



Original Article

Comparative Evaluation of Postoperative Pain Following Single Visit and Two Visit Endodontic Therapy in Non-vital Teeth

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ABSTRACT

Management of postoperative pain is a challenge for clinicians providing root canal therapy and a primary concern for patients as it directly affects their quality of life. Traditionally, multiple-visit endodontic treatment has been employed. In modern endodontics, single-visit endodontic therapy is becoming popular. **Objectives:** To compare frequency of postoperative pain following single and two-visit endodontic therapy in non-vital teeth. **Methods:** Randomized Controlled Trial was conducted at Operative Dentistry Department, Islamic International Dental Hospital, Islamabad. Each patient was assigned to group A or B with 140 participants in each group. Access, cleaning, and shaping were performed on the first visit. At the first visit, teeth in group A were obturated using guttapercha, whereas Group B was obturated after one week. Patients were instructed to mark the severity of pain at intervals of 6 hours, 24 hours, and 7 days after treatment. **Results:** 280 patients were divided into two groups of 140 each. Overall mean age and standard deviation was 27.35 ± 7.18 . At 6 hours, 123 group A and 119 group B patients experienced pain. 113 patients in group A and 105 patients in group B reported pain at 24 hours. On the 7th day, the number of patients in groups A and B that had pain was 8 and 7 respectively. P-value was not statistically significant. **Conclusion:** This study found no difference in the incidence of postoperative pain in non-vital teeth, irrespective of the number of endodontic treatment visits.

INTRODUCTION

The management of postoperative pain is a significant challenge for clinicians providing non-surgical root canal therapy. It is also a primary concern for most patients as it directly affects their quality of life [1]. Incidence of postoperative pain after endodontic treatment has been reported to be between 3-58% [2]. Another important factor, is the number of visits required to complete the treatment. Traditionally, multiple-visit endodontic treatment has been employed as a safe routine, especially in non-vital teeth, with the first visit directed at alleviating pain and determining the response of tissues to the treatment [3-5]. Single-visit root canal treatment, is considered appropriate for teeth with vital pulp tissue [6].

In modern endodontics, single-visit endodontic therapy is becoming extremely popular as it favors both the dentist and the patient. It offers several advantages including decreased cost, greater patient acceptance, fewer visits to the dental office, shorter chairside time, and reduced incidence of postoperative flare-ups [7-9]. However, the advantages such as the opportunity to reduce microbial counts and biofilms by the placement of intracanal medicament and repeated irrigation, along with increased patient comfort due to shorter duration of appointments, especially in case of medically compromised patients makes multiple visit root canal treatment an effective alternate treatment strategy [10, 11]. Research has shown

that there is no significant difference in the antimicrobial efficacies when single and multiple-visit treatments are compared in teeth with vital pulps [12-14]. Moreover, in a systematic review, postoperative pain was reported to occur as frequently after single-visit endodontic treatment as multi-visit treatment in vital teeth [9, 13, 14]. However, teeth with non-vital pulp pose a microbiological obstacle. The unsuspected inoculation of bacteria into the apex remains a concern with single-visit treatment. There is no agreement on the appropriateness of this approach in non-vital teeth. Some studies advocate that the use of an intra-canal medicament between appointments is mandatory for adequate disinfection of the root canals. On the contrary, many researchers have reported that the success of the treatment is not affected by the number of visits even for teeth with necrotic pulps [15-17]. A systematic review reported conflicting findings and claimed that the healing rate was 6.3% higher for single-visit cases [16]. A study conducted in Karachi compared the prevalence of postoperative pain relative to the number of endodontic treatment visits. They reported similar occurrences of pain with single and multiple visits at 6 hours follow-up but better results with multiple visit root canal treatment after 12 and 24 hours. Their study, however, included both vital and non-vital teeth [7]. Most of the data available in the literature are for vital teeth. Studies performed on non-vital teeth are inconclusive and mostly retrospective [15, 17-19]. This study aimed to investigate any correlation between dental pain experienced after root canal treatment of necrotic teeth and the number of treatment visits. Results obtained from this study will help in planning treatment visits and subsequently reducing postoperative pain, thus assisting the clinician in patient management.

