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Original Research Paper



# POST ENDODONTIC PAIN INTENSITY FOLLOWING ENDODONTIC TREATMENT

## WITH ONE RECIPROCATING AND ONE CONTINUOUS ROTATION NICKEL TITANIUM FILE SYSTEMS.

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ABSTRACT AIM: To evaluate post endodontic pain following instrumentation with various NiTi file systems

**MATERIALS AND METHOD:** 150 patients were divided into three groups. Group 1: instrumentation with WaveOne file system. Group 2: instrumentation with ProTaper Next file system. Group 3: instrumentation with hand files. The severity of the postoperative pain was assessed by the visual analogue scale (VAS) after 6, 12, 24, and 48h. Data were analyzed using the Kruskal-Wallis and Mann-Whitney U tests.

**RESULTS:** The patients in control group reported significantly higher mean postoperative pain intensity at 12, 24, 48, and 72 h compared to the patients in the two other groups (*P*<0.05). There was no significant difference in mean intensity of postoperative pain between Reciproc and OneShape at 5 time points (*P*>0.05).

**CONCLUSION:** The instrumentation kinematics (single-file reciprocating or single-file rotary) had no impact on intensity of postoperative pain.

**KEYWORDS** : post operative pain, VAS scale, NiTi files

#### **INTRODUCTION:**

Root canal treatment includes cleaning, shaping and sealing of the root canals, to allow healing of periradicular tissues [1]. Postendodontic pain can occur within a few hours or a few days after endodontic treatment [2]. Post-operative pain after endodontic treatment remains to be a major concern [3,] with a frequency ranging from 1.9 to 48% . Postendodontic pain of mild (with a frequency of 10-30%) [4] and severe (with a frequency of 6-12%) [5]. Intensities have been reported. Various factors are attributed to post-operative pain including a history of preoperative pain, defective canal debridement, hyper occlusion, periapical disease and extrusion of debris into the periapical tissue [6]. Extrusion of infected dentin into the periapical tissue has been suggested as a major source of pain after endodontic treatment [7]. While several in vitro studies have assessed the debris extrusion in different systems [8,9], few have focused on the clinical outcome [10,11]. Therefore, the purpose of this randomized clinical study was to compare intensity of postoperative pain after the root canal preparation of teeth diagnosed with symptomatic irreversible pulpitis using three different instrumentation techniques: hand, single-file rotary (ProTaper next), and single-file reciprocating (Wave One) systems.

#### MATERIALS AND METHODS:

Healthy patients aging between 20 to 50 years old with a pulpal status of symptomatic irreversible pulpitis were treated. A written consent was obtained before recruitment.

The patients were selected according to the following criteria.

#### **Inclusion criteria**

Permanent teeth with fully formed apex, teeth with vital pulp, teeth with no periapical radiolucency, patients having preoperative pain.

#### **Exclusion criteria**

Teeth with incompletely formed apex, teeth requiring secondary endodontic treatment, patients having complicating systemic disease such as diabetes, malignancy, pregnancy, central nervous system disorders, Cardiovascular system (CVS) disorders, teeth having multiple canals or multirooted teeth, teeth affected with periodontal disease. Teeth tender on percussion, teeth having procedural errors such as transportation, perforation, and missed canals. Prior to treatment a list of information regarding age, gender, type of tooth, pulpal and periapical status, presence of periapical lesion and a history of previous treatment were gathered from each patient. Local anesthetic (1:80,000 Arcaine, Aarge Pvt Ltd., India) was administered, and endodontic access was achieved under rubber dam isolation. Access cavity was prepared using round carbide and diamond cylindrical burs in a high-speed hand piece. Working lengths of the canals were determined using an electronic apex locator (Root ZX; J. Morita, Tokyo, Japan) and then confirmed radiographically. The instrumentation sequence used during the treatments in each group followed the procedure recommended by the manufacturer.

**Dental Science** 

**Group 1 (Wave-One):** Using Glyde (Dentsply Maillefer) as the lubricating agent, the glide path was created with PathFiles sizes 1, 2 and 3 (Dentsply Maillefer) until the full WL. The WO primary file (25.08) was used to prepare narrow and curved canals, and the WO large file (40.08) was used for large canals. Three in-and-out motions were applied in the cervical, middle and apical thirds, with an amplitude not exceeding 3 mm, until the established WL was attained.

**Group 2 (ProTaper Next):** Using Glyde (Dentsply Maillefer) as the lubricating agent, the glide path was created with PathFiles sizes 1, 2 and 3 (Dentsply Maillefer) until the full WL.then preparing upto X3 at the apex.

