



A Clinical Evaluation Of Post Operative Pain With And Without Maintenance Of Apical Patency

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ABSTRACT

Objectives: The aim of the study was to assess whether maintenance of apical patency during instrumentation lead to altered postoperative pain in single visit root canal treatment as compared to non maintenance of apical patency.

Methods: A total of sixty patients with symptomatic irreversible pulpitis in vital permanent mandibular molars were selected to be included in the study. The patients were randomly divided into two groups: Group A where apical patency was maintained and Group B where it was not maintained. The root canal procedures for the patients were carried out in single sittings under rubber dam using E3 Azure (Endostar, Poland) rotary system, 2.5% sodium hypochlorite as irrigant alternating with saline and obturation by lateral compaction technique. A questionnaire employing visual analogue scale for pain assessment was given to the patient and instructions on how to fill the form were given. The patients were recalled after 7 days, and the pain was analysed. The result was tabulated and statistically analysed.

Results: There was no statistical difference in the post operative pain between the groups where apical patency was maintained vs where apical patency was not maintained.

Conclusion: Based on our findings and in comparison with those of other studies, we conclude that there is no difference in post-operative pain when there is maintenance of apical patency versus non maintenance of apical patency in permanent mandibular molars with vital pulps treated with single sitting root canals.

Keywords: apical patency, post operative pain, single sitting root canal treatment

ADVANCES IN KNOWLEDGE

Postoperative pain is a common complexity associated with root canal treatment. It can be influenced by numerous factors such as insufficient root canal preparation, extrusion of irrigants, debris or intracanal inter appointment medicament, inter appointment time span ⁽¹⁾ , canal preparation protocol ⁽²⁾, local anesthetic agent used ⁽³⁾, presence of preoperative pain, presence of periapical pathosis, and apical patency during root canal instrumentation. Over the past decade, nickel titanium rotary instrumentation, more reliable apex locators, ultrasonics, microscopic endodontics, digital radiography, newer obturation systems, and biocompatible sealing materials have helped reduce the incidence of post operative pain.

APPLICATION TO PATIENT CARE

Very few studies have studied and compared the level of post-operative pain in vital molars treated with single-sitting endodontics while maintaining and not maintaining apical patency. Further, it is important to know which technique is of benefit to the patient in terms of better establishment of drainage and whether or not it affects post operative pain. And also, to determine if a correlation exists between post-operative pain and maintenance vs non maintenance of apical patency. With this background, we decided to study the post-operative pain in vital molars treated with single visit endodontics while maintaining and not maintaining apical patency.

INTRODUCTION

The idea of a root canal procedure and pain usually go hand in hand when it is suggested to a patient. Management of dental pain during and after root canal treatment remains a big challenge even today. Clinical research has suggested that there is a wide plethora of strategies that can be employed for painless root canal. Keeping this in mind, a clinician should make every attempt to have control over all factors that can potentially cause pain.

The question of the location of the apical endpoint for root canal preparation and filling is still a vehemently debated controversy in endodontics ⁽⁴⁾. For various reasons, the apical part of the root canal can be regarded as ‘critical territory’ for both micro-organisms and the host’s defences, and also for endodontists from the clinical point of view ⁽⁵⁾.

Patency is given a rather different interpretation when authors describe it being achieved by various methods. The debate about the pros and cons of patency techniques is currently shifting between these two poles – ‘pulp lovers vs apical barbarians’. Richard Mounce commented, the ‘pulp lovers’ attempt to instrument and fill the root canal as far as the apical constriction. The group of ‘apical barbarians’, on the other hand, attach great importance to being able to push a small K-file (size 06 to 15) a certain distance (0.5 to 1 mm) through the foramen into the periapical tissue⁽⁶⁾.

The study hypothesis proposed was as follows:

Null hypothesis (H_0) – There is no difference in the incidence of

postoperative pain in single sitting RCT with maintenance and non maintenance of apical patency. Thus, if μ_1 and μ_2 are the mean values of incidence of postoperative pain for maintenance group and non maintenance group, then,

$H_0: \mu_1 = \mu_2$

Alternate hypothesis (H_1) – The incidence of postoperative pain in single sitting RCT with maintenance and non maintenance of apical patency is not similar.

