

## Comparison of frequency of post-obturation pain of single versus multiple visit root canal treatment of necrotic teeth with infected root canals. A Randomized Controlled Trial

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### Abstract

**Objective:** To determine the pain of single versus multiple visit endodontic treatment after obturation in teeth with necrotic pulps and infected canals.

**Methods:** The randomized controlled study was conducted from January to June 2016 at Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, Pakistan. Dental patients aged 18-60 years of either gender were selected who were subjected to computer-generated randomisation. Both maxillary and mandibular single rooted teeth till second premolar were included. Single visit endodontic treatment to Group-I subjects was carried out by gaining access to canals, cleaning, shaping and obturation at same visit whereas in Group-II patients, who underwent multiple visits, cleaning and shaping was followed by placement of intra-canal medicament, while obturation was done 5 days later. Patients were recalled within 48 hours after obturation to record the pain score using visual analogue scale.

**Results:** Of the 60 patients, 30(50%) were in each of the two groups. There was no significant difference in post-operative pain in the two groups ( $p=0.8$ ). The frequency of post-operative pain was not significant either ( $p>0.05$ ). The post-operative mean pain score was  $2.23\pm 1.736$  in Group-I and  $2.38\pm 1.94$  in Group-II ( $p=0.8$ ).

**Conclusion:** Treatment carried out in single visit or multiple visits showed no difference in pain frequency.

**Keywords:** Dental pulp cavity, Root canal therapy, Endodontics, Single visit, multiple visits, Root canal obturation, Pain. (JPMA 68: 1429; 2018)

### Introduction

Patients often come to dental clinic with complaint of toothache either due to caries or trauma.<sup>1</sup> Endodontic is a conservative therapy for the teeth with irreversibly damaged pulp tissue. The endodontic treatment aims at accessing the root canal, performing pulpectomy, irrigating the canal, placing of medicament in the canals and, finally, obturation of the root canal.<sup>1,2</sup> In teeth with pulpal necrosis and infected canals, the incidence of pain increases.<sup>1</sup> The canal debridement is carried out and intra-canal medicament is added as an adjunct to minimise the inter-appointment pain.<sup>2,3</sup>

Endodontic treatment is carried out in single or multiple visits.<sup>4,5</sup> The multiple-visit treatment targets the elimination of the microbes along with by-products from the canals before obturation.<sup>6</sup> The single visit doesn't give the advantage of placement of an intra-canal medicament between the visits but it has merits of its own.

For infected teeth, choice of single versus multiple visit

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endodontic treatment has always been in dispute. However, multiple-visit endodontic treatment is usually accepted as a safe and reliable option.<sup>2</sup> Dentinal tubules harbour polymicrobes and endotoxins which have been associated directly with apical periodontitis. These bacterial colonies, especially enterococcus (*E.*) faecalis, can't be eliminated from the canals completely by either single or multiple-visit endodontics.<sup>3</sup> According to reports, single-visit endodontics might not be as efficient in reducing endotoxins as multiple-visit treatment.<sup>2</sup> Intra-canal medicaments are used in multiple visit root canal treatment to augment the mechanical procedure.<sup>6</sup> The inter-visit placement of canal medication basically aims at reducing and retarding growth of bacteria and, hence, preventing the risk of inflammation in periradicular tissues.<sup>7,8</sup> Contrary to this, single-visit endodontic treatment has several advantages like saving time, cost-effectiveness, better patient acceptance and being less stress-inducing for anxious patients and also reducing the risk of inter-appointment infections.<sup>9,10</sup> The chance of flare-ups with single visit decreases.<sup>4,5</sup> Therefore single-visit treatment has become a preferable option.

Some studies have reported no increase in post-operative complications after single-visit treatment.<sup>2-4</sup>

Complications may occur as a result of errors in technique, apical extrusion of debris or failing to seal the canal, both apically and coronally.<sup>7</sup> Since the single-visit root canal treatment is aimed at following an immaculate technique and the canals are sealed in both apicocoronal regions, the chances of flare-up are reduced.<sup>11</sup> Single-visit and multiple-visit treatments have their merits and demerits, but the decision depends upon specific selection criterion.

