

Review Article

Single Visit Endodontic Therapy: A Review

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Abstract

Successful endodontic treatment depends upon localization, proper chemo-mechanical preparation of the root canal system, debridement, shaping, disinfection, and three dimensional obturation of canal system. Thus multiple sitting endodontic therapy was advocated and followed. Single visit endodontic treatment had various drawbacks mainly concerning with post-operative pain and failure of the treatment outcome. With the advent of newer technology, elimination of these various drawbacks of single visit endodontic therapy could be made possible in many scenarios. The present article discussed the various case selection, indications, contraindications, patient and practice advantages with respect to single visit endodontic therapy. Present article also discusses about the adjunct used for the faster and better treatment outcomes of single visit endodontics mainly pain control, isolation access cavity preparation, light and magnification, use of irrigants and use of Laser.

Keywords: Single visit endodontic therapy, Post-operative pain

Introduction

In endodontics, with continuously evolving newer technology and data gathered from evidence based research, the art and science of endodontics have taken multiple travelled as well as untravelled roads in their quest for excellence and this may itself have opened new roads to travel [1].

In other words, Endodontic success depends upon localization, proper chemo mechanical preparation of the root canal system, debridement, shaping, disinfection, and three dimensional obturation of canal system. To achieve these goals, endodontic therapy used to be performed in multiple visits for complete disinfection of the canals, all together for the better success of endodontic therapy.

Multiple visit endodontics was an established norm in the field of endodontics, but it has certain 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 [2].

All these factors led to the shift in endodontic therapy from multiple visits to single visit endodontic therapy which is a conservative, non surgical treatment of an endodontically involved tooth consisting of complete chemo-mechanical preparation and obturation of the root canal system in a single visit [3].

Retrospective analysis suggests that single visit endodontics is a natural corollary to the transformation in the treatment modality of endodontic therapy to an era of rotary endodontics from an earlier era which consisted of hand held files. With research studies, the field of intra canal preparation, culturing, root canal filling materials and techniques has lead to complete alteration in the concept of endodontic practice. Because of the ever expanding newer materials and an increasing number of favorable clinical research studies and clinicians ability to perform more accurate endodontic procedures

using dental operative microscopes which greatly increases the visualization of the area of interest, enhanced imaging techniques using digital radiography, precise apical foramen detection using modern electronic apex locators, and root canal cleaning and shaping with more refined method of using rotary driven NiTi files used with computer assisted electronic hand pieces, ultrasonics, all for the sake of achieving an optical result during endodontic treatment ultimately adding to above concept of "Maximum dentistry in Minimum visits" in the present scenario. As time factor is probably one of the more important factor it is possible to use single visit endodontics as the most accepted technique among the patients and operators.

Single visit root canal treatment versus the multiple visit root canal treatment has been the subject of a long standing debate within the dental community. Some of the unresolved issues include differences in clinical outcomes, inadequate microbial control and pain. The air around the controversy can be investigated more systematically with the aid of an evidence based approach. When the clinicians are faced with choices of which treatment should be offered to patients, the central issues that should be considered are effectiveness, complication, cost and probably patient /operator satisfaction [4].

So with recent advances single visit endodontics has been shown to be an effective treatment modality when compared with multiple visit therapy and it does not deviate from achieving the objectives of proper biomechanical preparation, debridement, shaping, disinfection and 3 dimensional obturation of root canal system and is more beneficial to the patient and dentist provided there is careful case selection and strict follow of standard endodontic protocols.

Indications for single visit endodontics are

- Patients requiring full mouth rehabilitation [1-4].
- Physically disabled patients who cannot come to dental clinics frequently.
- Uncomplicated vital teeth.
- Patients in whom sedation is required.

- Fractured anterior or bicuspid teeth where esthetics is the concern.
- Teeth with accidental/mechanical pulp exposure.
- Intentional root canal therapy.
- Vital pulp exposures due to caries or trauma with symptomatic pulpitis.
- Teeth requiring immediate post placement, where esthetics is the concern.
- Teeth with sub-gingival breakdown, multiple coronal walls missing, where isolation and sealing is the problem.
- Non vital teeth with sinus tract.
- Some of the re-treatment cases.

Contraindications for single visit endodontics are

Patients having severe pain on percussion suffering from acute apical periodontitis [1-3].

