgical endodontic therapy: a randomised clinical trial: Amy Wai-Yee Wong,[1,2] Cissy Sung-Chi Tsang,[2] Shinan Zhang,[1] Kar-Yan Li,[1] Chengfei Zhang, Chun-Hung Chu[1]

[15] Wong AW[1], Zhang C[1], Chu CH[1], A systematic review of nonsurgical single-visit versus multiple-visit endodontic treatment.ClinCosmetInvestig Dent. 2014 May 8;6:45-56. doi: 10.2147/CCIDE.S61487. eCollection 2014.

[16] Wong AW[1,2], Tsang CS[3], Zhang S[4], Li KY[5], Zhang C[6], Chu CH[7]. Treatment outcomes of single-visit versus multiple-visit non-surgical endodontic therapy: a randomised clinical trial.BMC Oral Health. 2015 Dec 19;15:162. doi: 10.1186/s12903-015-0148-x.

[17] Rajesh singla, Nikhil marwesh, REVIEW on single vs. multiple visit treatment. ClinCosmetInvestig Dent. 2014 May 8;6:45-56. doi: 10.2147/CCIDE.S61487. eCollection 2014.

[18] Omar Yousef, Kashmala AZIZ khan, Farihanaz, post operative complications of single vs multiple visit treatment : A research; IEJ,1991,24,24-27