The current study was planned to evaluate the severity of post-operative pain and incidence after endodontic treatment in infected canals when performed in single versus multiple visit endodontic treatment. These approaches will not only help in the reduction of patients' apprehension regarding the treatment, but it will also improve their compliance and acceptance, and patients can be saved the hassle of multiple visits. This would also help support the hypothesis that if the root canals are prepared well and sealed both apically and coronally, the risk of re-infection and flare-ups is remarkably reduced, thus making single-visit a viable treatment option for teeth with necrotic pulps and infected canals.

## Patients and Methods

This randomized controlled study was conducted from January to June 2016 at the Department of Operative Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, Pakistan. After approval from the institutional ethics committee, patients of either gender aged 18-60 years were included. The subjects had single rooted teeth of both upper and lower arch. The maxillary first premolars were also included despite the presence of two canals. Besides, the subjects also had necrotic teeth with infected root canals, teeth with periapical lesions and asymptomatic necrotic pulp. Necrotic teeth were diagnosed by negative response to pulp sensibility tests, including heat test, cold test, and electric pulp testing (EPT).

Teeth with previous endodontic treatment, acute apical abscess and extra-oral swelling or sinus tract were excluded. Also, terminally ill patients and those with learning disabilities were excluded.

The sample size was calculated with the level of confidence measure 1.96, margin of error 0.05, Confidence level was taken as 90% power of study is 80%.

Level of confidence measure 1.96, Margin of error 0.05.

Baseline levels of indicators (sample proportions) 37%<sup>1</sup> and 10.5%<sup>2</sup> and number of group estimates 2. Design

effect for random sampling was 1. The sample size in each group was determined to be 30.<sup>1,2</sup>

## Exclusion Criteria

After taking informed consent from the selected subjects, each patient was assigned a computer-generated list of random numbers with a randomisation ratio of 1:1 produced by random allocation software version 1.0.

History was taken, and clinical examination was done to begin with. On the first visit, a pulp vitality test was done and the negative response was noted. A pre-operative visual analogue scale (VAS) score was also taken. Radiographs were taken before beginning the procedure to check for the presence of any apical radiolucency in the periapical region. Local anaesthesia using 2% lidocain with 1:100,000 epinephrine (MedicaineR) was given to ensure patients' comfort. Rubber dam (Henry Schein) was used for the isolation of the affected teeth. Access was gained to the root canals using Round bur (Mani) and Endo Z bur (Dentsply). All the caries was excavated at this stage. Endo probe (Hu-Friedy) was used to locate the canals. Glide path was established using Proglider (Dentsply). Glide path is a smooth passage that extends from canal orifice to apex of root. Pulpectomy was done using barbed broaches (Mani). Working length was established by radiographic method using #15 or #20 file. Canals were prepared at correct working length. Canal instrumentation was performed using NiTi Rotary Protaper Next system (Dentsply) till X2 and X3 according to the tooth. Throughout the procedure the canals were washed and flushed with 5.25% sodium hypochlorite (NaOCl) was used to irrigate the canals followed by saline. Once the canal preparation was done, a final wash was carried out using 10ml Ethylenediaminetetraacetic acid (EDTA) (META). Canals were then dried using paper points (GAPADENT).

In Group-I, the whole procedure was carried out at the same appointment. The canals were obturated by lateral condensation method using endomethsone (Sepodont) as a sealer. The access cavity was sealed with glass ionomercement (Fuji). In Group-II similar

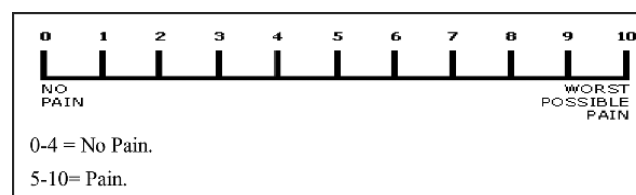


Figure-1: Visual analogue scale.

procedure was followed for the canal preparation and packed with calcium hydroxide (Ca[OH]<sub>2</sub>) (Roth international Ltd) using lentulo spiral and sealed with sterile cotton and temporary restoration like cavitation. Patients in Group-II were recalled after 5 days for obturation.

Patients were recalled to record the pain score using VAS to measure post-obturation pain within 48 hours after the procedure. The pain score was recorded on a 10-point scale, with 0-4 indicating 'No pain' and 5-10 indicating 'Pain' (Figure-1).

