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Experimental Research

Dentistry Section

Canal Shaping with One Shape File and Twisted Files: A Comparative Study

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ABSTRACT

Aim: The aim of this study was to compare the shaping ability of two different rotary Nickel –Titanium (Ni-Ti) files, One shape file and Twisted files in a simulated artificial canals.

Materials and Methods: A total of 40 endodontic training blocks were used in this study and divided in two groups consisting of 20 each (n = 20) and the shaping ability was accessed based on the left over ink stain in the artificial canal.

Results: Image proplus analysis software and stereomicroscope were used for analysing the shaping ability of the files and statistical analysis was done by SPSS software. Twisted files showed better shaping ability compared to one shape file both experimentally and statistically.

Conclusion: It can be concluded that twisted files shaped the canals better then one shape file.

Keywords: One shape file, Rotary instruments NiTi, Shaping ability, Twisted files

INTRODUCTION

Root canal shaping is one of the most important steps in canal treatment [1]. It is essential in determining the efficacy of all subsequent procedures, including chemical disinfection and root canal obturation [2]. However, even if this stage is adversely influenced by the highly variable root canal anatomy [3], it aims to achieve complete removal of the vital or necrotic tissue to create sufficient space for irrigation [2,4]. Furthermore, shaping tends to preserve the integrity and location of the canal and apical anatomy in preparation for an adequate filling [2,5,6]. The avoidance of both iatrogenic damage to the root canal structure and further irritation of the periradicular tissue is demanding for all the newest instrumentation Nickel titanium (NiTi) rotary instruments have shown efficiency in achieving optimal root canal shaping with less straightening and better centered preparations of curved root canals. Recently “One shape “ endodontic file has been introduced (Micro Mega France) it is a single file shaping system and proposed for single use to avoid the risk of cross- contamination. Twisted files (Sybron endo TF large assorted) come in 25,0.10 taper, size 25 , 0.08 taper and size 25,0.06 taper and are used in continuous motion. The purpose of this study is to compare the ability of the one shape file with the twisted file in shaping the root canal. The aim of this study was to compare the shaping ability of one shape file with that of twisted files in simulated artificial canals.

MATERIALS AND METHODS

Forty endodontic training blocks (DENTSPLY) [Table/Fig-1] were used in this study the glide path was prepared using Path files (DENTSPLY) with the manufactures recommendation in the speed of 300 rpm using X Smart endodontic motor [Table/Fig-2]. Canals were irrigated with NaOCl after each instrument, delivered by means of a gauge 27 needle, allowing for adequate back flow. Glyde lubricant was used throughout the procedure. Once the glide path was established Indian ink was injected into the simulated artificial canal using a 27 gauge needle in all the specimens, and the specimens were let dried for 30 min for proper and complete setting of the ink. Further the specimens were divided into two groups containing four each.

Group 1 (One shape file)

Twenty endodontic training blocks were assigned for One shape file (Micro mega france) the manufactures recommended speed for its use is 350-450 rpm in pecking motion. Canals were irrigated with NaOCl after each instrument, delivered by means of a gauge 27 needle, allowing for adequate back flow. Glyde (DENSPLY) was used throughout the procedure. After completion of shaping of the canals with the file the samples were analysed using stereomicroscope and Image proplus analysis software for the measurement of the unshaped area in the canal [Table/Fig-3].

Group 2 (Twisted files)

Twenty Endodontic training blocks were assigned for Twisted files (Sybron endo) the manufactures recommended speed for its use is 500 rpm in continuous motion. The protocol for its use is initially size 25 ,0.10 taper is used in the coronal part, then size 25, 0.08 taper is used till middle third and finally size 25 ,0.06 taper is used in full length in crown –down fashion . Canals were irrigated with NaOCl after each instrument, delivered by means of a gauge 27 needle, allowing for adequate back flow. Glyde (DENSPLY) was used throughout the procedure. After completion of shaping of the canals with the file the samples were analysed using stereomicroscope and Image proplus analysis software for the measurement of the unshaped area in the canal [Table/Fig-4].