- Teeth with anatomic anomalies for e.g. calcified and curved canals.
- Patients with allergies.
- Acute alveolar abscess cases with pus discharge.
- Patients who are unable to keep mouth open for long duration for e.g. TMJ disorders.
- Teeth with limited access.
- Symptomatic non vital teeth and no sinus tract.
- Asymptomatic non vital teeth with periapical pathology and no sinus tract.
- For most of the re-treatment cases.

Practice management advantages

- The number of teeth that patients are willing to save may increase because they do not have to return as often [3].
- Patient remembers a single healing procedure rather than multiple episode of pain and discomfort associated with the clinician.
- Prosthetic work can begin without delay.
- Single appointment treatment limits schedule interruption to replace lost or broken temporary restorations.
- Same patients will pay a premium to save time.
- The risk of cancelled appointments is reduced.
- 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
- Time is saved: There is no need to neither reappoint patient nor reconfirm appointments; no need to greet patients, update medical history nor anaesthetize more than once;

no need to customize instruments for patients, place rubber dam, remove temporary restorations, nor relearn patient's canal morphology etc.

Patients advantages

- Patient comfort – as the number of visits are reduced [3].
- Economics – Extra cost of multiple visits, use of comparatively less chair side time, fewer materials all increase the economics to both patient as well as doctor.
- Restorative considerations – In single visit endodontics, immediate placement of coronal restoration (post and core placements) ensure effective coronal seal and esthetics.
- Patient convenience – Patient does not have to endure the discomfort of repetitive pricking of local anesthesia and no additional appointments.
- Reduced intra appointment pain: Mid treatment flare ups which are usually caused by leakage of the temporary cements which would be reduced in single visit endodontic cases.

Adjuncts to Render Efficient and Faster Treatment in Single Visit Endodontics

Pain control

It relaxes the patient and saves time.

It is preferable to use a long acting local anesthetic agent such as bupivacaine or etidocaine. It also helps to control post-operative pain as compared to short acting local anesthetic like lignocaine. Pariorokh [5] has stated in 2012 that patients who receive bupivacaine as the anesthetic agent in mandibular molars for single-visit endodontic treatment of irreversible pulpitis as compared to those who had lidocaine as the local anesthetic has significantly less early postoperative pain and also used fewer analgesics. For better success rate of the anesthetic efficacy use of 4% articaine can be incorporated as compared to traditional use of lignocaine as observed by Roberston [6].

Sometimes supplemental anesthesia is indicated along with the standard injection [5].

These include:

- Intra-pulpal injections
- Intra-osseous injection
- Periodontal ligament injection

Isolation

The use of the rubber dam is mandatory in root canal treatment because of its following advantages:

1. Patient is protected from aspiration of instruments, tooth debris, medicaments and irrigating solutions.
2. Soft tissues are retracted and protected.
3. A surgically operating field is isolated from saliva, blood and other tissue fluids. It also reduces the risk of cross contamination of the root canal system with the spread of infectious agents.

4. Visibility is improved. It provides a dry field and reduces mirror fogging.
5. Efficiency is increased.

Access cavity preparation

While performing single visit endodontics, the objective is to perform the treatment in minimum time without compromising the quality of treatment. To achieve this goal use of conventional access cavity preparation by using hand piece and new burs along with use of ultrasonic system can be considered, as visibility will be better and also more effective in exploring canal orifices and calcifications present [1].

Magnification light

Use of high quality magnification in dentistry improves both the quality and speed of treatment, hence suitable for single visit endodontics [1]. Santos Accioly Lins C, et al. [7] gave a systemic review on operating microscope stating that use of operating microscope provide a marked significant improvement in vision of operative field thereby offering better quality jobs and a higher success rate [8-10].

Use of irrigants

Use of a suitable irrigant should be incorporated so as to improve the disinfection of the canal thereby enhancing the treatment outcome.

Use of laser

Bacteria are known to penetrate depth of 600 to 10000 micrometers whereas the irrigant can penetrate a depth of around 100 micrometer [11]. Laser has been used lately for better disinfecting of the root canal and it gives access to the deeper area of dentinal tubules of around 1000 micrometer. Thus laser improves the overall disinfection of the root canals thereby improving the treatment outcome. As per Preethee, et al. [12], use of LASER (908 nm diode) in conjunction with conventional chemo-mechanical techniques significantly eliminate *E. Faecalis* in apical third of root dentin.

