



Comparative Evaluation of Post Endodontic Pain After the Use of Protaper Next and WaveOne Gold file System in a Tooth With Irreversible Pulpitis: A Clinical Trail

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Abstract

Aim: The current study aims to assess clinically the occurrence of postoperative discomfort following endodontic treatment utilising the Protaper Next and WaveOne Gold file systems.

Material and Method: The study involved 30 healthy teeth with irreversible pulpitis but no periapical lesions. Protaper Next and Waveone gold were the two instrumentation systems used, and the patients were split into two groups (n=15). One session was used for all of the treatments. 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). All the results are calculated by using Statistical Package for the Social Sciences (SPSS) version 22 and statistically analyzed.

Result: After 12, 24 and 72 hours, the incidence of postoperative pain is much lower in the Protaper next group than it is in the Waveone gold group.

Conclusion: In comparison to the Protaper Next file, increased postoperative pain is anticipated following the preparation of the root canal system using WaveOne Gold.

Keywords: Postoperative Pain, Endodontic Treatment, Protaper Next file, WaveOne Gold, VAS

Introduction: A common consequence of endodontic therapy is pain, which is estimated to occur in 1.4–16% of cases.¹⁻³ Pain following endodontic treatment has many causes.⁴ Extrusion of debris during chemomechanical preparation is one underlying reason.⁵⁻⁷ To keep instruments within the boundaries of the canal, proper irrigation protocols and aspiration techniques are required, and employing various endodontic files with the right kinematics, debris extrusion can be reduced.⁸

There seems to be a connection between tissue injury severity and pain level. Inter-appointment or postoperative pain is brought on by periradicular inflammation brought on by debris extrusion and is mediated by the chemicals substance P, calcitonin, and gene-related peptides, which trigger the nociceptors' G protein-coupled receptors. The effects of this include allodynia, hyperalgesia, and spontaneous pain. Furthermore, central sensitization begins when there is a substantial and prolonged input flood from C-fibers. One of the most critical phases of endodontic therapy is the cleaning and contouring of the root canal, which removes inflammatory and necrotic tissue. Necrotic tissue, dentine fragments, bacteria, pulp tissue, and irrigants are typically present in extrusion.⁹

The use of root canal therapy is used to address conditions affecting the dental pulp and periradicular region. Since the introduction of single-visit endodontic therapy, the pros and cons of single vs many visits endodontic management have been debated. Initially became accessible. Single-visit endodontic therapy's proponents emphasise the time and cost reductions. Additionally, if there are any incidents during the visits, such a leak through a missed appointments, reinfection, and interim restoration in between appointments are avoided. This

study compares the two file systems to see whether instrumentation lowers the frequency and intensity of postoperative pain.

Dentsply Mailefer's ProTaper (Ballaigues, Switzerland) has a convex triangular cross-section, a varied taper along its length, and no radial land. Debris cannot accumulate on these instruments because of their small cross-sections and variable taper, which acts as a piston to push debris out the apex. The reciprocating single-file technique's flutes have a tendency to drive debris into the apical region as opposed to removing it while rotating at the release angle. Additionally, the WaveOne gold (Dentsply Sirona, Charlotte, NC, USA) method uses a large, moderately rigid single file with a greater taper that immediately reaches the apex. In some circumstances, reciprocal tools with force concentration at the apex are used to reach the apical working length.^{9, 10} This causes an active piston to push debris out of a patent apical foramen. Hence, the current study aims to assess clinically the occurrence of postoperative discomfort following endodontic treatment utilising the Protaper Next and WaveOne Gold file systems.

Material and Method: The research and ethical committee accepted the study protocol. 30 participants between the ages of 18 and 50 were chosen to participate in this clinical investigation and randomly divided into two group of 15 each.

Only mandibular molars are used in this study, and patients who want single-visit root canal treatment, teeth without periapical lesions, root fillings that show radiographic signs of periradicular illness, and teeth with enough crown structure for rubber dam isolation are all included. To minimise bias, multiple-seating root canal procedures, periodontal pockets, individuals with systemic disorders, patients who are medically compromised or have drug allergies, teeth with periapical lesions, and teeth with root fractures are excluded from study.

Local anesthesia is given with 2% lignocaine and epinephrine (1:80,000). Access cavities are prepared using small round bur on a high-speed endodontic motor. Once access has been gained, both groups build a glide path up to K-file number 15, using push-and-pull motion. The working length is measured with Epex pro (Eighteen, Changzhou, China) apex locator up to the apical foramen, at which point the file is removed and the length is measured with an endodontic ruler. The working length was verified by radiographic confirmation. Each group follows the

manufacturer's recommended instrumentation order. All instruments are driven by a torque-restricted endomotor.

