

Evaluation of Pain in Single and Multi Rooted Teeth Treated in Single Visit Endodontic Therapy

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Abstract:

Background: The incidence of post-operative pain was compared following single-visit canal treatment in single- and multi-rooted teeth, with and without periapical radiolucency. The article also reviews the issues of postoperative pain and healing, following single-visit and multi-visit endodontic therapy. Single-visit endodontic therapy (SVE) was performed in 50 single-rooted teeth and 60 multiple-rooted teeth.

Materials & Methods: Single-visit endodontic therapy (SVE) was performed in 50 single-rooted teeth and 60 multiple-rooted teeth. The subjects were divided as follows:

Group I -Single-rooted teeth with periapical radiolucency (n=25);

Group II-Single-rooted teeth without periapical radiolucency (n=25);

Group III-Multiple-rooted teeth with periapical radiolucency (n=30); and

Group IV-Multiple-rooted teeth without periapical radiolucency (n=30). Assessment of postoperative pain was done at 24hrs, 3 days and 1 week using a self report questionnaire. The data was analyzed using non-parametric Kruskal -Wallis test.

Results: No statistically significant difference was observed in postoperative pain following SVE between the single-rooted and multiple-rooted teeth groups at 24hrs, 3 days and 1 week. The presence or absence of periapical radiolucency had no significant influence on the incidence of reported post-operative pain following SVE.

Conclusion: There was no difference in incidence of pain in single rooted teeth and multi-rooted teeth with and without periapical radiolucencies following SVE. Thus, incidence of

post-operative pain does not seem to be a valid comparison criterion between single- and multiple-visit endodontic therapies. Also, the literature suggests similar success rates with single-visit and multiple-visit root canal treatment.

Key Words: Evidence based practice, multi-rooted teeth, periapical radiolucency, post-operative pain, single-visit root canal treatment

Introduction

A major goal of nonsurgical root canal treatment is the prevention or treatment of apical periodontitis, leading to the preservation of natural teeth. Since apical periodontitis originates from an infected or affected pulp, it is axiomatic that the root canal must be thoroughly debrided and obturated. Contemporary endodontic therapy is often completed in two or more appointments. The concept of single-visit endodontic therapy (SVE) is not new. However, it is only within the last few years that this technique is being incorporated into clinical practice. SVE is defined as "the conservative nonsurgical treatment of an endodontically involved tooth consisting of complete biomechanical cleansing, shaping, and obturation of the root canal system during one visit".¹ With the introduction of better diagnostic aids (surgical microscopes), instrumentation systems (Ni-Ti rotary systems), disinfection protocols (ultrasonics), and obturation techniques (single cone and injectable obturation systems), it is now considered as an acceptable alternative treatment option that is faster, well accepted by patients and also prevents the recontamination of root canals. A number of research studies have observed clinical success with single visit protocol,^{2,3} but still there is lack of evidence-based clinical studies to support the same.^{4,5} The major considerations in SVE therapy are incidence of postoperative pain and healing following treatment. Though no significant differences in success rates have been observed between the two treatment protocols⁸, the literature to date has failed to establish a consensus concerning the relationship between post operative pain and number of treatment appointments.^{4,5} Therefore, we designed a study to bring the post operative sequelae of SVE into sharper

focus. The purpose of our study was to evaluate and compare the incidence of post operative pain in single and multirooted teeth as well as with and without periapical radiolucency.

Around 35-67% of vital case and approximately 9-35% of non-vital cases are treated in a single-visit^{6,8} and one-third of cases with periapical lesions are treated in multiple-visits.⁸ Teeth indicated to be treated in single-visit include,⁹ vital teeth with pulp exposures caused by trauma, caries, or mechanical reasons; teeth with subgingival breakdown; teeth with multiple coronal walls missing; full coverage restorations with carious margins; fractured anterior or bicuspids requiring temporary restorations; teeth to be used as over-denture abutments, full jacket crowns on mandibular anterior; physically disabled patients or patients who require sedation. The main contraindications are the presence of anatomic anomalies (receded pulp chambers, calcified canals, sharply curved canals, bifurcated canals, and dilacerations) or procedural difficulties (broken instruments, perforations, ledge formation), that extend treatment time, patients suffering from physical (muscular dystrophy) or mental disability (neuro-muscular disorders) as it is difficult to obtain sufficient cooperation from these patients for SVE.

The most controversial condition is non-vital teeth with apical periodontitis and re-treatment cases in which maximum failures are seen.¹⁰ An inter-appointment dressing of calcium hydroxide reduces the number of bacteria in root canals in such cases.^{11,12} SVE for the successful treatment of such cases is controversial. The reason could be the ineffectiveness of an inter-appointment antibacterial dressing.¹³ Introduction of more effective irrigants (MTAD)¹⁴ superior BMP techniques (rotary NiTi files systems) and disinfection systems (ultrasonic's, PAD)^{15,16} may solve the problem but studies are needed to validate this.

