



Comparison of Postoperative Pain after Single Visit versus Multiple Visit Root Canal Treatment in Premolars with Irreversible Pulpitis Using Rotary Instruments

Laraib Choudhry¹, Urwa Javed¹, Mahnoor Irfan¹, Kainat Choudhary¹, Nafeesa Irfan², Rukhma Javed³

¹Rawal Institute of Health Sciences, Islamabad, Pakistan.

²Faryal Dental College (UHS), Lahore, Punjab, Pakistan.

³Islamic International Dental College, Islamabad, Pakistan.

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Correspondence to: Laraib Choudhry, House Officer, Rawal Institute of Health Sciences, Islamabad, Pakistan.

Email: elsea1610@gmail.com

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Authors' Contribution

All authors equally contributed to the study and approved the final manuscript.

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ABSTRACT

Background: This study was conducted to provide clinicians with evidence regarding whether single visit root canal treatment is better than multiple visits by assessing pain experienced by patients after treatment. There is ongoing debate among dentists and patients on this topic to minimize multiple appointments but there is a lack of consensus. **Objective:** To compare pain after single versus multiple visits endodontic treatment after 24 hours of follow-up. **Methodology:** This study was conducted on 66 participants divided into two groups: 33 in a single visit "(Group SV)" and 33 in multiple visits "(Group MV)" for endodontic treatment. Patients within the age range 20-40 years, with irreversible pulpitis in premolars having completely formed foramina were included. Patient's demographic data like age and gender along with the history of postoperative pain (its severity, episodes, and aggravating factors) were recorded. The Chi-square test was used to compare post-operative pain between two groups. **Results:** The mean age of the sample was 31.09 ± 6.67 years. There were 51.52% (n=34) females and 48.48% (n=32) males. Overall, a total of seven patients (10.6%) reported postoperative pain. From the SV group, four cases (12.12%) reported with pain; and from the MV group, only three cases (9.09%) reported with pain. The difference was not statistically significant ($p>0.99$). The difference between single and multiple visits' endodontic treatment for the episode ($p=0.58$), duration ($p=0.706$), severity ($p=0.183$) and aggravating factors ($p=0.693$) of postoperative pain were not statistically significant. **Conclusion:** The history of 24hrs post-operative pain in patients with single or multiple visit RCT in premolars does not vary significantly. Therefore, for premolar teeth, single-visit endodontic treatment can be a viable option to reduce the number of patient visits. .

INTRODUCTION

Endodontic treatment is the biomechanical preparation followed by three-dimensional sealing of the root canal system.¹ The latest concept of root canal preparation has been changed from cleaning and shaping to shaping and cleaning.² The incidence of pain is often experienced more in patients with irreversible pulpitis as compared to reversible pulpitis.³

Root canal treatment can either be performed in single or multiple visits.⁴⁻⁶ As claimed, multiple visits is the total elimination of bacteria and their toxins and placement of intracanal medicaments.⁷ For infected teeth, although controversy regarding SV or MV root canal treatment exists yet MV are considered safer.⁸ The advantages of single-visit endodontics include less time consuming, fewer expenses for treatment, lesser chances of flare-up and less dental anxiety due to single visit involving anesthesia and instrumentation.^{8,9}

Riaz et al.¹⁰ determined the pain of single versus multiple visit endodontic treatment after obturation in non-vital teeth. They reported more patients with postoperative pain in multiple visits' groups, although the difference was not statistically significant. Another study also reported higher frequency of pain in multiple visits and the difference was statistically significant.¹¹

Rationale

There is a lack of consensus on whether a single visit is better than multiple visits or vice versa. Moreover, in our region i.e., Pakistan, we have not found any related study. Therefore, our study will help in the clinical outcome of the regional population. It will provide clinicians with the awareness of whether single-visit root canal treatment may be a choice or multiple-visit root canal treatment considering postoperative pain in premolars. Therefore, the objective of this study was to compare postoperative

pain after single versus multiple visits' endodontic treatment after 24 hours follow-up in premolars.

Research Question

Is post-operative pain comparatively less in single visit root canal treatment than in multiple root canal treatment using rotary instruments?

Objective:

This study's objective is to compare the post-operative pain experienced by individuals suffering from irreversible pulpitis in premolars who have had root canal treatment using rotary instruments, either in single vs multiple appointments.