STATISTICAL ANALYSIS

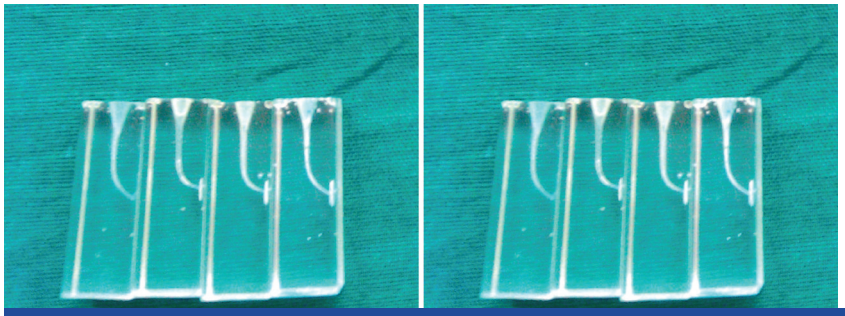
Statistical analysis [Table/Fig-5] was done by SPSS 17.0 and unpaired student T-test

RESULTS

There was no significant difference between the two groups with respect to shaping in the coronal region but Twisted file shaped fairly better in all the groups in middle third and apical region. The images were taken by stereomicroscope and were analysed by image pro plus software that maximum unshaped area was seen in One shape file group which was revealed by Indian ink in the simulated canals (endodontic blocks).

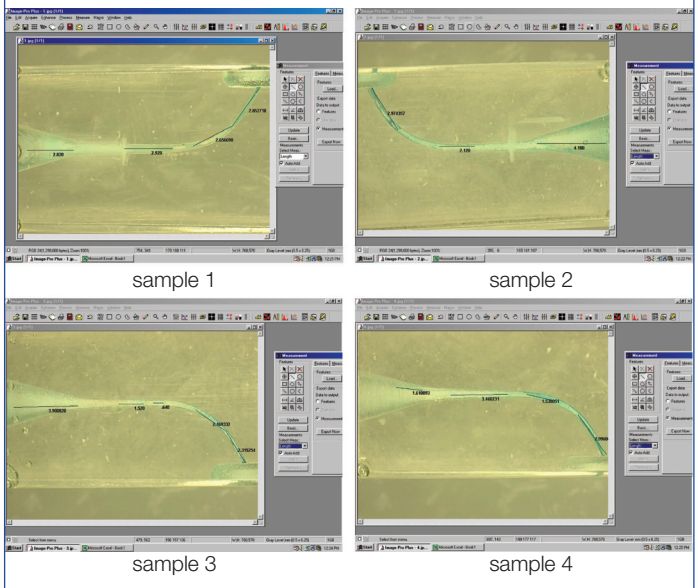
DISCUSSION

In this present study we have evaluated the shaping ability of one shape file, and Twisted file using endodontic training blocks (Densply) simulated root canals have been widely used to allow a direct analysis of post instrumentation changes in canal curvatures and thus to evaluate the tendency of technique to maintain the

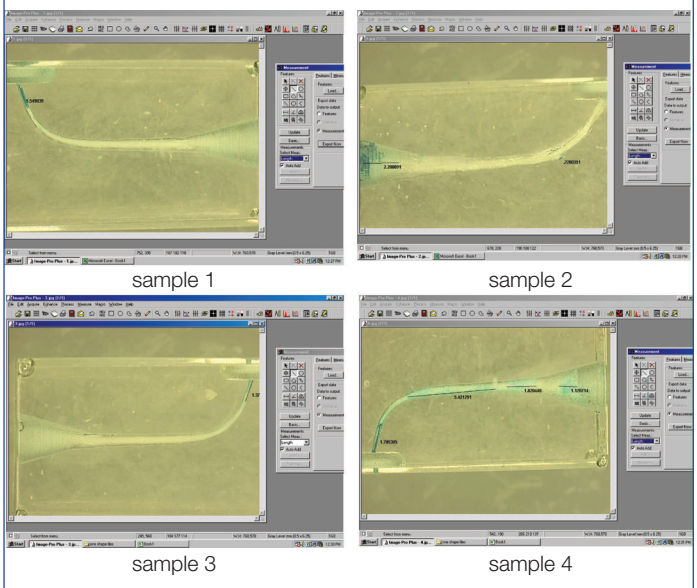


[Table/Fig-1]: Endo blocks

[Table/Fig-2]: Endo motor X-smart (DENTSPLY)