**Group 3 (control group):** canals were prepared using stainless steel K-files up to size #25 in smaller and #40 in larger canals. A 0.5 or 1-mm incrementally reducing step-back technique was used to provide tapers of 5% and 10%, respectively depending on the size of the canal.

Table 1: Demographic groups				
data	Group 1(n=50)	Group 2(n=50)	Group 3(n=50)	P value
Mean age of patients	31.2yrs	32.3yrs	33.7	.647*
No of males	24	23	28	
No of females	26	27	22	

\*Non statically significant difference

Following instrumentation with the mentioned techniques the coronal chamber was flushed with 1 mL of 2.5% NaOCl, and agitated ultrasonically for 1 min per canal followed by irrigation with 5 mL 17% EDTA and agitated ultrasonically for 1 min to remove the smear layer. Afterward, irrigation was repeated with 5mmL of 2.5% NaOCl solution and the procedure was completed by irrigation with 5 mL saline solution. The canals were then dried using paper cones and obturated using lateral condensation of gutta percha and AH-plus sealer. The tooth was then temporarily sealed using Cavit (3M ESPE, Seefeld, Germany). At the end of the session VAS questionnaires were handed out to the patients and they were asked to assign a number correlating to their post-treatment pain, with 0 representing no pain and 10 representing the most severe pain

CONCLUSION

imaginable. These scores were marked in intervals of 6, 12, 24, and 48hrs. The data were analyzed using the Kruskal-Wallis and Mann-Whitney U tests. A cut off point of 0.05 was set as the statistical significance

#### Table 2. Mean (SD) of pain intensity in study groups during the first 48 h after treatment

	Group 1	Group 2	Group 3	P value
Preoperative	5.22(2.9)	6.36(2.44)	6.64(2.14)	.076
After 6 hrs	3.5(3.1)	3.5(2.9)	5(2.7)	.006
After 12 hrs	1.5(2.1)	1.7(1.5)	3.88(2.6)	<.001
After 24 hrs	1(2.0)	.8(1.3)	2.76(1.5)	<.001
After 48 hrs	.5(1.96)	.6(1)	1.66(1.5)	<.001

#### RESULTS

A total of 160 patients were included in this study. At the end10 patients were excluded due to procedural errors; including overfilled canals; and fractured instruments or failure to return the VAS forms and statistical analysis was performed on the remaining 150 participants.

Table 1 summarizes the general characteristics and demographic data of the study groups. There were no differences in age, gender and type of teeth between the groups (P>0.05).

The results showed that the intensity of patient's pain had significantly decreased by 48 h in all groups (P<0.05). The highest postoperative pain intensity was recorded in the early stage after the root canal treatment. The Kruskal-Wallis test showed that the patients in control group reported significantly higher mean postoperative pain intensity at 6, 12, 24, and 48h compared with the patients in the two other groups (P<0.05). There was no significant difference in mean postoperative pain intensity between ProTaper Next and Wave One at the 4 assessed time points (P<0.05) (Table 2).

#### DISCUSSION

The aim of this study was to compare the intensity of postoperative pain using one rotary file system and one reciprocation systems. In the present study, the VAS questionnaire was used to quantify pain and categorize it into mild, moderate and severe groups. Attempts were made so that the various procedural steps including the number of anesthetic cartridges used, working length determination, irrigation and obturation procedures were standardized between the groups. Comparison of post-endodontic pain following various instrumentation techniques and armamentarium has been the focus of attention in the recent years. The results of this study found no significant difference in postoperative pain between ProTaper Next and Wave One groups; however, the control group exhibited significantly higher pain intensity compared with the patients in the two other groups. This finding may be attributed to the Archimedes' screw effect, which minimizes debris extrusion from the apical foramen [12-13]. These results are in line with previous studies that found lower postoperative pain using NiTi rotary files compared to stainless steel hand files, however these studies used different engine-driven instruments [14].

It is well established that extrusion of debris into the periapical region may irritate the periradicular tissues and cause inflammation leading to postoperative pain and flareups [15]. While some studies have applied full-sequence rotary files with higher debris extrusion compared to reciprocating rotary files, others have reported reciprocating rotary files with more debris extrusion [16]. The variation observed could be attributed to differences in the crosssection, cutting-edge design, taper, and tip type, configuration, and flexibility, and alloy type, number of used files, kinematics, or cutting efficacy [17]. Micro-computed tomography (µCT) studies have shown that reciprocating motion provides better shaping, with less incidence of canal transportation, compared to rotary files [18]. This could be one of the reasons for increased intensity of postoperative pain by ProTaper Next.

This study found significantly higher levels of post-operative pain in the group using K-files compared to wave one and ProTaper Next group groups. No significant difference was found between Wave One and ProTaper Next groups in terms of pain after endodontic treatment.

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