The following rotary files were used to clean and shape the root canal: Group I: Protaper Next and Group II: WaveOne Gold. After cleaning, the canal was dried with a paper point, sealed with gutta-percha and AH plus sealant (epoxide-amine resin root canal sealer), and then sealed again. A radiograph was done to verify the obturation. After that, the access cavity was sealed using a durable restorative material.

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). All the results are calculated by using Statistical Package for the Social Sciences (SPSS) version 22 and statistically analyzed.

Result: 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. (**Table I and II**)

Table no 1: Mean Pain Score (VAS) for Group I			
	Time	Mean with Std. Deviation	P Value
Group I Protaper Next	12 Hrs	3.07 ± 0.81	< 0.05*
	24 Hrs	1.67 ± 0.45	
	72 Hrs	0.00	

Table no 1I: Mean Pain Score (VAS) for Group II			
	Time	Mean with Std. Deviation	P Value
Group I WaveOne Gold	12 Hrs	3.05 ± 0.78	

	24 Hrs	2.15 ± 0.53	< 0.05*
	72 Hrs	0.00	

Discussion: Pain is a highly individualised experience that is influenced by a wide range of variables, including but not limited to behavioral and cultural learning and expectations, attention reaction from those around you, physical (genetic), and psychological variables. It might be difficult to accurately measure and standardize pain across a group of people.¹¹

To measure postoperative pain, many different approaches have been utilised. Because VAS is frequently used in studies to determine the intensity of pain and has a track record of dependability, it was used in this study.^{12,13} Only mandibular molars are examined in this study. To prevent bias, the preoperative diagnosis of irreversible pulpitis was used to select teeth for treatment. This eliminated the potential that intracanal medications or other factors could cause discomfort. All of the teeth were treated in one appointment. In all endodontic procedures including root-filling procedures, the amount, type, and concentration of the irrigating solutions used are all standardised.^{14,15}

Patients still have a severe problem with pain after endodontic treatment¹¹, despite the fact that analgesics are commonly given. According to the findings, the incidence of post-endodontic discomfort varies greatly, from 82.9% to 10.6%. These changes in the results could be caused by variations in the use, taper, cross-section, alloy type, cutting-edge design, flexibility, kinematics, tip type, and the number of files used concepts, which vary with file systems and operators' ability.^{16,17}

The substance P and calcitonin gene-related peptide, which activate G protein-coupled receptors on nociceptors and cause the sensitization or activation of neurons, may also be responsible for the pain associated with periradicular inflammation brought on by the extrusion of debris. These neuropeptides can cause peripheral sensitization characterised as hyperalgesia, allodynia, and spontaneous pain. A barrage of C-fiber inputs with appropriate strength and duration also triggers central sensitization.¹⁸

In this study, compared to a protaper Next rotary file, WaveOne gold file caused more noticeable pain. When ProTaper Rotary instrumentation was utilised, the pain was minimal. This might be because the flutes on these instruments have a tendency to draw debris back towards the orifice, which lowers the amount of extrusion of debris by rotating systems. In contrast, the

manual step-back approach tends to thrust the material through the apical foramen, leaving insufficient room for it to be expelled coronally, increasing the likelihood of irritation and pain.¹⁹

The higher amount of extruded debris and, thus, the more extreme postoperative discomfort observed by the reciprocation instrumentation technique, are thought to be caused by two different mechanisms, according to Gambarini et al. First, a larger cutting angle and a lower releasing angle combine to generate the reciprocation movement. Second, the flutes have a tendency to push some dirt apically rather than remove it. Most likely, the second mechanism is more important. It is commonly established that the coronal and apical regions should be instrumented first and last, respectively, when employing rotating Ni-Ti instruments. Because the coronal portions of the canal have been cleansed and cleared before the contents of the apical area are treated, this approach minimises extrusion.²⁰

The results of this study are also similar to those of another study carried out by Kundgulwar P et al.,⁹ who compared the effectiveness of hand and rotary instrumentation techniques on postoperative pain in asymptomatic necrotic premolars with periapical lesions and instrumented by a modified step-back technique using a K file, crown down by continuous rotary motion technique using ProTaper Next and with the reciprocation technique using WaveOne (Dentsply Sirona, Charlotte, NC, USA) and found that the K file and Protaper next file cause significantly less pain compared to Wave One file. Within the limitations of this study, it was thus concluded that different instrumentation techniques/systems used for cleaning and shaping had an effect on post endodontic pain. Minimum pain was reported by patients, in which the cleaning and shaping was done using ProTaper next rotary file when compared with WaveOne Gold file.

Conclusion: We can conclude that from present study; in comparison to the Protaper Next file, increased postoperative pain is anticipated following the preparation of the root canal system using WaveOne Gold.

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Conflicts of interest: There are no conflicts of interest.

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