$H_1: \mu_1$ not similar μ_2

$\mu_1 \neq \mu_2$

METHODS

Patient Selection:

Sixty adult patients were chosen from the referred patient pool of the Department of Conservative Dentistry and Endodontics, D. Y. Patil University School of Dentistry. The clinical study protocol was reviewed and approved by the Institutional Research And Ethical Board. The trial individuals were treated in agreement with the Declaration of Helsinki. All subjects were instructed about the aims and objectives of the study, and written authorizations were obtained from patients before their inclusion.

Inclusion Criteria:

- Healthy controls (American Society of Anaesthesiologist I or II)

who required endodontic treatment in mandibular 1st molar vital teeth / which respond positively to vitality tests with a clinical diagnosis of irreversible pulpitis

- Teeth with no history of root canal therapy
- Teeth having no pus or inflammatory exudate draining through the canal
- Teeth with straight canals that are visible clearly on the radiograph
- Absence of anatomic variations, for example, receded pulp chamber, calcified canals, or sharply curved canals
- Teeth without sinus tract
- Teeth with sound periodontal apparatus

Exclusion Criteria:

- Teeth with large restorations, previous endodontic therapy
- Teeth with periodontal disease
- Teeth having restorations with poor margins
- Teeth with pulp necrosis
- Teeth having periapical lesion >2mm

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- Teeth having radiographic evidence of apical periodontitis >2mm
- Vital teeth with full crowns
- Teeth with curved canals
- Immuno compromised patients
- Patient had taken antibiotics in the past 1 month or required antibiotic prophylaxis for the root canal procedure
- Had a positive history of analgesic use within the past 3 days

Sixty adult subjects participated in this study. Each patient was selected such that he/she presented with carious pulpal involvement of mandibular first molars which required root canal treatment, that is, either tooth 36 or 46 were cariously involved. All the cases were subjected to vitality testing using electric pulp tester and cold test. A preoperative radiograph was taken to check the canal anatomy, status of the periodontal tissues and the periapical area. An in-depth clinical examination was carried out and a comprehensive case history was taken. Once it was decided that a patient met the criteria of the study, the subject was informed about the nature of the study. After the patient agreed to participate, written consent was obtained, and the patient was randomly allocated to one of the two designated groups: patency(P) or nonpatency (NP). Each patient rated their initial pain on a 10cm Visual Analogue Scale (VAS) with a range of no pain (0 cm) and unbearable pain (10cm)⁽⁷⁾. When the sixty patients were randomly divided into the two study groups, care was taken that patients with similar pain scores were evenly distributed between the two groups.

Local anesthesia (2 %Lignocaine with 1:80,000 epinephrine) was given to all patients using conventional inferior alveolar nerve block technique. The following steps were done during standard treatment procedure; tooth was isolated using rubber dam. The access cavity preparation was done using round bur (Mani Inc., Japan) with high-speed handpiece. Low-speed Gates-Glidden burs (Dentsply Maillefer, Ballaigues, Switzerland) were used for coronal pre-flaring. Number 10 K-file was used to negotiate the canals with the help of RC Prep (Prime Dental). The Working Length (WL) was determined using an electronic apex locator (Root ZX; J Morita, Tokyo, Japan) and verified radiographically. If there was disagreement between radiographic and electronic Working Length measurements, the apex locator reading was selected. Cleaning and shaping was done with E3 Azure (Endostar, Poland) using crown-down technique. All mesial canals were prepared till 25/4 and distal canals till 25/6 for standardization. In Group A (patency group), between each instrument change, a size 10 K-file was passed 1 mm beyond the working length. In Group B (nonpatency group), all efforts were taken to prevent the use or surpassing of patency file beyond the working length at all times during treatment. Working length was reconfirmed using an apex locator after instrumentation of the coronal and middle thirds of the canal. Irrigation was performed with saline and 5 ml of 2.5% NaOCl solution (Prime Dental, India) with Sideport irrigation needle 30 guage (UDG, China) after each instrumentation. After

instrumentation, the root canals were thoroughly irrigated with saline to flush away the debris. The canals were checked with paper points to assess if they were ready for obturation. Gutta percha points coinciding with the master apical instrument were inserted to working length. The fit and tug back of the gutta percha was confirmed and verified on radiographs. AH Plus sealer (Dentsply Maillefer, Ballaigues, Switzerland) was applied on the walls of the canal with a lentulospiral. Then the root canals were obturated with gutta percha by lateral condensation technique.