Data analysis was done using SPSS 23. For qualitative and quantitative variables, descriptive statistics were calculated. Mean ± standard deviation (SD) was calculated for quantitative variables like age and pain score. Frequencies and percentages were calculated for qualitative data. Frequency of pain between the two groups was compared by Chi-Square test. If the number of times pain occurred was more in one group than the other, then it was taken to show a significant difference. Effect modifiers like gender and age were controlled by stratification. Chi-Square test was applied post-stratification.  $P \leq 0.05$  was considered to be significant.

## Results

Of the 60 patients, 30(50%) were in each of the two groups. The overall mean age was  $38.8 \pm 12.3$  years. There were 34(55%) females and 26(45%) males. The mean score of pain post-operatively was  $2.23 \pm 1.736$  in Group-I and  $2.38 \pm 1.94$  in Group-II ( $p=0.8$ ). No pain was recorded in 28(93.3%) patients in Group-I and only 2(6.6%) had pain. In Group-II, no pain was seen in 27(90%) patients, while only 3(10%) had pain at 48 ( $p=0.71$ ) (Figure-2). Different scores for post-operative pain were noted (Figure-3).

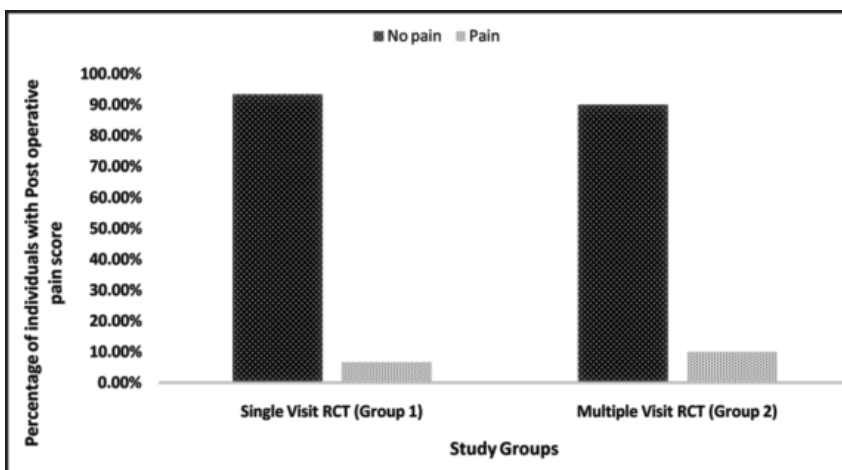
Distribution of pain at 48 hours had no significant difference according to gender between the groups (Table-1). Also, there was no significant difference in pain according to age categories (Table-2).

**Table-1:** Pain at 48 hours according to demographic data (Gender).

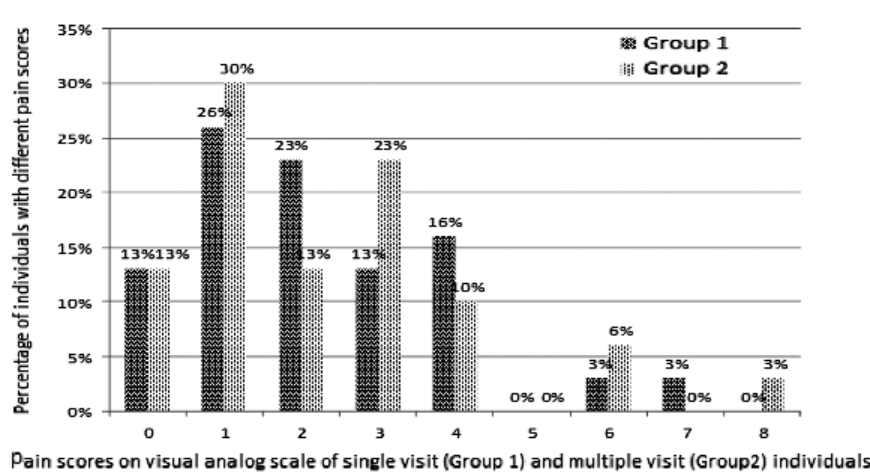
	Treatment	Without pain	With Pain	P value
Male	Group-I	77.8% (7)	22.2% (2)	0.940
	Group-II	76.5% (13)	23.5% (4)	
Female	Group-I	76.2% (16)	23.8% (5)	0.555
	Group-II	84.6% (11)	15.4% (2)	

