

An in vitro Comparison of Apically Extruded Debris with the use of Full Sequence M-two and Heroshaper Ni-Ti File systems

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ABSTRACT

Introduction: During root canal preparation, irrigants, dentin chips, pulp tissues may extrude into periapical tissues and may cause postoperative pain. The main objective of the present study was to compare the amount of apically extruded debris using M-two and HERO Shaper Nickel titanium instruments.

Material and Methods: Forty freshly extracted human permanent single rooted straight teeth with single canal were divided into two groups each allotted with 20 teeth. Rotary Mtwo system used for instrumentation in one group and Hero-shaper for other group and each group was divided into two sub groups of sample size 10 each. Regardless of instrumentation technique, each group was irrigated with 1ml of distilled water. Debris extruded were collected using eppendorf tubes.

Results: All rotary instruments used in this study caused apical extrusion of debris. A statistically significant difference was observed between two groups.

Conclusion: Followed by instrumentation with different rotary file systems, HERO shapers with glide path created mechanically showed a less apical debris extrusion compared to Mtwo.

Keywords: Path File, Glide Path, Periapical Debris Extrusion.

INTRODUCTION

Postoperative pain after endodontic procedure may result from extrusion of pulp tissue, irrigants, dentinal chips and microorganisms into periradicular tissues during root canal procedure.¹ Results of previous studies performed on apical extrusion of debris have stated that all instruments and instrumentation techniques are associated with extrusion of debris.²⁻⁶

It is made possible to preserve original canal shape associated with less iatrogenic errors due to new design concepts and technological advancements in rotary Ni-Ti instrumentation that have led to easier and faster root canal preparation.⁷⁻⁸

Alper kustari et al., observed from their study that instrumentation with rotary movements predominantly reduced the amount of debris extrusion because of their tendency to pack dentin chips within the flutes of file and expel them in coronal direction from the root canals.⁴

Crown down technique leads to minimal apical extrusion of debris, but various instrumentation designs affect debris extrusion.⁵ Glide path with Ni-Ti rotary files leads to less postoperative pain and faster symptom relief⁹ compared to glide path created by manual files.

Endodontic glide path is a smooth radicular tunnel from canal orifice to physiological terminus. Its minimal size should be #10 endodontic file. Glide path has to be discovered if already present in root canal anatomy or prepared if it is not present. The glide path can be short, long, narrow, wide, straight or curved. The rationale of endodontics cannot be achieved without glide path¹⁰, failure to establish endodontic glide path may result in ledge formation, canal blockade, transportation.

The purpose of present study was to compare the amount of apically extruded debris between HERO Shapers and Mtwo Ni-Ti rotary instruments.

MATERIAL AND METHODS

This study was done in the Dept of Conservative Dentistry and Endodontics of G.Pulla Reddy Dental College and Hospital, Kurnool, A.P, in the month of November 2015.

Sample Selection

Sampling was estimated using random sampling. Forty freshly extracted human permanent mandibular premolars with single root and straight root canal extracted for orthodontic purpose were collected from department of oral and maxillofacial surgery. Soft tissues and calculus were removed mechanically from root surface using scaler. Teeth with open apices, severely curved and dilacerated roots, calcified canals were discarded.

Access cavity was prepared using a round bur, # 10 k file was moved up and down in the canal until the file was just visible. Endodontic working length was established by reducing 1mm from these lengths. Teeth with open apices, severely curved and dilacerated roots, calcified canals were excluded from study.

The crown of each tooth was sectioned at 21mm from apical foramen. The coronal portion was removed with a water cooled double faced diamond disk operated at low speed. Files were used with X-smart endomotor (Tulsadental, Dentsply Switzerland) at a recommended speed and torque following manufacturer's instructions. Last apical file of tip size 25 was used in both systems.

(Group-1) M two Rotary instrument system: The group comprised of 20 teeth. In sub group a- manual glide path upto #20 k file was established. In sub group b- machinised glide path was established using proglider 10/0.07 followed by #15/ 5% taper, #20/6% taper, #25/6% taper – till working length at speed 400 rpm and 1.2 N .cm. Torque. Both sub groups were instrumented with Mtwo Ni-Ti rotary instruments (VDW, Munich, Germany) instruments were used following manufacturer guide lines till apical size# 25.

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(Group-2) Hero shaper Rotary Instrument system: The group comprised of 20 teeth. In sub group a- manual glide path upto #20 k file was established. In sub group b- mechanized glide path was established using G1 – N^o12, .03 followed by G2 - N^o 17, .03 – till working length at speed 400 rpm and 1.2 N .cm. Torque. Both sub groups were instrumented with Hero shaper SC₁ N^o 25/.06 -2/3 working length, SC₂ N^o 25/.04 till working length, SUN^o 25/.06 till working length.

Regardless of the technique used all canals were irrigated with 1ml distilled water after the use of each instrument using 28 gauge needle.

Debris Collection

To evaluate the amount of the apically extruded debris, method as described in previous studies² was used. Empty vials without stoppers were weighed with an electronic weighing balance. The Stoppers of eppendorf tubes were separated and hole was drilled in top. Each tooth was inserted up to CEJ into the stoppers of eppendorf tubes.