An appropriate selection of cases for SVE is essential.^{17,18} we need positive patient acceptance, sufficient available time, absence of acute symptoms, anatomical obstacles and procedural difficulties.

Healing following SEV is dependent on case selection, proper treatment protocol, and adequate time management. Most of the studies have shown minor or no difference in the healing rate of single- and multiple-visit endodontic therapy;^{3,18-21} low failure rates with SVE;^{10,22,23} no statistically significant differences are observed between the two treatment protocols based on gender, age, arch, pulp

vitality status or provider.^{18,24} However, a higher success rate is seen in anterior teeth as compared to posterior teeth.^{20,24} Few studies have observed a higher success rate²⁵ with multiple-visit endodontic therapy.²⁶ Studies have reported a lower incidence of postoperative pain following SVE.²⁷ Studies show that there is no statistically significant difference in postoperative pain and swelling between the two treatment groups.^{18,20} Few studies have even observed a higher frequency of postoperative pain with multi-visit endodontic treatment in both vital and non-vital cases as compared to SVE.² As far incidence of flare-up's is concerned, data from studies have shown no difference between the two treatment protocols or it is higher in case of multiple-visit endodontic therapy.^{28,29}

The purpose of this study was to compare the incidence of post-operative pain following single-visit endodontic therapy in single- and multi-rooted teeth, with and without periapical radiolucency.

Materials and Methods

The sample comprised of adult patients in the age group of 20-40 years that require root canal treatment. A total of 110 teeth that needed to undergo root canal treatment were selected for the study. Out of this, 50 were single-rooted teeth and 60 were multiple-rooted teeth. At initial appointment the subjects were informed about the nature of the study, along with a through description of the procedure to be performed. Following this an informed consent was taken from the subjects to include them in the study. A thorough clinical examination including the case history was documented. Patients who were on analgesics pre-operatively were excluded from the study. A Pre-operative radiograph was taken to check for the number and anatomy of roots and root canals, condition of periodontal tissues and for the presence of any periradicular radiolucencies. Then the subjects were divided into 4 groups as follows;

Group I - Single-rooted teeth with periapical radiolucency (n=25)

Group II - Single-rooted teeth without periapical radiolucency (n=25)

Group III - Multiple-rooted teeth with periapical radiolucency (n=30)

Group IV - Multiple-rooted teeth without periapical radiolucency (n=30)

Root canal treatment

The access cavity was prepared and coronal orifices were enlarged upto Gates Glidden No. 3. Working length was determined by Ingle’s radiographic method and cross checked using ROOT-ZX (J. Morita Mfg. Corp., Japan). Chemomechanical preparation was done with modified step back technique using 2.5% NaOCl and Saline. Canals were obturated with guttapercha and AH plus sealer by lateral compaction technique. Access cavities were restored with composite resin.

Follow-up

Subjects were recalled after 24hrs, 3 days and 1 week. At each recall appointment they were instructed to fill a self report questionnaire (Figure.1) for the assessment of postoperative pain at 24hrs, 3 days and 1 week.

radiolucency are shown in Table III and table VI. Table I and Table II show the pain experience (no. of subjects reported with postoperative pain) in single-and multiple-rooted teeth after SVE at different time intervals (24hrs, 3 days and 1 week) along with the p-value.

Table I: Pain experience in Group I and II at different time intervals.			
Groups	24 hrs	3 days	1 week
Group I (n=25)	2	6	3
Group II (n=25)	4	6	0
p-value*	0.035	0.970	0.228
*p<0.05			

A non-parametric Kruskal –Wallis test was applied to test the association between the pain scores following SVE in the single- and multiple-rooted teeth with and without

Name	
Hospital No.	
Address	
Date	
Rating for Pain	
0 No Pain	
1 Mild Pain*	
2 Moderate pain**	
3 Severe Pain***	
Please tick the appropriate response as per rating for pain described above	
Pain after 24 hrs	0 ()
	1 ()
	2 ()
	3 ()
Pain after 3 days	0 ()
	1 ()
	2 ()
	3 ()

Figure 1: Questionnaire for the Assessment of Postoperative Pain.

Mild pain – Any discomfort that did not require medication or emergency treatment, no matter how long it lasted.