**Table-2:** Pain at 48 hours according to demographic data (Age).

Age groups	Treatment	Without pain	With Pain	P value
14-29	Group-I	61.5% (8)	38.5% (5)	0.077
	Group-II	100% (6)	0% (0)	
30-44	Group-I	88.9% (8)	11.1% (1)	0.774
	Group-II	84.6% (11)	15.4% (2)	
45-60	Group-I	87.5% (7)	12.5% (1)	0.243
	Group-II	63.6% (7)	36.4% (4)	



**Figure-2:** Post-operative pain at 48 hours in Group-I and Group-II.



**Figure-3:** Percentage of individuals with different postoperative pain scores on visual analogue scale (VAS).

## Discussion

The endodontic therapy does not depend on biological consequences alone, but it also aims at minimising patient's discomfort. The success of root canal treatment depends on the eradication of microbes from the root canal and to create a favourable environment for healing.

The endodontic treatment can be executed by two approaches. In one approach intra-canal medication is used to reduce the microbial load from the root canals. The second approach entombs the microbes in the canals by sealing teeth both coronally and apically. Finishing the treatment in one visit decreases the survival of microbes in root canals by depriving the microbes of nutrition.

According to our results, there was no pain in 28(93.3%) patients in Group-I while only 2 (6.6%) patients had pain. No pain was seen in 27(90%) patients while only 3(10%) patients had pain at 48 hours in Group-II ( $p=0.71$ ). In a study, the frequency of pain post-obturation in single-visit and multiple-visit groups was 10.5% (6/57) and 37% (14/61) respectively<sup>1</sup> which was not significant ( $p \leq 0.05$ ). The association of pain was found in cases where there was presence of pain pre-operatively ( $p=0.04$ ).<sup>1</sup> Similar pattern was observed in the present study.

In the current study the canal preparation was done with Protaper Next rotary system and the canals were irrigated with NaOCl and EDTA to ensure maximum elimination of root canal bacteria. The fact that the chance of extrusion of debris is reduced by the use of rotary systems, thus resulting in lesser incidence of flare-ups, has been supported by many studies.<sup>12,13</sup> A study compared the rotary instruments with hand files and deduced that the incidence of post-operative pain was lower with rotary systems.<sup>14</sup> Based on these studies, a rotary system was used to ensure lesser complications during the procedure.

According to evidence, single-visit or multiple-visit endodontics has no superiority over the other.<sup>15,16</sup> The adequate treatment option depends upon the treatment criteria. Neither of the treatment options can prevent the complications.

Ca(OH)<sub>2</sub> is considered a gold standard for root canal medication against the microbes. The intra-canal medicaments not only reduce the count of microbes present in the canals, but also target at retarding the growth of new pathogens, thus reducing the periradicular infection.<sup>8,9,11</sup> In Group-II, Ca(OH)<sub>2</sub> was used as an intra-canal medicament for 5 days before obturation. The pain score in the group at 48 hours post-obturation was  $2.38 \pm 1.94$  which was not much different from the pain

score of Group-I in which no intra-canal medicament was used, thus implying that single-visit endodontic was equally effective in reducing endodontic complications.

VAS was used as a measure of pain score in the current study. Pain is a subjective phenomenon and it is influenced by factors like age, gender and patients' psychological status.<sup>16</sup> Since it is a relatively simple procedure and the scoring is explained to the patient prior to the treatment, it can be used to measure the intensity and unpleasantness of pain.

According to research based on the dentists' preference to perform single-visit or multiple-visit endodontic treatment, it was concluded that some dentists assume that multiple-visit endodontic treatment has better success than single-visit endodontics.<sup>17,18</sup> However, the results of the current study don't support this belief. The success rate of single-visit over multiple-visit endodontic treatment in terms of pain was similar without any flare-ups and complications.

Pain assessment at a single time interval of 48 hours was a limitation of the study. Including more time intervals would make the results more meaningful. It is recommended that future studies should compare different treatment strategies on molars.

## Conclusion

There was no significant difference in pain scores between the single-visit and multiple-visit endodontic treatment groups, indicating that the former is a viable treatment option in routine endodontics which reduces the number of patient visits and can be viewed as a procedure that supplements patient care.

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**Conflict of Interest:** None.

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