Single Visit Endodontic Therapy: Acceptance

The main concern among dentist that had probably held back the single visit endodontic therapy is the common association of its post-operative pain and the regular failure of the treatment outcome previously observed.

Healing rate of single visit versus multiple visit endodontic treatment for infected root canals

Analyzing the healed and non-healed outcome is the commonest way of comparing both the treatment modality. Short or long term follow-up of both size of the lesion as well as the bone radiograph is the most commonly used technique to evaluate the process of healing, usually based on PAI score developed by Orstavik, et al. [13]. Yingying [14] in a systemic review states that healing rate for infected tooth is similar for single visit as compared to multiple-visits root canal treatment.

Post operative pain

There is that feeling in single visit management the chances of flare ups are more [15,16]. The fear that patients will probably develop post-operative pain and that the canal has been irretrievably sealed has probably been the greatest discouragement to single visit therapy.

Yingying in a systemic review has quoted that patients experience less frequency of short-term post-obturation pain after single-visit than those having multiple-visit root canal treatment.¹⁴

In the late 1970's and early 1980's, progressive endodontists accepted single visit treatment of vital cases because those canals were uninfected and therefore unlikely to undergo an infectious flare up afterward. A seldom recognized irony is that most flare ups patients experience occur between endodontic visits not after the last visit (assuming treatment of the root canal system is complete). It makes perfect sense, however before they are cleaned and sealed, these root canal systems are very efficient incubators of periradicular pathogens. Unfilled root canal spaces also harbor many chemical pain mediators (histamines, Kinins etc) created as byproducts of pulpal degeneration. A vascular root canal space becomes a safe harbor for immune cells and antibiotics in effect the perfect perpetual infection machine. Until fairly recently, a serious root canal treatment was to never finish treatment when a tooth was symptomatic, primarily because post obturation flare ups were feared. Now it is realized that the root canal spaces is most often primary etiology of patient pain, be it pulpal or periradicular. When it is pulpal in origin the degenerating tissue must be removed. In necrotic cases, periradicular pain is usually caused by the empty canal harboring chemical pain mediators and infections pathogens. In these cases cleaning and filling the root system is surest path to patient comfort. Then, because only the viable pathogens left are in well vascularized bony tissue, anti-inflammatory mediators, immune cells and antibiotics can very capably deal with them.

Galberry did not find this to be true in Louisiana, neither Nagasawa nor Nakainuta in Japan, who after treating 106 infected cases in single appointments had only a 7.5% pain incidence. Also the symptoms the patient experienced were mild.

At the University of Oklahoma however, Roane [17] and his associates found that treatment completed in multiple visits had a two to one higher frequency of pain when compared to those completed in one visit. Fara and Genet from Netherland and Brazil respectively found no difference in the incidence of pain between one and two visit cases. Trope [18] reported no flare ups in one appointment cases with no apical lesions. However retreatment of the failed cases with apical periodontitis did made the difference.

Martin Trope [19] in his *in-vivo* study had determined the flare up rates of single visit endodontics. He found that teeth without signs of apical periodontitis did not have any flare-ups; however one flare up did occurred in 69 teeth with signs of apical periodontitis which was not previously treated. The majority of flare ups occurred in teeth with signs of apical periodontitis requiring retreatment.

Thus, the studies do not give a sole valid reason to avoid single appointment endodontic therapy. Moreover, if the root canal space is left unfilled for several days tissue fluid and blood will collect and act as a medium for bacterial growth and flare ups. If it is filled this may not occur single visit can be safely tried for vital and non-vital teeth without symptoms. If antibiotics are also started along with one day before, flare up will be minimum.

Symptomatic teeth can also be managed by single visit after controlling the abscess infection with antibiotic, provided the root canal is dry without any discharge.

Summary

With the advent of technological advancement and emergence of new gadgets, evidence based dentistry and more scientific deliberations and the concept of maximum dentistry in minimum visits led to a resurgent impetus towards laying down of various protocols to enable dentists to venture into single visit endodontics with reasonable level of outcome.

Single visit root canal treatment versus the multiple visit root canal treatment has been the subject of a long standing debate within the dental community, when the clinicians are faced with choices of which treatment should be offered to patients, the central issues that should be considered are effectiveness, complication, cost and probably patient /operator satisfaction.

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