** Moderate pain – Pain requiring medication.

*** Severe pain – pain that was not relieved by medication and required palliative treatment.

Most people would have used a visual analogue scale here

Results

The association between pain-scores in single-and multiple-rooted teeth with and without periapical

periapical radiolucency, after 24hrs, 3 days and 1 week. The chi-squared value obtained was used to see the overall difference between the groups. The level of significance

Table II: Pain experience in Group III and VI at different time intervals.			
Groups	24 hrs	3 days	1 week
Group III (n=30)	5	8	0
Group VI (n=30)	5	11	1
p-value*	0.602	0.351	0.317
*p<0.05			

Table III: Association between the pain-scores in single and multi-rooted teeth with periapical radiolucency after SEV at different time intervals.

	24 hrs	3 days	1 week
Chi-square	6.120	0.84	3.73
d.f.	1	1	1
p-value	0.013	0.772	0.06

was set at $p < 0.05$. The results of the study showed no statistically significant difference in postoperative pain following SEV between the single-rooted and multiple-rooted teeth groups at any recall appointment. Also presence or absence of periapical radiolucency had no significant influence of the incidence of reported post-operative pain.

Discussion

SVE has certain inherited advantages that include;

- Reduction in number of appointments and treatment cost as well.
- Avoidance of inter-appointment contamination leading to reduction in incidence of flare-ups
- No need of tooth anatomy familiarization by the clinician.
- Reduced chances of immune reaction that may be caused by intracanal medicaments.

Fear of postoperative pain is considered as a major deterrent factor for SVE for both the dentist and the patient. Though performing SVE on molars is quite a debatable issue, in this study there was no significant effect of tooth type (single- or multiple-rooted) on the incidence of post-operative pain. Similar results were observed by Olie¹⁸ in a long-term study that observed no significant difference between the single-visit and multiple-visit groups when compared by tooth morphology (anterior teeth, premolars, and molars), sex, diagnosis (vital pulps versus necrotic pulps) and filling terminus (filling short or within 0.5 mm of the radiographic apex). This can be attributed to the meticulous instrumentation technique, thorough debridement and utmost care taken to obturate the root canals completely without harming the periapical tissues.

Also incorporation of newer scientific advancements in cleaning, shaping, debridement and obturation of root canals encourage dentists to practice SVE on everyday basis. Presence or absence of periapical radiolucency also had no significant difference on incidence of postoperative pain any of the tooth groups. Similar observations are made in

Table IV: Association between the pain-scores in single and multi-rooted teeth without periapical radiolucency after SEV at different time intervals.

	24 hrs	3 days	1 week
Chi-square	0.04	1.13	0.83
d.f.	1	1	1
p-value	0.84	0.287	0.361

other studies also.¹⁸

Thus results of this study show that neither the tooth type nor the existing periapical condition has any influence on the incidence of postoperative pain. Apart from this using pain as an evaluation criterion has the following drawbacks:

- Owing to its subjective nature, pain experience can be influenced by factors like age, sex, patient psychology and past experiences.
- Stressful situation unrelated to treatment can influence the incidence of reported pain.
- Anxiety and ignorance of procedure can also alter the incidence.
- Lastly pre and post-operative suggestions concerning a procedure can influence the patient's response.

Thus post-operative pain should not be taken as an avoidance factor for SVE nor is it an effective clinical parameter to compare SVE with any other treatment protocol. This also does not indicate that SVE can be opted blindly for any tooth requiring root- canal treatment. Therefore, the following suggested preliminary considerations should be taken into account before selecting a case for SVE:³⁰

Operator Ability and Clinical Experience

SVE should be performed only by experienced practitioners who practice it on routine basis as they can better assess the time required to thoroughly cleanse, shape, and fill the root canal of teeth.

Time and Auxiliary Utilization

Based on the clinician's operative skill and the difficulty of the case a realistic time limit should be set for the endodontic treatment. As per the guidelines SVE should be completed within 45-60 minutes (a little longer would not be unreasonable). A well-trained and efficient dental assistant could help in achieving this objective.

Clinical Techniques

Adequate knowledge and competence in basic operative skills can reduce the incidence of failure in an endodontic

procedure. Thus it is necessary for the dentist to develop the skills mandatory to perform SVE.

Moreover, further clinical studies are required taking into consideration additional criteria, such as, periapical healing, reduction in tenderness to percussion or palpation, etc. to recommend SVE as a routine clinical procedure.

Conclusion

Overview of the literature and results from the present in-vivo study concluded that:

1. There is no statistically significant difference among the incidence of pain in single rooted teeth and multirooted with and without periapical radiolucencies teeth from 1st day to one week in SVE therapy.
2. Incidence of post-operative pain does not seem to be a valid comparison criterion between single- and multiple-visit endodontic therapies.
3. The literature suggests similar success rate for single-visit and multiple-visit endodontic therapy. In spite of this clinical trials are still required to recommend SVE in apical periodontitis cases.
4. The choice of treatment should be made on the basis of individuality of a case and the operator's skill. Wherever and whenever in doubt multiple-visit endodontic therapy is still recommended.

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