METHODS

This randomized control trial was conducted in the Operative Dentistry Department of Islamic International Dental College and Hospital, Islamabad from July 2018 to January 2019. An institutional ethical committee approved the proposal. A sample size of 280 patients was calculated (140 in each group) as follows. A population proportion of pain on the 7th day after treatment from a previously reported paper (0.105 in single visit group vs. 0.23 in multiple visit group) was used by an Open epi online calculator with the power of test (95%) and level of significance at 5%. The inclusion criteria was set as patients in the age range of 12-40 years diagnosed with non-vital mature teeth with fully formed apices requiring root canal treatment. Teeth with weakened periodontal support, insufficient and non-restorable remaining tooth structure, severe pre-operative pain, acute abscesses and cellulitis, multiple teeth with pulp diseases requiring

endodontic therapy, teeth requiring retreatment, patients who had complicating systemic disease, and patients using medications such as analgesics, antibiotics or corticosteroids were excluded from the study. Prior to their inclusion in the study, informed, verbal and written, consent from the patients was obtained. After selection according to the inclusion criteria, the patient was informed about the procedure of nonsurgical root canal and his/her participation in the present research. A consent form was signed. Non-probability convenience sampling technique was used. The patient was either allotted to the single visit group (Group A) or two visits group (Group B). On the first visit, the clinical procedure for each group included local anesthesia administration using 2% Lignocaine with 1: 80000 epinephrine, followed by isolation with a rubber dam and preparation of an access cavity. A periapical radiograph and an electronic apex locator, Dentaport ZX apex locator (J. Morita, Japan) were used to measure the correct working length. Disinfection was done using 2.5 % sodium hypochlorite and 17% EDTA as irrigating solutions. Canals were prepared using Gates Glidden drills in sequential order for orifice opening, followed by glide path preparation till #20K file. Cleaning and shaping were completed with Hyflex EDM rotary files using the crown-down preparation technique. 17% EDTA was used as the final rinse. Paper points were used to dry the prepared canals. Gutta percha and calcium hydroxide sealer, Sealapex (Kerr) were used to obturate teeth in the single-visit group (Group A). Cold lateral condensation technique was used. Whereas in the multiple visit group (Group B), a non-setting calcium hydroxide medicament was placed in the canals and a temporary restoration material, Cavit (3M ESPE), was used to seal the access cavity. Patients in Group B were requested to visit again after 1 week. Their teeth were obturated using the cold lateral condensation technique with similar materials as group A. All patients were prescribed 550 mg of naproxen sodium, to be taken twice daily only in case of moderate pain. Patients were requested to report back to the department in case of intolerable pain for emergency treatment. The post-treatment pain evaluation was carried out with the modified visual analogue scale (VAS). Each patient was given a form and they were explained how to fill the form based on the presence and severity of pain. The patients were instructed to mark the postoperative pain severity at intervals of 6 hours, 24 hours, and 7 days following treatment. Patients were requested to return for clinical examination 1 week after completion of the root canal treatment for pain assessment. All procedures were done by the same clinician to minimize bias. Data analysis was performed with SPSS version 20.0. To compare the frequency of pain between the two groups, the chi-square

test was used. Mean \pm SD was noted for age of the patient, frequency, and percentage for gender and pain at 6 hours, 24 hours, and 7 days. A p-value of <0.05 was considered significant.

RESULTS

None of the patients included in this study were lost to follow-up. The overall mean age and standard deviation was $27.35 + 7.18$. Similarly, the mean pain scores in both groups were 3.03 ± 1.76 and 2.88 ± 1.83 respectively. The frequency of pain according to age and gender was calculated (Table 1).

Age Group	Group	Male	Pain		Female	Pain		P-value
			Yes	No		Yes	No	
1 (12 to 22)	1	20	2	18	15	3	12	0.62
	2	19	3	16	13	3	10	
1 (12 to 22)	1	38	16	22	32	11	21	0.96
	2	36	15	21	30	15	15	
1 (12 to 22)	1	20	7	13	15	3	19	0.38
	2	18	10	8	24	3	19	

Table 1: Frequency of pain according to age and gender

Male patients in Group A reported that at the 6-hour interval, 88% had pain. At the 24-hour interval, 79% had pain and on the 7th day, only 6% of patients reported pain. In Group B, 90% had pain at the 6-hour interval, 75% had pain at 24 hours and only 9% reported having pain on the 7th day (Table 2).

