

## COMPARISON OF POSTOPERATIVE PAIN LEVELS AFTER ROOT CANAL INSTRUMENTATION WITH TWO ROTARY NICKEL TITANIUM INSTRUMENTS (AN IN-VIVO STUDY)

Nada Salah El-Din\* , Kariem El Batouty\*\*  and Tarek Moustafa Abdel Aziz\*\* 

### ABSTRACT

**Introduction:** post endodontic pain comprises a consequence to root canal treatment as it is an unpleasant outcome to both patient and the clinician.

**Aim of this study :** to compare the level of post endodontic pain after instrumentation with ProTaper Gold or KontrolFlex systems.

**Methodology:** 70 patients were randomly allocated to two groups 35 patients each. Group A: canals were instrumented using ProTaper Gold system, Group B: canals were instrumented using KontrolFlex system. Patients were asked to record their pain levels after 6h, 12h, 24h and 48h using the visual analogue scale. Data were tabulated and statistically analyzed using Shapiro Wilk test and Kolmogrov Smirnov test.

**Results:** ProTaper Gold was accompanied with significantly less pain after 6h and 12h after which no statistically significant difference was found.

**Conclusion:** There was a statistically significant difference in the post endodontic pain after 6h and 12h after which no statistically significant difference was found. The pain steadily decreased over time when both systems were used.

**KEYWORDS:** post endodontic pain, ProTaper Gold, KontrolFlex

### INTRODUCTION

One of the goals of endodontic treatment is to decrease the post endodontic pain as well as to preserve the compromised tooth structure to

maintain function<sup>1</sup>. Post endodontic pain can be defined as the unpleasant sensation following root canal treatment that is reported in 3%-65% of the cases<sup>2</sup>.

\* Department of Endodontics, Faculty of Dentistry, Msa University, Giza, Egypt

\*\* Department of Endodontics, Faculty of Dentistry, Ain Shams University, Cairo, Egypt

Post endodontic pain is considered to have a major influence on patient's assessment of treatment quality<sup>3</sup>. Whenever it is severe, patients tend to attribute the pain to the operator's performance<sup>3</sup>. Alongside microorganisms, several factors contribute to the occurrence of post endodontic pain. These factors include: gender, position of tooth, preoperative status, number of visits, apical extrusion of debris, technique of obturation and teeth vitality<sup>4</sup>. Instrumentation has been considered to greatly affect the resulting post endodontic pain due to the extruded debris during preparation<sup>5</sup>.

KontrolFlex™ (Brasseler USA, Savannah, GA) is one of the newly introduced rotary systems. According to manufacturer, it is made of controlled memory wire that can be precurved and has high resistance to cyclic fatigue and is recommended to be used in curved canals.

The ProTaper Gold™ (Dentsply, Maillefer, Ballaigues, Switzerland) rotary system has been widely used in cases with curved canals due to its gold wire proprietary metallurgy that offers superior flexibility and its progressive taper that ensures better cutting efficiency<sup>6</sup>.

The purpose of this study was to assess and compare the levels of post endodontic pain after instrumentation with Protaper Gold and KontrolFlex rotary systems.

## PARTICIPANTS AND METHODS

A total of 70 patients were selected to participate in this study after signing an informed consent explaining the procedure and the post treatment expected outcomes.

### Inclusion criteria

- Medically free adult patients in age ranged from 20 – 40 years
- Necrotic asymptomatic lower first permanent molars with no more than one wall missing

### Exclusion criteria:

- Symptomatic teeth
- Severe bone loss
- Immature apices
- Swelling or cellulitis
- Periradicular radiolucency

Patients were randomly distributed to two groups with 35 patients each. Group A: canals were instrumented with ProTaper Gold rotary files, group B: canals were instrumented with KontrolFlex rotary files

### Clinical procedure

Tooth diagnosis was done by visualization, percussion, palpation, mobility and electric pulp testing. Inferior alveolar nerve block was administered and access cavity opening and complete de-roofing were done after complete caries removal. Isolation was obtained via rubber dam application. Orifices were enlarged with Endopener file (Thomas, Bourges Cedex, France). Patency was established with K-files 10 and 15 then working length was recorded using J morita apex locator (J. Morita, Tokyo, Japan). The patients were divided into two main groups according to techniques of instrumentation used that was done with J morita endomotor (J. Morita, Tokyo, Japan). Canals were instrumented as follows :

#### Group A (ProTaper Gold):

Canals were instrumented with the files sequence: S1 (0.18/0.02), S2 (0.20/0.04) to full W.L. in brushing motion upon removal, F1 (0.20/0.07), F2 (0.25/0.08), F3 (0.30/0.09) then F4 in pecking action to reach W.L. (0.40/0.06). When a single canal within a root was found, it was instrumented up to F5 (0.50/0.05).