Operational Definitions

Post-operative pain (POP): is a common example of acute pain which occurs after treatment that can be treated through therapeutic intervention. Non-steroidal anti-inflammatory drugs (NSAIDs) are commonly used to manage post-operative pain. The pain can be recorded by using "the visual analogue scale".¹⁹

Single Visits RCT: During the single appointment, the endodontic procedure will be carried out in its entirety, including the pulpectomy, canal preparation, and obturation.²⁰

Multiple visits RCT: In a multiple visit endodontic treatment, the steps of Pulpectomy and preparation of the root canal system are performed at the initial appointment of the treatment. During the second visit, which takes place one week after the first appointment, obturation of root canals is performed. Multiple-visit treatment includes placement of a short-term medicament, such as calcium hydroxide, for the time between the cleaning and shaping appointment and the obturation appointment.²⁰

Irreversible Pulpitis: Irreversible pulpitis occurs when inflammation and other symptoms, such as pain, are severe, and the pulp cannot be saved.²¹

Rotary Instruments: Rotary instruments enable dental health professionals to remove or reduce tooth matter and dental materials and to shape teeth during various procedures.

MATERIAL AND METHODS

This comparative cross-sectional study was conducted at the Operative Dentistry Department of Rawal Dental Hospital, Islamabad from 1st January, 2022 to 30th July, 2022 on 66 patients by convenience sampling technique. The sample size was calculated by using a WHO sample size calculator with a 95% confidence level, 5% margins of error and 6.6% pain(n=2) in single-visit root canal treatment from a previous study². The estimated sample size was 66 (33 in each group: single and multiple visits). After an in-depth explanation of the study protocol to the patients, informed consent (Annexure 2) was taken from all participants verbally.

Patients within age 20-40 years, with irreversible pulpitis, requiring endodontic treatment in premolars with completely formed foramina and no calcified canals were included. Pregnant women and patients with any systemic diseases, taking any pain medications or corticosteroids, root canals with resorption, irregular

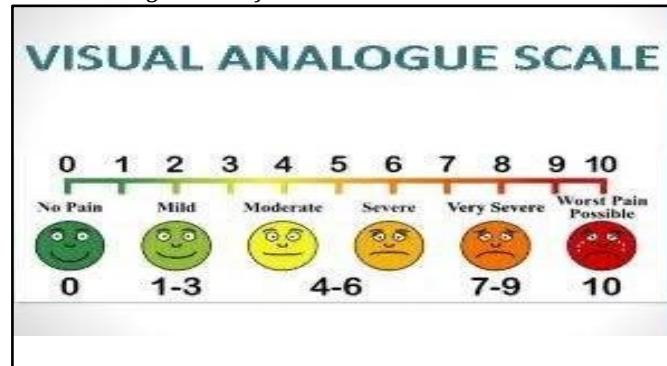
canals, periapical surgery, and re-endodontic cases were excluded.

The participants were randomly divided into two groups (single visits and multiple visits). Single visit endodontic treatment involves pulpectomy, canal preparation and obturation in the same visit while endodontic treatment protocol for multiple visits includes pulpectomy and canal preparation in the first visit and obturation in the following appointment.

Data with age, gender, pain (yes/no), the severity of pain (mild, moderate and severe), episode of pain, duration of pain and aggravating factors for the pain were recorded in both groups. A visual analogue scale was used to measure the degree of postoperative pain that had occurred 24 hours after the obturation via WhatsApp text. The pain was classified on the visual analogue scale as 1-3 as "mild pain"; 4-6 as "moderate pain"; and 7-10 as "severe pain". All endodontic treatment procedures were carried out by FCPS trainees having more than two years of experience in Operative Dentistry department of Rawal General and Dental Hospital.

Figure 1.1

Visual Analogue Scale for Pain



Analysis of data was carried out in Statistical Package for the Social Sciences version 22. Descriptive statistics including mean and Standard Definition(SD) for continuous variables of age and frequency and percentages for other variables of pain, types of pain and gender were computed. The Chi-square test was used to compare pain between single and multiple visit groups. The level of significance was $p \leq 0.05$.

RESULTS

The mean age of the participants was 31.09 ± 6.67 years with a range from 20 to 40 years. Females were 34 years old (51.52%) and males were 32 years old (48.48%). Overall, the pain was present in seven (10.61%) participants. In four patients (6.06%), there was one episode in 24 hours whereas two patients (3.03%) reported more than one episode in 24 hours. The common duration of pain reported by patients was 30 minutes (n=3, 4.55%) followed by one hour (n=2, 3.03%) and the least was <30 minutes (n=1, 1.52%). The frequency of both moderate and severe pain was 3 (4.55%). Aggravating factors included pain after eating (n=3, 4.55%) and positional change (n=3, 4.55%). (Table 1)

Among those who had single visit treatment, four cases (12.12%) reported pain and among those who had multiple visits, three cases (9.09%) reported pain. The

difference was not statistically significant ($p>0.99$). **(Fig 1)** The difference between single and multiple visits for endodontic treatment for the episode ($p=0.58$), duration ($p=0.706$), severity ($p=0.183$) and aggravating factors ($p=0.693$) for pain was not statistically significant. **(Table 2)**

