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International Journal of Recent Scientific Research
Vol. 6, Issue, 7, pp.5055-5057, July, 2015

International Journal of Recent Scientific Research

ISSN: 0976-3031

RESEARCH ARTICLE

CENTERING ABILITIES OF TWO ROTARY NITI SYSTEMS IN MEDIUM CURVED CANALS

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ARTICLE INFO

Article History:

Received 2nd, June, 2015
Received in revised form 10th, June, 2015
Accepted 4th, July, 2015
Published online 28th, July, 2015

Key words:

ABSTRACT

Objectives: The aim of our study was to compare the centering ability of two recently introduced NITI file systems-New One Shape™ and Protaper Next™. **Methods:** 40 teeth were divided into 2 groups of 20 teeth each. A gig with radiopaque markers was prepared for each tooth, and an X ray was taken with a #10 file to the working length in the canal. Each group prepared using one of the file systems in accordance to manufacturer's instructions. The last rotary instrument to be used was X rayed in the canal using the gig. Both X ray imaged were digitized. A point was drawn at the tip of each file, and images were superimposed and aligned using the radiopaqe markers imbedded in the gig. The distance between the marked points drawn earlier was measured. **Results:** No significant difference was found between the file systems. The mean deflection for One Shape and Protaper Next was 51.38 and 46.72 respectively. Mean deflection for single rooted teeth was 55.95 and 44.68 for multi-rooted teeth. The mean deflection was lowest in multi rooted teeth while using Protaper Next, (35.93) however this was not statistically significant. **Conclusions:** Within the parameters of this study, it could be concluded that no statistically significant difference in centering ability exists between New One Shape™ and Protaper Next™ systems in medium curved canals.

INTRODUCTION

Since the introduction of NiTi rotary instruments, the abilities of dental practitioners to instrument curved canals have greatly improved (1-5).

Some authors claim that it is possible to overcome the problem of canal straightening in different areas, especially areas with thin dentin layers, and minimize dentine removal (4) compared to the use of SS instruments (6).

Nevertheless, NITI instruments can also lead to procedural errors, such as canal transportation (7).

Manufacturers continuously improve instruments by altering their designs and component alloys to improve their mechanical properties (8, 9). It has been shown that the design features and methods of manufacturing might significantly affect the clinical performances of NiTi rotary instruments (9-12).

In 2014, Micro-Mega (MicroMega, Besancon, France) launched the New One Shape (NOS). The prominent feature of this file is its asymmetrical cross section.

Also in 2014, Dentsply (DentsplyMaillefer, Ballaigues, Switzerland) introduced the ProTaper Next (PTN), which also has an asymmetrical cross section. The abovementioned instruments vary in terms of the NITI alloys and have different cross sections (13). The manufactures claim that these files' unique designs increase their centering abilities and reduce transportation errors.

The purpose of this study was to compare the centering abilities of the MM New One shape file and the ProTaper Next in vitro in medium curved canals.

MATERIALS AND METHODS

Forty extracted human teeth were collected and included mandibular molars and single-canal premolars. In the molar teeth, only the mesial roots were used. The teeth were maintained in a saline solution.

The teeth were X rayed with 10# files, and the teeth with canal angles between 10-35 degrees were selected.

The canals were negotiated with a 10# K file until the file could be seen on a surgical microscope, and the file was then retracted 1 mm to determine the working length (WL). The X rays were acquired using rigs that were specifically made for each tooth to prevent movement and reproduce the angle of the X ray. The rigs were impregnated with 3 radiopaque markers.

The teeth were randomly divided into two groups

1. The coronal 2 mm were preflared using an Endoflare drill (MM). After filing with a #10 file, G1-G2 files were used following the MM protocol, rinsed with NaOCl (3%) and recapitulated.
   The files were checked for deformations and fractures. In teeth in which the #15 file was the first to reach the WL, the G1 file was not used, and if the canal was wider, no glide path was established.The teeth were prepared using the new One Shape file following the MM protocol.

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2. The glide path was established as described for group 1. The teeth were prepared using Protaper Next files (X1 and X2) following the Dentsply protocol. Rinses with 2 ml of NAOCl (3%) were applied after each filing.