[Table/Fig-3]: Analysis by image proplus software (One shape file)
In all the samples of One shape file its been observed that maximum amount unshaped area (Stained with Indian ink) was seen in coronal and middle thirds in the simulated canals (endodontic blocks)



[Table/Fig-4]: Analysis by image proplus software(Twisted file)
In all the samples of Twisted file its been observed that the shaping was considerably good (with minimal staining) in the simulated canals (endodontic blocks)

GROUP	NUMBER	MEAN±SD	Std. Error Mean
1	20	63.5425 ±5.62270	2.81135
2	20	11.9000 ±3.26807	1.63403

[Table/Fig-5]: Group Statistics

original canal anatomy using standardized conditions [7]. Previous studies have shown that preserving the original canal shape with less invasion approach minimizes the risk of canal transportation with a subsequently lower incidence of canal curvature straightening, the formation of ledges, and irregular apical enlargement [8,9].

The prevention of apical transportation and irregular foramen widening may also lead to well sealed root filling with less extrusion of debris and reduced postoperative discomfort [10,11]. Preservation of the original canal shape and lack of canal aberrations can associate with increased microbial and sealing efficiency [12] and reduced weakening of tooth [13]. Besides canal anatomy, other factors contribute to optimal mechanical instrumentation outcome, such as instrument design, instrument sequence, rotational speed, operator experience and use of irrigants [14]. Several studies shown that the use of NiTi rotary instruments are more predictable and efficient canal preparation with less procedural errors, particularly in narrow and severe curved canals compared to hand instrumentation [15-17]. Recently "One shape file has been introduced (Micro- mega France) which is a single file system to provide the canal with adequate size and taper, and it has three dynamic cross sections.

The single use of endodontic instruments was recently recommended to decrease instrument fatigue and possible cross contamination [18]. Reducing the number of NiTi rotary instruments required for canal preparation. The single file technique was also suggested as being cost effective [19].

In 2008, Sybron endo introduced the most advanced endodontic Nickel-Titanium file. Twisted files combines three proprietary processes to deliver unsurpassed strength and flexibility that is using R-Phase heat treatment technology, TF cutting flutes are created by twisting the file, not grinding, the advanced surface conditioning treatment .The reason might be attributed to the three proprietary processes to deliver unsurpassed strength and flexibility and cleaning efficiency TF optimizes the strength and flexibility of NiTi, creating a highly durable and flexible file. TF cutting flutes are created by twisting the file, but not by grinding, thus eliminating micro fractures for greater strength. The advanced surface conditioning treatment finishes the file surface while respecting the underlying grain structure thus making the TF efficient to be used in curved canals and improved cleaning efficiency [20].

A study was done by Anil Dingra et al., comparing the canal shaping ability of One shape file with wave one file on endo-training blocks (Densply) the study concluded that wave one file shaped better, the reason attributed by the authors is its improved core alloy of the file and variable pitch design [21]. Cutting flutes are created by twisting the file, not grinding, the advanced surface conditioning treatment The reason might be attributed to the three proprietary processes to deliver unsurpassed strength and flexibility and cleaning efficiency TF optimizes the strength and flexibility. According to Raidan-Ba-Hattab comparing shaping ability of Twisted file and GT series files in endodontic training blocks the authors concluded that Twisted files shaped the simulated canals better because of improved metallurgy and variable cross section of TF [22].

In this present study Twisted files shaped the canals better then the single file system one shape file the reason behind its better

performance is its cutting flutes are created by twisting the file, not grinding, the advanced surface conditioning treatment. The reason might be attributed to the three proprietary processes to deliver unsurpassed strength and flexibility and cleaning efficiency.

CONCLUSION

According to the results of this study, TFs respected the original canal curvature and shaped better than the newly introduced single file system One shape file (Micro-mega).

