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Severity of Post Obturation Pain in Single Versus Multiple Sittings Endodontic Treatment Using Rotary Nickle Titanium Instruments

Nouman Noor[1], Rahima Azhar[2], Rafia Sartaj[3], Hasan Mujtaba[4], Sadaf Humayoun[5], Muhammad Mohsin Javaid[6], Muhammad Athar[7]

[1]Associate Professor, Operative Dentistry, SOD/SZABMU Islamabad, [2]PGR Operative Dentistry, RIHS Islamabad, [3]PGR Operative Dentistry, Bakhtawar Amin Medical and Dental College Multan, [4]Associate Prof, Oral Pathology, SOD/SZABMU Islamabad, [5]Associate Professor, RIHS Islamabad, [6]Demonstrator, Community and Preventive Dentistry, SOD/SZABMU Islamabad, [7]Project Assistant, Indus Hospital and Health network, Islamabad

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Address of Correspondent
Dr. Muhammad Mohsin Javaid
Demonstrator, Community and Preventive Dentistry,
SOD/SZABMU Islamabad
Mohsinjavaid734@gmail.com

ABSTRACT

Objective: To evaluate the significant difference in the incidence and severity of post-obturation pain following single-visit and multiple-visit root canal treatments.

Methodology: This study was conducted in the Operative Dentistry Department of Rawal Dental Hospital in Islamabad. A total of 156 patients were randomly assigned to two groups, with 78 participants in each group. Prior to treatment, all participants were asked to mark a horizontal scale to indicate the intensity of their pain. After 24 hours of treatment, participants were questioned about their pain using a Visual-Analogue Scale. SPSS- 20 was used & Independent T-test was done for an analysis. P<0.05 was well-thought-out as statistically significant.

Results: The study comprised 93 male participants (59.6%) and 63 female participants (40%). Among the treated teeth, 80 (51%) were anterior teeth, and 76 (48%) were posterior teeth. The mean Visual-Analogue Scale (VAS) and standard deviation (SD) for Group 1 before treatment were 9.12 and 1.98, respectively, while for Group 2, they were 8.76 and 1.03, respectively. After 24 hours post-operatively, the mean VAS and S.D for Group 1 were 5.58 and 1.92, and for Group 2, they were 4.86 and 1.18, respectively. An independent sample t-test revealed a statistically insignificant variation in pre- and post-operative pain levels in both groups.

Conclusion: The incidence of pain was lower in the multi-visit group compared to the single-visit group, but this difference was not statistically significant.

Keywords: Endodontic treatment, RCT, Severity, Single visit, Visual-Analogue Scale.

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Introduction

After undergoing root canal treatment, patients may experience both long-term and short-term complications, which can include mild pain or flare-ups caused by inflammation of periapical tissues. Improper procedures and the use of irrigating solutions that force endodontic instruments, infected debris, and microbes into peri-apical tissues can result in the persistence of bacteria, leading to inflammation, infection, abscesses, and sinus tracts.[1,2] In some cases, antibiotics are prescribed, and various decisions and factors are taken into account before their prescription and consumption.[3,4] The success of the therapy depends on several major factors, such as tooth type (posterior or anterior), the vital or non-vital condition of the tooth, prevailing peri-apical conditions, and the effectiveness of the procedure.[5-7]

Root canal treatments can be carried out in a single visit or multiple visits, each with its own advantages and disadvantages. Apical periodontitis is a dynamic process that involves microbes and host defenses at the junction of the periodontal ligament and an infected root pulp,

ultimately leading to hard tissue resorption and preapical lesions. Proper management involves completely eliminating persistent bacteria and preventing further infection by closing off the root canal space three-dimensionally.[8-9,1] Single-visit root canal treatment is less time-consuming, prevents regrowth of bacteria, is cost-effective, and is less stressful for the patient in terms of instrumentation and anesthesia. However, one drawback is the inability to check tissue response after root canal treatment or culture.[1,10]

In the early 1960s, a nickel-titanium alloy was developed by WF Buehler and introduced to the field of dentistry. This super-elastic alloy has the ability to recover from distortions of approximately eight percent strain, compared to just 1% for stainless steel. Stainless steel instruments are manufactured through twisting, while nickel-titanium gadgets are machined, allowing for the production of various instrument designs. These properties, along with its high elasticity, make nickel-titanium alloy widely used in the production of endodontic instruments, particularly rotary instruments (RIs).[11,12] Several studies have reported better performance of nickel-titanium RIs in shaping and cleaning the root canal system compared to stainless steel instruments. In one study involving forty cases, Ni-Ti hand files demonstrated a higher success rate than SS K-files.[13,14]

The aim of this study was to assess the severity and incidence of post-operative pain and the number of visits required for endodontic treatment using the Crown-down technique with rotary nickel-titanium instruments. The primary objective was to determine whether there is a significant difference in the incidence and severity of post-obturation pain between single-visit and multiple-visit root canal treatments.

Methodology

The study was conducted in the Operative Dentistry Department at Rawal Dental Hospital in Islamabad. The sample size was determined using the WHO calculator, and simple random sampling was employed. The confidence level was set at 95%, with an alpha error of 5% and a desired study power of 80%. The anticipated mean pain in the single visit group was 10.1%, while the anticipated mean pain in the control group was 11.9%. These values were determined using the common sigma (standard deviation of 4.0). Each group had a sample size of 78 cases, resulting in a total study sample of 156 cases.

Inclusion criteria for the study encompassed patients aged 18 years and older who required endodontic treatment and had teeth with no calcified canals and completely formed foramina. Exclusion criteria comprised patients currently taking antibiotics, pregnant patients, individuals with complicating systemic ailments, immunocompromised individuals, and those under the age of 18 years.

Pain measurement was conducted as follows: before treatment, all participants were asked to mark their pain intensity on a horizontal scale. After treatment, participants were questioned about their pain level twenty-four hours post-treatment, and the responses were graded using a Visual-Analogue Scale.

All the procedures were completed by a single operator 2% lidocaine having 1:80,000 epinephrine, followed by access preparation and rubber dam isolation. Pro-Taper Engine driven rotary NiTi and hand files were used to prepare canals. 2.5% hypo-chlorite was used as an irrigant, all the teeth were set for working length and paper points were used to dry canals. In group 1 the canals were filled with Pro-Taper universal GP by lateral compaction & then temporary material was used for restoration. In group 2 canals, germ-free dry pellet of cotton was placed in a chamber.

SPSS- 20 was used & Independent T-test was done for an analysis. $P<0.05$ was well-thought-out as statistically significant.

Results

Out of 156 patients, males were 93 (59.6%) while females were 63 (40%). Anterior teeth were 80 (51%) while posterior teeth were 76 (48 %) as shown in table I.

Table I: Category of Patients on Gender &Tooth Type.

Tooth Type	
Anterior	80 (51%)
Posterior	76 (48 %)
Gender	
Men	93 (59.6%)
Ladies	63 (40%)

Mean VAS & S.D of Group 1 was 9.12 & 1.98, while for Group 2 was 8.76 & 1.03 pre-operatively. When talking about 24 hours post-operatively, Mean VAS & S.D of Group 1 was 5.58 & 1.92, while for Group 2 was 4.86 & 1.18 respectively. Independent sample t-test exposed statistically in-significant variation in a pre and post-operative pain levels in both groups as shown in table II.

Less incidence, severity and intensity of pain was observed in multi-visit cluster than single visit, which is shown in figure 1.

Table II: Pre and post-operative pain among participants using Visual Analogue Scale.

	Preoperative		
	Mean VAS	**SD**	**P value**
Group 1	9.12	1.98	>0.05
Group 2	8.76	1.03	
24 hours Post-Operative			
Group 1	5.58	1.92	>0.05
Group 2	4.86	1.18	

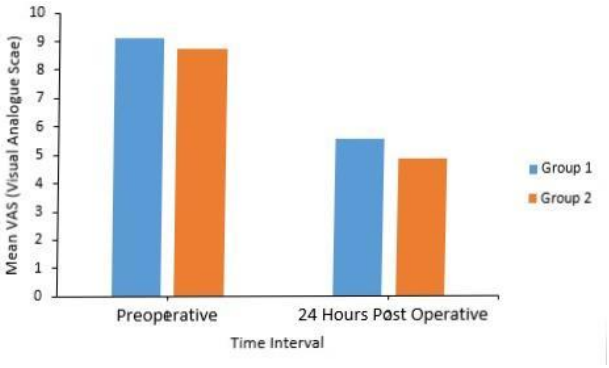

Figure 1. Pain severity in multi-visit group versus single-visit group.

Discussion

Bacteria can persist even after thorough disinfection through bio-mechanical preparation followed by canal irrigation. Successful root canal treatment primarily depends on the removal of microbes and the establishment of an environment conducive to proper healing.[15,16] This can be achieved in either a single visit or multiple visits, with dressing placed between these appointments. Many individuals worry about experiencing pain after an endodontic procedure. Therefore, addressing the concerns of both patients and endodontists can reduce the chances of post-obturation pain.

Most individuals undergo endodontic treatment to find relief from pain.[17] Traumatic dental and oral injuries are most common among adolescents and children, and oral healthcare services are continually advancing with technology.[18,19] There is ongoing debate about whether to opt for multiple or single-visit therapy in cases of pulpal necrosis with or without apical periodontitis. Some endodontists believe that intracranial medicament should be administered for longer durations to eliminate bacterial load.[20,21] Improved levels of self-efficacy can enhance personal performance in various tasks and play a significant role.[22] Some patients may also be prescribed medications.[23] The perception of pain is mostly subjective and variable, depending on physical and psychological factors, and it is assessed using the Visual Analogue scale. There was no significant difference in pre and post-obturation pain based on sex or gender.

In our investigation, we found that there was less prevalence of pain in the multi-visit group compared to the single visit group, although this difference was not statistically significant. These findings are consistent with other studies.[8,24] Soars and Ceasr noted that single visit root canal treatment is clinically effective in all cases, but radiographic success may lag when evaluating post-operative pain incidence and peri-apical healing after 12 months of root canal treatment.[25] The primary goal of root canal treatment is to achieve success with no signs or symptoms in post-treatment teeth. In cases of non-vital teeth, multiple appointments with intracranial medicament between visits may be necessary.[1]

In our research, we observed a lower incidence, severity, and intensity of pain in the multi-visit group compared to the single visit group. However, Eleazer stated in another study that single visit RCT is superior to the multiple-visit approach.[26] Our results align with those reported by Dhyani, who found a significantly higher incidence of pain in the single-visit group.[27] These findings contrast with other researchers' reports, where the pain score in the multiple-visit group was significantly higher than in the single-visit group.[28,29] For the single-visit group, the mean pain score remained unchanged throughout the study at 0.38 ± 0.81, and the p-value was 0.723.[29] Postoperative pain may be higher in some patients due to factors like reduced blood flow, lower pain tolerance, and delayed healing.[28] It is important for dentists and other healthcare professionals to be trained to handle medical emergencies in dental clinics as well.[30]

On the other hand, some research did not reveal any significant difference in the intensity or incidence of post-endodontic flare-ups between the multiple and single visit groups (p-value > 0.05).[31] Our findings contradict a few other studies where an increased incidence in multiple visits was reported ($p = 0.001$).[32,33]

Limitations of Study: We didn't record probable confounding factors for instance obturation, experience of an endodontist and quality. Variations between multiple and single root teeth should have been carried out and Small sample size

Conclusion

Pain incidence was less in multi-visit group than a single-visit, using rotary nickle titanium instruments. In future,

further researches have to be done in endodontic settings with longer follow-up and large sample size

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