The apical preparations of all canals were completed with a #25 instrument to maintain standardization between the systems.

In all teeth, the last rotary file used to the WL was X rayed using the rig, and the images were analyzed using the GNU Image Manipulation Program (GIMP). The images were superimposed using the radiopaque reference markers embedded in the rigs. Reference points were marked at the tip of the #10 file and at the tip of the tested file on the superimposed image. The distance between the reference points at the file tips were measured.

Images for which superimposition was impossible (due to poor film development, curving of the file inside the canal, etc.) were omitted from the statistical analyses.

The statistical analyses were performed with SPSS 22 software (SPSS Incorporated, Chicago, IL, USA) The deflection, type of tooth (i.e., single or multi-rooted) and utilized file system were recorded.

RESULTS

No files separated during the testing.

Of the 40 tested teeth, 7 were excluded from the analyses due to file curving inside the canal (4 teeth) or the inability to visualize the apical area on the radiographs (3 teeth). In total, 17 teeth were treated with OS, and 16 teeth were treated with Protaper Next (Table 1)

The mean deflections for the New One Shape and Protaper Next were 51.38 and 46.72, respectively. (Table 1)

No significance difference was found between the different systems, and multiple comparison analysis also revealed no significant differences between the single- and multi-rooted teeth. (Table 2)

The mean deflections of the single- and multi-rooted teeth were 55.95 and 44.68, respectively.

The mean deflection was lowest in the multi-rooted teeth when the Protaper Next was used (35.93); however, this difference was not statistically significant.

File System	Tooth	Mean	N	Std. Deviation
NOS	single-rooted	48.4429	7	44.74121
	multi-rooted	53.4300	10	54.56839
	Total	51.3765	17	49.31560
PN	single- rooted	64.7000	6	45.85857
	multi- rooted	35.9300	10	32.94160
	Total	46.7188	16	39.48443

DISCUSSION

One of the major issues with SS files is their relative inflexibility, which results in the problem of canal transportation, particularly in curved canals (4) The NITI alloy is a more flexible material than SS and thus maintains better centering in curved canals (1, 7), which results in less transportation. (15).
The centering ability of a rotary system results from a complex interrelationship of different parameters that include the following: the type of alloy, design of the cross section, taper of the instrument, diameter of the core, diameter of the instrument and obviously the curvature of the canal (5, 8, 9,14). For example, although NiTi files are flexible, transportation may occur with increases in the file diameter (5) due to the shape memory effect of the alloy. Different companies have attempted to introduce new systems and instruments to overcome canal transportation and to preserve the original path of the canal by altering design features.Some research indicates that different NiTi systems exhibit significant differences in canal transportation (1,6,14,16)

Hence, the testing of new file systems is recommended.

The purpose of this study was to determine the abilities of the instruments that have most recently been introduced to the market to maintain canal paths in medium curved canals.

Dependent Variable: deflection	Mean Square	Sig.
File System	3.032	.969
Tooth Type	1110.104	.466
File System * Tooth Type	2236.490	.303

The New One Shape (NOS) file (MicroMega, Besancon, France) is a single-file system that is used with a traditional, continuous, rotational motion. The NOS file's innovation is the variable asymmetrical cross-sectional geometry along the blade: asymmetrical triangular cross section at the file tip, gradually transforming to an s-shaped cross section at the end of the active part.

The ProTaper Next (PN) (DentsplyMaillefer, Ballaigues, Switzerland) is another novel NiTi multi-file system. This system has an asymmetrical rectangular cross section and progressive and regressive percentage tapers on a single file. The PN is made from M-Wire alloy.

No significant differences were found between the tested file systems; however, both systems exhibited some degree of transportation. It would be of clinical interest to investigate the performances and centering abilities of these systems in severely curved canals.

CONCLUSION

Based on the parameters examined in this study, it can be concluded that there were no significant differences in the centering abilities of the New One Shape™ and Protaper Next™ systems in medium curved canals. Both systems exhibited some degree of transportation.

Acknowledgments

The authors thank Micro-Mega for the donation of the instruments used in this research project.