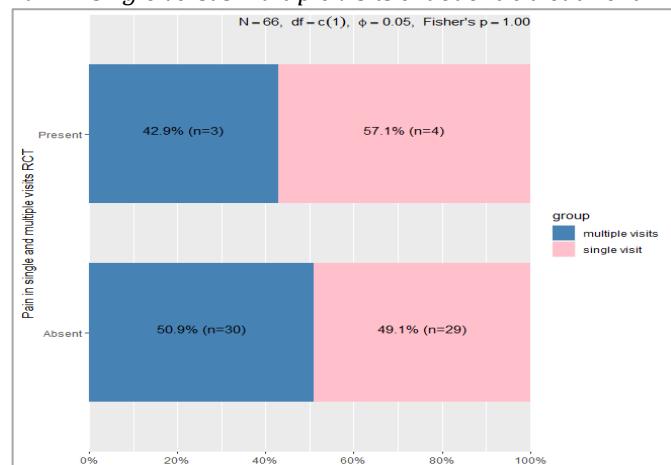
Table 1

Frequency distribution of gender, occurrence, episode, duration and severity of postoperative pain.

Variable	Characteristic	n(%)
Gender	Female	34 (51.52)
	Male	32 (48.48)
Pain	Absent	59 (89.39)
	Present	7 (10.61)
Episode(s) of Pain	> 1 in 24 hrs.	2 (3.03)
	1 in 24 hrs.	4 (6.06)
Duration of pain	Nil	60 (90.91)
	< 30 mins.	1 (1.52)
	1 hr.	2 (3.03)
	30 mins.	3 (4.55)
Severity of pain	Nil	60 (90.91)
	Moderate	3 (4.55)
	Severe	3 (4.55)
Pain aggravating factors	Eating	3 (4.55)
	Positional change	3 (4.55)
	Nil	60 (90.91)

Figure 1.2

Pain in single versus multiple visits endodontic treatment

**Table 2**

Comparison of episode, duration, severity and aggravating factors for pain between single and multiple visits endodontic treatment

Variable	Characteristic	Multiple visits, n = 33	Single visit, n = 33	p-value*
Episode of pain	> 1 in 24 hrs.	1 (3.03)	1 (3.03)	0.587
	1 in 24 hrs.	1 (3.03)	3 (9.09)	
	Nil	31 (93.94)	29 (87.88)	
Duration of pain	< 30 min	0 (0.00)	1 (3.03)	0.706
	1 hr.	1 (3.03)	1 (3.03)	
	30 mins.	1 (3.03)	2 (6.06)	
	Nil	31 (93.94)	29 (87.88)	
Severity of pain	Moderate	0 (0.00)	3 (9.09)	0.183
	Nil	31 (93.94)	29 (87.88)	
	Severe	2 (6.06)	1 (3.03)	
Aggravating factors for pain	Eating	1 (3.03)	2 (6.06)	0.693
	Nil	31 (93.94)	29 (87.88)	
	Positional change	1 (3.03)	2 (6.06)	

*Fisher exact test at $p<0.05$

(hr = hour, hrs. = hours, mins= minutes)

DISCUSSION

This comparative cross-sectional study was conducted to compare pain after single versus multiple visits endodontic treatment after 24 hours follow-up. Our results revealed that there is no significant difference in pain whether the root canal treatment is carried out in a single visit or in multiple visits in premolar teeth.

Root canal treatment can be performed either in a single visit or multiple visits.² The prime goal of multiple visits is the complete elimination of bacteria as well as their byproducts prior to the final filling of the canal with obturation materials.¹⁰ Moreover, endodontic treatment involving multiple visits have the advantage of using intracanal medicaments between visits for control of microbes.¹²

There is still a debate regarding infected teeth to select single or multiple visits for endodontic treatment but multiple visits are considered a safer option. Microbes and their toxins residing within dentinal tubules can cause periapical periodontitis. However, certain resistant bacteria like enterococcus (E.) faecalis can neither be eliminated by single or multiple visits endodontic treatment.¹³

Some studies reported that single-visit endodontic treatment is inferior to multiple visits due to the fact that intracanal medicaments can aid mechanical debridement of canals which leads to less inflammation of periapical tissues.¹⁴ But on the other hand advantages are associated with single-visit endodontics like time-saving, fewer costs of treatment, more compliance of patients, less anxiety for anxious patients and less risk of inter-appointments infections.^{15, 16}