A 19-gauge needle was placed next to fitted root to equalize internal and external pressure. The gaps surrounding the hole, needle and tooth were carefully filled with adhesive to prevent extrusion of irrigation solution through the hole. Teeth were isolated with rubber dam to prevent operator from seeing the root and prevent extrusion of irrigants solution. An aspirator was used to suction the irrigant that overflowed out of root canals.

After completion of instrumentation, the stoppers of eppendorf tubes were removed. The surface of roots was washed with 1ml of distilled water into the vial to collect the debris adhering to the root surface. The net weight of the extruded debris was determined by subtracting the initial weight from final weight.

STATISTICAL ANALYSIS

Data collected was statistically analyzed using Kruskal-Wallis, One-Way ANOVA test to determine the amount of apically extruded debris among the groups at level of significance P = 0.05.

RESULTS

Mean extrusion values (mg) and standard deviations of each group of debris weight were given in table 1 below. A statistically significant was observed between Mtwo and Hero shapers P≤ 0.05. Hero shapers showed less extrusion of debris. Comparison between the groups is given in table 2.

DISCUSSION

Root canal instrumentation may lead to apical extrusion of debris which inturn lead to interappointment flare-ups, which are characterized by development of pain or swelling or both. It has been proved that maximal apical debris extrusion occurs with hand instruments compared to crown down technique done with rotary instruments.⁴ Inter-appointmet and postoperative flare-ups are mainly due to mechanical, chemical and microbial injury to the periradicular tissues.¹¹

Periradicular tissues with infected debris that is extruded apically due to instrumentation is the main cause of postoperative pain. In previous studies it has been shown that more extrusion of debris apically occurs with step-back technique using hand instruments in comparison to crown down technique done with rotary instruments.¹² File during instrumentation acts as a plunger in the apical third in step-back technique and forces the debris ahead of the file causing greater extrusion of debris.¹²

Distilled water was used for irrigation instead of NaOCl to avoid any possible weight increase due to NaOCl crystal formation. Working length for all specimens was determined 1mm short

	Group 1 a	Group 1 b	Group 2 a	Group 2b
Mean	23.9	22.3	17.5	11.4
S.D.	1.72884	1.636392	2.068279	2.458545

Table-1: Mean extrusion values (mg) of groups

Group Comparison	Statistic value	P value
1 a and 1 b	t = 2.125475725	0.047646452 Significant
2 a and 2 b	t = 6.004035242	0.0001 Significant
1 a, b, 2 a, b	F = 78.97776233	0.0001 Significant

Table-2: Group Comparison extrusion values (mg) of groups

of apical foramen. As many studies showed that teeth that were instrumented 1mm short of apex in which apical plug formation was usually not present.¹³ All the teeth were of similar length and size of master apical file was the same in all groups. Both instrumentation technique and instrument design may affect extrusion of debris. In the present study both hand glide path, mechanical glide path, crown down technique and full length instrumentation technique was compared.

According to Walsch, the files with variable helical flute angle as well as positive rake angle resulted in better dentinal cutting and removal of debris from the root canal.⁸ Glide path preparation total length crown down preparation could be the probable reason for minimal extrusion in Hero file systems.

CONCLUSION

The results of the present study showed that all rotary instruments used resulted in some amount of apical debris extrusion. Glide path with Mechanized files produced less debris compared with manual files. HERO Shapers produced a minimum amount of debris extrusion compared to Mtwo.

REFERENCES

1. Seltzer S, Naidorf IJ. Flare-ups in endodontics: I. Etiological factors. J Endod. 1985;11:472-8.
2. Fairbourn DR, MC Walter GM, Montgomery S. The effect of four preparation techniques on amount of apically extruded debris. J Endod. 1987;13:102-8.
3. Er K, Sumer Z, Akpınar KE. Apical extrusion of intracanal bacteria following the use of two engine driven instrumentation techniques. Int Endod J. 2005;38:871-6.
4. Tinaz AC, Alacam T, Uzun O et al. The effect of disruption of apical constriction on peri apical extrusion. J Endod. 2005;31:533-5.
5. Quantitative evaluation of amount of apically extruded debris using 3 different rotary instrumentation techniques. Oral surgery Oral Med Oral Pathol Oral Radiol Endod. 2006;101:250-7.
6. Apical extrusion of intracanal debris and irrigants following the use of various instrumentation techniques. Oral surgery Oral Med Oral Pathol Oral Radiol Endod. 2008;105:257-625.
7. Flare –ups in endodontics: etiological faactors. J Endod. 1985;11:472-478.
8. Walsch H. The hybrid concept of nickel titanium rotary instrumentstion. Dent Clinic North Am. 2004;48:183-102.
9. Post operative pain after manual and mechanical glide path: A random clinical trial. J Endod 2012;.
10. West J. the endodontic glide path. Secrets to rotary success. Dentistry today. 2010;29(9).
11. Salzgeber RM, Brilliant JD. An in vivo evaluation of the

- penetration of irrigating solution in root canals. *J Endod.* 1977;3:394-398.
12. Kustarci Alper, Akpmar Kerem Engin, Sivas Kursat Er, Trabzon. Apical extrusion of intracanal debris and irrigants following the use of various instrumentation techniques. *Oral Pathol Oral Radiol Endod.* 2008;105:257-625.
 13. Myers GL, Montgomery S. A comparison of weights of debris extruded apically by conventional filing and canal master techniques. *J Endod.* 1991;17:275-279.

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