#### Group B (KontrolFlex):

Canals were instrumented with the files sequence: KF (0.20/0.04), KF (0.25/0.04), KF (0.30/0.04), KF

(0.35/0.04) then KF (0.40/0.04) with feather-light touch taking the file to engagement until W.L. is reached. When a single canal within a root was found, it was instrumented up to KF (0.45/0.04). canals were disinfected with 2 ml of 2.5% concentration of sodium hypochlorite (NaOCl) for 20 seconds after each file change using side vented needles inserted up to 1mm short of W.L.<sup>7</sup>. Obturation was done using AH Plus as sealer (Dentsply De Trey GmbH, Konstanz, Germany) introduced on master cone then the accessory gutta percha were added.

### Pain assessment:

Patients were instructed to record their pain levels using the visual analogue scale after 6h, 12h, 24h and 48h. The scale was represented by degradation from 0 to 10 with 0 representing no pain and 10 representing severe unbearable pain.

### Statistical analysis:

Data were tested for normality using Shapiro Wilk test and Kolmogrov Smirnov test. Data were presented as mean and standard deviation (SD) and tested using Mann-Whitney U test.

## RESULTS

#### 1- 6 h:

There was a statistically significant difference between the two groups ( $p = 0.004$ ) (Table 1).

#### 2- 12 h:

There was a statistically significant difference between the two groups ( $p = 0.001$ ) (Table 1).

#### 3- 24 h:

There was no statistically significant difference between the two groups ( $p = 0.151$ ). (Table 1).

#### 4- 48 h:

There was no statistically significant difference between the two groups ( $p = 0.129$ ). (Table 1).

TABLE (1): The mean, standard deviation (SD) values of pain scores over time with each file system

	ProTaper Gold	KontrolFlex	P value
	Mean $\pm$ Std. Dev	Mean $\pm$ Std. Dev	
6h	4.09 $\pm$ 1.76	5.20 $\pm$ 1.55	0.004
12h	3.46 $\pm$ 1.24	4.49 $\pm$ 1.42	0.001*
24h	2.89 $\pm$ 1.11	3.40 $\pm$ 1.61	0.151
48h	1.63 $\pm$ 0.73	2.00 $\pm$ 1.16	0.129

\*: P value ( $p < 0.05$ )

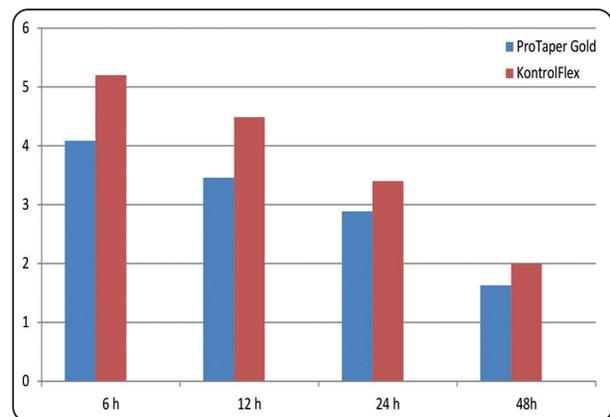


Fig. (1) Bar chart representing effect of time on pain scores in each file system.

## DISCUSSION

Post endodontic pain has been a pivotal concern due to the unsatisfactory outcome to both patient and operator<sup>8</sup>. Due to its clinical significance, it has been addressed in many studies in attempt to reach a more or less painless treatment protocol.

The success of endodontic treatment doesn't only depend on the execution of the clinical steps but also on the overall outcome as the post-operative quality of life<sup>9</sup>. Multiple factors have been identified as causes for post endodontic pain such as tooth type, age, gender, and irrigation protocol and periradicular condition<sup>10</sup>. The unavoidable apical extrusion of debris during root canal preparation may cause

inflammation of the periradicular tissues leading to post endodontic pain. While all instrumentation systems would cause debris extrusion<sup>11</sup>, it is important to select a system that would cause less debris extrusion. Reviewing the literature showed that multiple studies were conducted to assess the performance of ProTaper Gold system in regard to post endodontic pain while the KontrolFlex system is yet to be evaluated so this study aimed to evaluate and compare the effect of both systems on the levels of post endodontic pain.

In the present study, a sample of 70 patients was chosen to participate in this study. Patients were randomly allocated to two groups to receive treatment using either ProTaper Gold files or KontrolFlex files. Treatment was completed in a single visit as it meets patient's wishes and shown to be different in comparison to treatment done in multiple visits. In this study, ProTaper Gold was associated with significantly less pain after 6h and 12h. This came in agreement with Kumar et al whom found ProTaper Gold group to cause less post endodontic pain compared to other groups in their studies<sup>12</sup>. The less post endodontic pain associated with ProTaper Gold could be attributed to less debris extrusion due to the file flexibility and the non-cutting tip design<sup>13</sup>. Both file systems used in this study were heat treated to produce a more flexible wire compared to the conventional super elastic NiTi systems. This flexibility aimed to decrease the extrusion of canal content during preparation to minimize the resulting post endodontic pain.

## CONCLUSION

There was a statistically significant difference in the post endodontic pain after 6h and 12h after which no statistically significant difference was found. The pain steadily decreased over time in both systems.

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