Root canal therapy was carried out similarly for all sixty patients in single visits. Patients were instructed to rate any occurring pain after the endodontic procedure using Visual Analogue Scale. Patients were instructed about how to assess and record the incidence and severity of pain at 4, 8, 12, 24, 48, 72 hours and 7 days after the appointment. Subjects were recalled after 7 days with the questionnaire that was provided on the day of the treatment and post endodontic restorations were carried out for all patients.

RESULTS

Table 1 and 2 show the frequency distribution chart of post operative pain for Group A (patency) and Group B (no patency) respectively. The pain was categorized as having no pain to having mild, moderate and severe pain. The incidence of pain was noted at 4hrs, 8hrs, 12hrs, 24hrs, 2 days, 3 days and 7 days post operatively. Nearly the same number of patients reported with no or mild pain at 4 hrs, 8hrs and 24 hrs for both the groups. No patients reported with severe pain in either of the groups. No patient reported any pain at 3rd and 7th day for both the groups.

Statistical analysis of the tabulated scores was carried out. Table 3 presents Mann Whitney U and Wilcoxon W test that tests the significance of difference between the means of Group1 and Group 2 patients at 4 hours, 8 hours, 12 hours, 24 hours and 48 hours, 3 and 7 days.

Interpretation: Since p value is more than 0.05 there is no significant difference in the two groups.

Graph 1 shows frequency plot of mean incidence of postoperative pain in both groups at every time interval.

DISCUSSION

To many patients, pain and dentistry are synonymous. Because patients are anticipating pain, it often makes their pain management more difficult. The notion of root canal treatment being painful began decades ago. This myth is being debunked thanks to modern tools, technologies, anesthetics and various other clinical strategies available to us to make root canal a virtually painless procedure.

When root canal treatment has been confirmed as the treatment of choice, a very important decision which needs to be made by the clinician is to determine whether the

treatment will be done in a single or a multiple visit. Considerable controversy exists over this decision. In our study we used a single visit approach.

The preponderance of the research to date has shown no significant difference in postoperative pain when one visit RCT was compared with two visit treatment, especially in teeth with vital pulps.^(8,9)

The root apex is morphologically and therapeutically, a challenging zone and prognostically an important but unfortunately unclear area⁽¹⁰⁾. There has been a paradigm shift with regards to apical patency amongst clinicians around the world. Patency filing is a rather new concept in endodontics which has been emphasised upon by a number of authors and researchers. The principal objective of this present study was to assess whether maintenance of apical patency during instrumentation lead to postoperative pain in single visit root canal treatment as compared to non maintenance of apical patency.

Based on the findings in our study, statistical analysis showed that, there was no significant difference in post operative pain during maintenance vs non maintenance of apical patency. Hence the null hypothesis was accepted.

On comparison with research by different clinicians, we found concurrence with several studies. The findings of a study conducted by Garg et al⁽¹¹⁾ were in agreement to ours where they found no significant differences between patency and non patency groups regarding incidence and degree of postoperative pain. Marwa Sharaan and Naguib Aboul-Enein⁽¹²⁾ concluded that apical patency did not increase the post preparation pain significantly. Arias et al⁽¹³⁾ found that maintenance of apical patency does not increase the incidence, degree, or duration of postoperative pain when considering all variables together. Arora et al⁽¹⁴⁾ concluded that maintenance of apical patency during chemomechanical preparation had no significant influence on post- operative pain in posterior teeth with necrotic pulps and apical periodontitis.