The authors deny any conflicts of interest related to this study.

References

1. Al-Sudani D, Al-Shahrani S. A comparison of the canal centering ability of ProFile, K3, and RaCe Nickel

Titanium rotary systems J Endod. 2006 Dec;32(12):1198-201

2. Arora A, Taneja S, Kumar M. Comparative evaluation of shaping ability of different rotary NiTi instruments in curved canals using CBCT. J Conserv Dent. 2014 Jan;17(1):35-9
3. Capar ID, Ertas H, Ok E, Arslan H, Ertas ET. Comparative study of different novel nickel-titanium rotary systems for root canal preparation in severely curved root canals. J Endod. 2014 Jun;40(6):852-6
4. Celik D, Taşdemir T, Er K. Comparative study of 6 rotary nickel-titanium systems and hand instrumentation for root canal preparation in severely curved root canals of extracted teeth J Endod. 2013 Feb;39(2):278-82
5. Glosson CR, Hailer RH, Dove SB, del Rio CE. A comparison of root canal preparations using NiTi hand, NiTi engine-driven, and K-Flex endodontic instruments. J Endodon 1995;21:146-51.
6. Hartmann MSM, Barletta FB, Fontanella VRC, Vanni JR. Canal transportation after root canal instrumentation: a comparative study with computed tomography. J Endod 2007;33:962–5
7. Hashem AA, Ghoneim AG, Lutfy RA, Foda MY, Omar GA. Geometric analysis of root canals prepared by four rotary NiTi shaping systems. J Endod. 2012 Jul;38(7):996-1000.
8. Hulsmann M, Peters OA, Dummer PMH. Mechanical preparation of root canals: shaping goals, techniques and means. Endod Topics 2005;10:30–76
9. Koch K, Brave D. Real world endo: design features of rotary files and how they affect clinical performance. Oral Health 2002;92:39–49
10. Kuhn WG, Carnes DL Jr, Clement DJ, Walker WA 3rd. Effect of tip design of nickel-titanium and stainless steel files on root canal preparation. J Endod. 1997 Dec;23(12):735-8.
11. Leseberg DA, Montgomery S. The effects of Canal Master, Flex-R, and K-Flex instrumentation on root canal configuration. J Endod. 1991 Feb;17(2):59-65
12. Luiten DJ, Morgan LA, Baumgartner JC, Marshall JG. A comparison of four instrumentation techniques on apical canal transportation. J Endodon 1995;21:26-32.
13. Ounsi HF, Franciosi G, Paragliola R, et al. Comparison of two techniques for assessing the shaping efficacy of repeatedly used nickel-titanium rotary instruments. J Endod 2011;37:847–50.
14. Peters OA. Current challenges and concepts in the preparation of root canal systems: a review. J Endod 2004;30:559–67.
15. Ponti TM, McDonald NJ, Kuttler S, Strassler HE, Dumsha TC. Canal-Centering Ability of Two Rotary File Systems. J Endod. 2002 Apr;28(4):283-6.
16. Setzer FC, Kwon TK, Karabucak B. Comparison of apical transportation between two rotary file systems and two hybrid rotary instrumentation sequences. J Endod 2010; 36:1226–9.
17. Short JA, Morgan LA, Baumgartner JC. A comparison of canal centering ability of four instrumentation techniques. J Endod. 1997 Aug;23(8):503-7.
18. Song YL, Bian Z, Fan B, Fan MW, Gutmann JL, Peng B. A comparison of instrument-centering ability within the root canal for three contemporary instrumentation techniques. IntEndod J. 2004 Apr;37(4):265-71
19. Van Himel T, McSpadden TJ, Goodis EH. Instruments, materials and devices. In: Cohn S, Hargreaves MK, eds. Pathways of the Pulp. Ed 9. St Louis: Mosby, Inc; 2006:244–51.

How to cite this article:
Joe Ben Itzhak *et al.,* Centering Abilities of Two Rotary Niti Systems in Medium Curved Canals. *International Journal of Recent Scientific Research Vol. 6, Issue, 7, pp.5055-5057, July, 2015*

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