Riaz et al.¹⁰ conducted a study to compare the pain in single versus multiple visit endodontics and found no significant difference between the two types of interventions ($p=0.8$). In the single visit group, only 2(6.6%) had pain while in the multiple visits group only 3(10.0%) had pain at 48 hrs. Another study conducted on pain of single versus multiple visit endodontic treatment reported that there were 41 (18.6%) and 43 (19.5%) patients who did not feel pain in one visit and two visits root canal treatment respectively ($P=0.942$).¹⁷ Another study reported that the frequency of pain in a single visit was 25.7% and in multiple visits was 40.0% and the difference was statistically significant ($P<0.05$).¹⁸

This study design is associated with certain limitations: First, sample size was taken. Second, only premolars were included, multi-rooted teeth and root irregularities can have different pain levels than single roots. Future researchers should try to include multi-rooted teeth.

CONCLUSION

With the limitations of this study, we assessed that the history of 24hrs post-operative pain in patients with single or multiple visit RCT in premolars does not vary significantly. It can be concluded that single-visit endodontic treatment can be a viable option for premolars to reduce the number of patient's visits.

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ANNEXURE I:**Pain after single vs. several visits for root canal treatment with rotary tools in teeth**

Name:

Age:years

Gender: Male Female Date: //

WhatsApp number:

MR Number:

Hospital Name:

Relationship Status:

Group**a)** Single visit RCT (Group 1)**b)** Multiple visit RCT (Group 2)

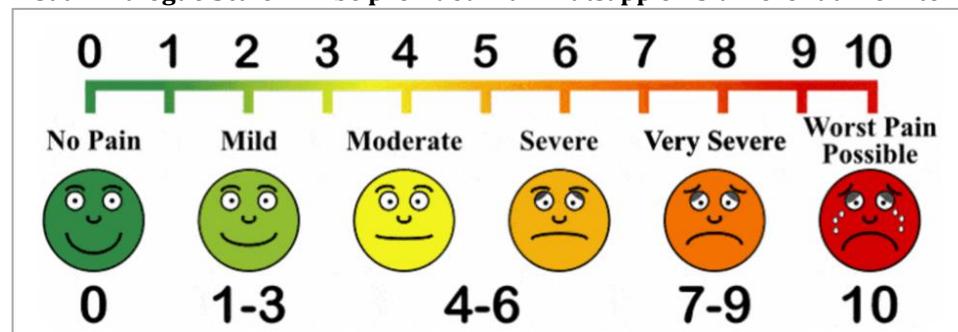
• Medical History(if any):

• Dental History(if any):

1. Presence of Postoperative Pain

a) No pain (0-4 on VAS)

b) Pain present (5-10 on VAS)

Visual Analogue Scale will be provided via Whatsapp on 3 different time intervals (6hrs., 12hrs., 24 hrs.)**Frequency of pain episodes**

a) One episode within 24 hrs.
 b) More than 1 episode within 24 hrs.
 c) One episode within 48 hrs.
 d) More than 1 episode within 48 hrs.
 e) One or more episodes after 48hrs.

Duration of pain episode

a) Less than 10 mins
 b) Less than 30 mins
 c) About an hour
 d) More than 1-hour
 e) Consistent until the use of pain-killer

Severity of Pain

a)Mild
 b)Moderate
 c)Severe
 d)Intolerable, need medication

Aggravating Factors

a) Positional Changes
 b) Eating/Drinking habit
 c) Morning/Evening

Consent Form**Title of Study**

COMPARISON OF POSTOPERATIVE PAIN AFTER SINGLE-VISIT VERSUS MULTIPLE VISIT ROOT CANAL TREATMENT WITH IRREVERSIBLE PULPITIS IN PREMOLARS USING ROTARY INSTRUMENTS

Principal Investigators

DR URWA JAVED

DR MAHNOOR IRFAN

DR LARAIB CHOUDHRY

Department

OPERATIVE DENTISTRY

Purpose of Study

You are being asked to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully. Please ask the researcher if there is anything that is not clear or if you need more information.

The purpose of this study is to :

This study's purpose is to compare the post-operative discomfort experienced by individuals suffering from irreversible pulpitis in premolars who have had root canal treatment using rotary instruments, either in single or multiple appointments.

Study Procedures:

Endodontic Treatment

Record on VAS

Confidentiality:

We'll ensure confidentiality, such as those:

- Keeping notes, interview transcriptions, and any other identifying participant information in a locked file cabinet in personal possession.
- Participant data will be kept confidential except in cases where it is legally obligated to report specific incidents.

Voluntary Participation

Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

FINAL CONSENT

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ **Date** _____

Investigator's signature _____ **Date** _____

Patient's Signature:

Parent/Guardian:

Date: