



Evaluation of Postoperative Pain after Single Visit Endodontic Treatment Using Different Rotary File System

Mohammad Ali¹, Hasib Ahmed²

¹Associate Professor & Head, Department of Dentistry, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh

²Associate Dental Surgeon and practitioner, Shah Ali Dental Clinic, Kallyanpur Bus Stand, Dhaka, Bangladesh
Corresponding Author: Mohammad Ali, Associate Professor & Head, Department of Dentistry, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh

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ABSTRACT

Introduction: Root canal preparation is recognized as being one of the most important stages in endodontic treatment. As post-obturation discomfort is a major concern, treating patients with symptomatic irreversible pulpitis in a single visit is challenging. Any level of pain experienced following the start of root canal therapy is referred to as post-operative pain. To evaluate the incidence of postoperative pain after root canal treatment of tooth with irreversible pulpitis of teeth using two different instruments rotary file systems.

Methods: This randomized clinical trial was carried out in the Department of Dentistry, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh from July to December 2023. A total of 50 patients age between 18 and 45 years having symptomatic irreversible pulpitis with mandibular premolar, requiring endodontic therapy were included in the study. After 12 hours, 24 hours, 72 hours the participants were asked to rate their level of postoperative pain on a visual analogue scale (VAS) (no pain, mild discomfort, moderate pain, and severe pain). Data obtained were analyzed using the chi square test and Statistical significance was defined as $p < 0.05$.

Result: Total 50 patients were enrolled in the current randomised experiment, and their data were analysed without dropouts or exclusions. From 12 h to 72 h time intervals, Group I protaper universal group displayed a decreasing mean. The highest mean was reported at 12 hours (4.03 ± 0.58), followed by 24 hours (2.59 ± 0.76), and the lowest mean (0.83 ± 0.10) at 72 hours. Except for the intervals following 48 and 72 hours, there was a statistically significant difference between all of the intervals. The protaper next group's findings revealed a decreasing mean during intervals of 12 to 72 hours. The greatest mean was observed at 12 hours (2.78 ± 0.43), followed by 24 hours (1.45 ± 0.32), while the lowest mean was reported at 72 hours (0). Results showed that there was a significant difference between both rotary file

groups. Postoperative pain was significantly higher in protaper universal group than protaper next file group.

Conclusion: Postoperative pain was lower in the protaper next file system than in the protaper universal file system after single-visit root canal therapy at 12, 24, and 72h.

Keywords: Root Canal Treatment, Postoperative Pain, Protaper Next, VAS

I. INTRODUCTION

Root canal preparation is recognized as being one of the most important stages in endodontic treatment. For successful treatment necrotic tissue, microorganisms, and dentinal debris should be removed from the root canal system. Any level of pain experienced following the start of root canal therapy is referred to as post-operative pain. [1] The incidence of post-operative pain was 40% in the first 24 hours and declined to 11% after 7 days, according to a comprehensive study on the prevalence and severity of pain in root canal treated teeth. [2,3] The aim of cleaning and shaping is to debride the intra-radicular contents and render the space suitable for obturation. Unfortunately, postoperative pain is still an unpleasant sensation that frequently occur after root canal treatment. Numerous clinical research have found that post-operative pain can range in intensity from 25% to 40%. [4,5] Preoperatively symptomatic teeth have been found to have a higher prevalence of post-operative pain than asymptomatic teeth. [6] As post-obturation discomfort is a major concern, treating patients with symptomatic irreversible pulpitis in a single visit is challenging. The prevalence of post obturation discomfort, despite its brief duration, is frustrating for patients and dental surgeons alike, especially when there were no symptoms in the tooth before to treatment. The general public has a misconception that single-visit endodontic therapy results in increased postoperative pain, discomfort, and flare-ups. Numerous studies demonstrated that



single-visit RCTs conducted in critical pulp patients replicated positive results. Compared to multiple visit endodontic therapy, single visit endodontic treatment has a higher risk of flare-up, discomfort, and postoperative pain. [7] Several risk factors are associated with postoperative endodontic pain, such as; age, gender, extrusion of debris, tooth anatomy, residual pulp remnants, preoperative pain, use of analgesic agents, pulpal and periapical status, and several treatment visits. [8-10] Adequate disinfection of the root canal system is crucial to minimize the symptoms, such as pain, abscess, and cellulite. For this purpose, root canal instrumentation and irrigation procedures should be performed efficiently; additionally, lasers and ultrasonic devices can be considered as adjunctive protocols. [11] During rotation these files produce a mechanical wave which travels along the length of the working part of instrument. The offset design of this instrument improves flexibility in the working part of the instrument and minimizing the contact between the file and dentin. Wave One Gold files are fabricated with M-Wire using an innovative thermal treatment process. The reciprocating motion require an initial rotation of the instrument in a counter clock wise direction, during which the instrument penetrates and cuts the dentin, and then a rotation in the opposite direction, during which the instrument is released. Regarding the system's capacity for shaping, impressive findings have been obtained. The increasing number of instruments, learning curve, and instrument fatigue are some of its drawbacks. [12] The fifth generation of files, which are more recent, have been engineered with offset centres of mass and/or rotation. Hence, the objective of this randomized clinical trial was to evaluate the incidence of postoperative pain after root canal treatment of tooth with irreversible pulpitis of teeth using two different instruments rotary file systems i.e. protaper universal and protaper next files.

II. MATERIAL AND METHODS

This randomized clinical trial was carried out in the Department of Dentistry, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh from July to December 2023. A total of 50 patients age between 18 and 45 years having symptomatic irreversible pulpitis with mandibular premolar, requiring endodontic therapy were included in the study. Patients with periapical abscess, facial cellulitis, sinusitis, known allergies to aspirin or nonsteroidal anti-inflammatory drugs, known allergies to local anaesthesia, sodium hypochlorite, or chlorhexidine, systemic diseases like

cardiovascular disease, renal disease, or any bleeding disorders, as well as pregnant women and nursing mothers, were excluded from the study. The study did not include patients with more than 1 symptomatic tooth.

Patients were divided into two groups using table of random numbers. Group A (n =25) Protaper universal and Group B (n =25) Protaper next. All the teeth were treated by single operator. Endodontic therapy consisted of local anesthesia administration and rubber dam isolation followed by access cavity preparation. A size # 10 stainless steel hand K-file (Mani; Japan). Root ZX II apex locator (J Morita Corp, Kyoto, Japan) was used to determine the working length which was further confirmed using periapical radiographs After working length determination, the canal was enlarged to size # 15 using stainless steel hand K-files (Mani; Japan).

In both groups, irrigation was done with saline and sodium hypochlorite using side vented needles. 2 ml of 2% chlorhexidine were used during the last irrigation. After the last irrigation, the canals were dried with absorbent paper points before being sealed with AH Plus (Dentsply Maillefer, Ballaigues, Switzerland) sealer and 6% gutta-percha cones that matched the size of the apical preparation. Finally access cavity is filled with Fuji II GIC (GC, Tokyo, Japan). After 12 hours, 24 hours, 72 hours the participants were asked to rate their level of postoperative pain on a visual analogue scale (VAS) (no pain, mild discomfort, moderate pain, and severe pain). Statistical Package for the Social Sciences (SPSS) version 23 is used to calculate and statistically analyse all of the results.

III. RESULTS

Total 50 patients were enrolled in the current randomised experiment, and their data were analysed without dropouts or exclusions. From 12h to 72h time intervals, Group I protaper universal group displayed a decreasing mean. The highest mean was reported at 12 hours (4.03 ± 0.58), followed by 24 hours (2.59 ± 0.76), and the lowest mean (0.83 ± 0.10) at 72 hours. Except for the intervals following 48 and 72 hours, there was a statistically significant difference between all of the intervals. The protaper next group's findings revealed a decreasing mean during intervals of 12 to 72 hours. The greatest mean was observed at 12 hours (2.78 ± 0.43), followed by 24 hours (1.45 ± 0.32), while the lowest mean was reported at 72 hours (0).

In this study, compared to a protaper Next rotary file, WaveOne gold file caused more noticeable



pain. The results of the current study showed that, on average, postoperative pain scores decreased over the course of the 12 to 48-hour period, whereas no postoperative pain were observed after

72 hrs. When comparing the two systems, results showed that protaper universal had higher mean values in all observation periods than protaper next and this was statistically significant at $P \leq 0.05$.

Table 1: Mean Pain Score (VAS)for Group I

Group I Protaper Universal	Time	Mean with Std. Deviation	p-value
	12 Hrs	4.03 ± 0.58	<0.05*
	24 Hrs	2.59± 0.76	
	72 Hrs	0.83 ± 0.10	

Table 2: Mean Pain Score (VAS) for Group II

Group II Protaper Next	Time	Mean with Std. Deviation	p-value
	12 Hrs	2.78 ± 0.43	<0.05*
	24 Hrs	1.45± 0.32	
	72 Hrs	0.00	

IV. DISCUSSION

Endodontic therapy is designed to manage pain and eliminate infection from teeth. Pain is a personal and subjective experience, that involves activation of peripheral nociceptors. It is a combination of nociceptor signals with emotional and cognitive elements that makes pain a multidimensional experience. Postoperative pain after the root canal treatment is basically unpreventable. Over the past 30 years, it has been clear that endodontic disease has a microbiological pathophysiology. Therefore, endodontic illness is treated by removing bacteria from the root canal space by root canal therapy. It is commonly acknowledged that mechanical enlargement of the main canals is necessary for root canal space cleaning and obturation, and most methods and tools are designed with these goals in mind. [6] In this regard, there have been two techniques suggested. By using an inter appointment dressing during the multi-visit root canal treatment, one method eliminates or prevents remaining germs from repopulating the root canal system. By encasing the remaining bacteria in a complete, three-dimensional obturation and completing the treatment in a single visit, the second strategy aims to eradicate any residual bacteria or render them harmless by depriving the microorganism from nutrition and the space they need to thrive and reproduce. [13] A single visit for endodontic treatment is also possible. To execute single-visit endodontics, a set of requirements must be met. Regarding the advantages of single-visit versus multiple-visit endodontics, there has been discussion for many years. According to one theory, quick obturation during root canal preparation reduces postoperative pain in single-

visit endodontics by limiting the penetration of medicines, irrigants, and repetitive instruments, which are thought to be the causes of postoperative discomfort. [14] In present study was conducted to evaluate the incidence of postoperative pain after root canal treatment of tooth with irreversible pulpitis of teeth using two different instruments rotary file systems i.e. protaper universal and protaper next files. There have been numerous different methods used to quantify postoperative pain. This study used VAS since it is often used to assess pain severity and has a proven track record of dependability. [15,16] In the present study, it was noted that comparatively higher VAS scores were observed with protaper universal at the end of 12h, 24h, showing relatively higher scores even at the end of 72hrs when compared to the protaper next file. The result of our study in accordance to the study conducted by arora et al. [17] In this investigation, only mandibular premolars are looked at. The irreversible pulpitis preoperative diagnosis was used to select teeth for treatment in order to avoid bias. This removed the possibility that discomfort could be brought on by intracanal medicines or other elements. One appointment was required to treat every tooth. The quantity, nature, and concentration of the irrigating fluids used in all endodontic operations, including root-filling procedures, are all standardised. [18,19] In present research it was observed that; with increasing time, it was seen that the intensity of the pain gradually decreased in both groups. It makes sense and is to be anticipated that tooth discomfort will lessen over time as the disease process progresses naturally after debridement. None of the patients mentioned any further signs or side effects, such as paresthesia or postoperative edema. The level of care that was



taken to establish an atraumatic treatment protocol is highlighted by all of these facts. No participants in either of the therapy groups in the current trial required analgesics at any point during the investigation. The discrepancy in the number of files used five for the protaper universal group against just three for the protaper next group - could be the cause of this. [20] A further explanation can be provided by the protaper next files' off-center rectangular cross section. With such a change in the cross-section, the area in contact with the canal is reduced, which increases cutting efficiency and decreases the amount of time needed for preparation. [21] The incidence of postoperative pain has been a matter of concern even with the inception of advanced endodontic instruments While several in vitro studies have assessed the debris extrusion in different systems, [22,23] few have focused on the clinical outcome. [24] Based on these premises, the aim of this study was to evaluate and compare postoperative pain following endodontic treatment performed by rotary and reciprocating file systems.

V. CONCLUSION

No significant difference was found between Rotary file system and reciprocating file system groups in terms of pain after endodontic treatment. Postoperative pain was lower in the protaper next file system than in the protaper universal file system after single-visit root canal therapy at 12, 24, and 72 hrs.

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