Time interval	Group A Frequency (%)	Group B Frequency (%)
6 hours	69(88%)	66(90%)
24 hours	62(79%)	55(75%)
7 days	5(6%)	7(9%)

Table 2: Pain in males at different time intervals

In female patients Group A reported that at the 6-hour interval 87% had pain. At the 24-hour interval, 82% had pain and on the 7th day, 2% of patients reported pain. In Group B, 79% had pain at the 6-hour interval, 76% had pain at 24 hours and 9% reported having pain on the 7th day (Table 3).

Time interval	Group A Frequency (%)	Group B Frequency (%)
6 hours	54(87%)	53(79%)
24 hours	51(82%)	51(76%)
7 days	1(2%)	6(9%)

Table 3: Pain in females at different time intervals

The frequency of pain was according to the time interval and the Chi-Square Test (Table 4). At the 6 hours interval, the result (0.24) showed no correlation between pain and treatment visits. The calculated p-value was 0.97 which was not statistically significant. At the 24 hours interval, the result (0.80) showed no correlation between pain and treatment visits. The calculated p-value was 0.84 which was not statistically significant. On the 7th day, the result (0.68) showed no correlation between pain and treatment

visits. The calculated p-value was 0.71 which was not statistically significant.

Parameter	No pain	pain	Percentage of pain	Total	Chi-square	p-value
Frequency of pain at 6 hours						
Single	17	123	88%	140	0.24	0.97
Multiple	21	119	85%	140		
Total	38	242	86%	280		
Frequency of pain at 24 hours						
Single	27	113	81%	140	0.80	0.84
Multiple	35	105	75%	140		
Total	62	118	78%	280		
Frequency of pain at 7 days						
Single	132	8	6%	140	0.68	0.71
Multiple	133	7	5%	140		
Total	265	15	5%	280		

Table 4: Frequency of pain at 6 hours, 24 hours, and 7 days

DISCUSSION

Results of the current study demonstrate no significant correlation between the number of visits and postoperative pain incidence. The findings of the present study support our initial hypothesis that there is no difference in the success rate between single-visit and two-visit endodontic therapy. This allows not only the dentist but also the patient to have the liberty to tailor treatment according to their individual interests. Our findings are similar to those of other studies reported in the literature for permanent teeth. Systematic reviews by Wong et al. and Sathorn et al. also support that the number of primary treatment visits has no effect on the endodontic treatment outcome and postoperative pain incidence [3, 16]. Moreira concluded in a systematic review that both treatment forms showed similar results regarding repair or success rates regardless of the preoperative status of the tooth [20]. Canal preparation using the crown down technique permits improved irrigation and reduces the apical extrusion of debris. These results are also consistent with those of another study which reported that within 24 hours of completion of endodontic treatment, the incidence of post-treatment pain was higher in the two-visit group compared with the single-visit group. After the initial 24 hours, the pain diminishes. Most of the patients are free of pain by the 7th day [21]. On the contrary, Su et al., Schwendicke et al., and Mubarak et al., have reported a decreased incidence of pain in endodontic cases treated in a single visit. The repetitive physical and chemical insults to tissues around the apex that result from instrumentation and medicament placement in multi-visit treatments are evaded in single-visit treatments. Multiple visit treatments also require the placement of temporary restorations which pose a risk of bacterial reinfection of the disinfected root canals [15, 22, 23]. These factors may be responsible for the reduced incidence of pain associated with single-

visit endodontic therapy. Yoldas et al., conducted a study evaluating postoperative pain in cases requiring endodontic retreatment. He concluded that in retreatment cases, postoperative pain was less frequent when treatment was done in multiple visits, with an intra-canal dressing placed between appointments [24]. This could be attributed to the greater resistance of bacteria associated with re-infections.

CONCLUSIONS

This study reports no difference in the incidence of postoperative pain in non-vital teeth, irrespective of the number of endodontic treatment visits. Single and multiple-visit root canal treatments had the same healing rate. It is proposed that future studies, like clinical trials with larger sample sizes, should be conducted to figure out the difference in the incidence of postoperative pain so that a treatment protocol can be recommended predictably.

Conflicts of Interest

The authors declare no conflict of interest.

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