REFERENCES

[1] Peters OA. Current challenges and concepts in the preparation of root canal systems: a review. *J Endod*. 2004;30(8):559-67.
[2] Hulsmann M, Peters OA, Dummer PMH. Mechanical preparation of root canals: shaping goals, techniques and means. *Endod Top.* 2005;10:30–76.
[3] Peters OA, Peters CI, Scheonenberger K, Barbakow F. ProTaper rotary root canal preparation: assessment of torque and force in relation to canal anatomy. *Int Endod J.* 2003;36:93–99.
[4] Schilder H. Cleaning and shaping the root canal. *Dent Clin North Am.* 1974;18: 269–96.
[5] Wu MK, Fan B, Wesselink PR. Leakage along apical root fillings in curved root canals. Part I: effects of apical transportation on seal of root fillings. *J Endod.* 2000;26:210–16.
[6] Moore J, Fitz-Walter P, Parashos P. A micro-computed tomographic evaluation of apical root canal preparation using three instrumentation techniques. *Int Endod J.* 2009;42:1057–64.
[7] Merrett SJ, Bryant ST, Dummer PM. Comparison of the shaping ability of RaCe and Flex-Master rotary nickel-titanium systems in simulated canals. *J Endod.* 2006;32:960–62.
[8] LoizidesAL,KakavetsosVD,TzanetakisGN,KontakiotisEG,EliadesG.Acomparative study of the effects of two nickel-titanium preparation techniques on root canal geometry assessed by microcomputed tomography. *J Endod.* 2007;33:1455–59.
[9] Jafarzadeh H, Abbott PV. Ledge formation: review of a great challenge in endodon- tics. *J Endod.* 2007;33:1155–62.
[10] Pak JG, White SN. Pain prevalence and severity before, during, and after root canal treatment: a systematic review. *J Endod.* 2011;37:429–38.
[11] Siqueira JF Jr, R^oc as IN, Favieri A, et al. Incidence of postoperative pain after intra-canal procedures based on an antimicrobial strategy. *J Endod.* 2002;28:457–60.
[12] Wu MK, Fan B, Wesselink PR. Leakage along apical root fillings in curved root canals. Part I: effects of apical transportation on seal of root fillings. *J Endod.* 2000;26:210–16.
[13] Moore J, Fitz-Walter P, Parashos P. A micro-computed tomographic evaluation of apical root canal preparation using three instrumentation techniques. *Int Endod J*. 2009;42:1057–64.
[14] Karabucak B, Gatan AJ, Hsiao C, Iqbal MK. A comparison of apical transportation and length control between EndoSequence and Guidance rotary instruments.*J Endod*. 2010;36:123–25.
[15] Gambill JM, Alder M, del Rio CE. Comparison of nickel-titanium and stainless steel hand-file instrumentation using computed tomography. *J Endod.* 1996;22:369–75.
[16] Berutti E, Cantatore G, Castellucci A, et al. Use of nickel-titanium rotary PathFile to create the glide path: comparison with manual preflaring in simulated root canals. *J Endod.* 2009;35:408–12.
[17] Glossen CR, Haller RH, Dove SB, del Rio CE. A comparison of root canal prepara- tions using Ni-Ti hand, Ni-Ti engine-driven, and K-Flex endodontic instruments. *J Endod.* 1995;21:146–51.
[18] Azarpazhooh A, Fillery ED. Prion disease: the implications for dentistry. *J Endod.* 2008;34:1158–66.
[19] Yared G. Canal preparation using only one Ni-Ti rotary instrument: preliminary observations. *Int Endod J*. 2008;4:339–44.
[20] Gergi R, Rjeily JA, Sader J, Naaman A. Comparison of canal transportation and centering ability of Twisted files, Pathfile-ProTaper system, and Stainless steel hand K-files by using computed tomography. *J Endod.* 2010;36(5):904-07.
[21] Dhingra A, Kochra R, Banerjee S, Srivastava P. Comparative evaluation of the canal curvature modifications after instrumentation with One Shape rotary and Wave One reciprocating files. *J Conserv Dent.* 2014;17(2):138–41.
[22] Ba-Hattab R, Pröhl AK, Lang H, Pahncke D. Comparison of the shaping ability of GT® Series X, Twisted Files and AlphaKite rotary nickel-titanium systems in simulated canals. *BMC Oral Health*. 2013 Dec 17;13:72.

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