But in some studies there were results which pointed at a difference in post operative pain with maintenance and non maintenance of apical patency. Yaylali et al⁽¹⁵⁾ found that the maintenance of apical patency in molar teeth with necrotic pulp and apical periodontitis was associated with less postoperative pain when compared with non maintenance apical patency. However, only asymptomatic patients with necrotic pulp and radiographic evidence of apical periodontitis were included in their study unlike our study, where patients with molars having vital pulps were selected.

In our study, the one finding that significantly influences the incidence of postoperative pain was the presence of preoperative pain. In our study the pain intensity was recorded preoperatively as base line data and postoperatively at different time intervals. 4 and 8 hours was chosen because the time that the effect of anesthetic solution lasts is about 2-4 hours. 12, 24, 48 hours were chosen as it was proven that most of postoperative pain occurred between these time intervals⁽¹⁶⁾. Results of our study showed that in both groups, the pain decreased significantly from pre-treatment levels after 2 days.

The H_0 was therefore approved and the null hypothesis stands conclusive proven.

The scientific world is divided into two, with regards to whether apical patency should be maintained throughout the cleaning and shaping procedure. Based on the results of our study we conclude that there is no difference in post-operative pain when there is maintenance of apical patency versus non maintenance of apical patency. Based on the data available in literature the ball is now in the clinician's court as to whether they want to incorporate or not, the technique of maintaining apical patency throughout the cleaning and shaping procedure in their clinical practice.

CONCLUSION

Within the limits of human error, after careful evaluation and statistical analysis the following conclusions were made.

1. Maintenance of apical patency has no effect on post operative pain on mandibular first molars with vital pulps treated with single visit endodontics.
2. There was no statistical difference in the post operative pain between the groups where apical patency was maintained vs where apical patency was not maintained.
3. There seems to be no correlation between post operative pain and maintenance vs non maintenance of apical patency.

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Frequency distribution chart of postoperative pain for Group A (PATENCY)

Pain incidence	4 HRS		8 HRS		12 HRS		24 HRS		48 HRS	
	Count	%	Count	%	Count	%	Count	%	Count	%
No Pain	7	47	10	67	10	67	12	80	13	87
MILD	7	47	4	27	5	33	3	20	2	13
MODERATE	1	6	1	6	0	0	0	0	0	0
SEVERE	0	0	0	0	0	0	0	0	0	0

Pain	3 days	7 days
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incidence				
	Count	%	Count	%
No Pain	15	100	15	100
MILD	0	0	0	0
MODERATE	0	0	0	0
SEVERE	0	0	0	0

Frequency distribution chart of postoperative pain for Group B (No Patency)

Pain incidence	4 HRS		8 HRS		12 HRS		24 HRS		48 HRS	
	Count	%	Count	%	Count	%	Count	%	Count	%
No Pain	7	47	10	67	9	60	12	80	14	94
MILD	7	47	4	27	5	34	3	20	1	6
MODERATE	0	0	1	6	1	6	0	0	0	0
SEVERE	1	6	0	0	0	0	0	0	0	0

Pain incidence	3 days		7 days	
	Count	%	Count	%
No Pain	15	100	15	100
MILD	0	0	0	0
MODERATE	0	0	0	0
SEVERE	0	0	0	0

Comparison of average scores between Group-A and Group-B at every time interval

	Mann-Whitney U	Wilcoxon W	Z	p-value	Interpretation
PO	107.50	227.50	-0.21	0.83	NS
4_H	100.50	220.50	-0.54	0.59	NS
8_H	109.00	229.00	-0.17	0.86	NS
12_H	106.50	226.50	-0.29	0.77	NS
24_H	111.00	231.00	-0.09	0.93	NS

48_H	105.50	225.50	-0.56	0.58	NS
3_D	112.50	232.50	0.00	1.00	NS
7_D	112.50	232.50	0.00	1.00	NS

Interpretation: P<0.05 indicates significance of difference. NS: Not significant

Frequency plot of incidence of postoperative pain in both groups at every time interval

