International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 13, No. 10, October 2024 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_13.10.2024.93

ORIGINAL RESEARCH

Effects of different glide path files on apical debris extrusion in curved root canals

[1]Dr. Megha Khatri, [2]Dr. Tariq Mohammad Shekh

[1]MDS Conservative Dentistry and Endodontics, Darshan Dental College, Udaipur, Rajasthan, India
[2]Reader, Pacific Dental College & Research Centre, Bhillo ka Bedla, Udaipur, Rajasthan, India

Corresponding Author
Dr. Tariq Mohammad Shekh
Reader, Pacific Dental College & Research Centre, Bhillo ka Bedla, Udaipur, Rajasthan, India
Email: tariqshaikh87@gmail.com

Received Date: 23 August, 2024 Accepted Date: 27 September, 2024

ABSTRACT

Background: Endodontic files and irrigation solutions are used in chemomechanical preparation to clean and shape the root canal system. The present study was conducted to assess effects of different glide path files on apical debris extrusion in curved root canals. **Materials & Methods:** 30 recently extracted mandibular first molar teeth with curved mesial roots were divided into 6 groups according to the root canal preparation (n = 5): group IV-File, a glide path with G-Files + WaveOne Gold preparation; group I, a glide path with One G+ WaveOne Gold preparation; group II, a glide path with ProGlider+ WaveOne Gold preparation; group III, a glide path with PathFiles+ WaveOne Gold; group V, a glide path with a K-file + WaveOne Gold preparation; and group without a glide path, WaveOne Gold preparation without a glide path file. Roots were attached to pre-weighed Eppendorf tubes. Apically extruded debris was collected in Eppendorf tubes. **Results:** The mean apical debris extrusion was 0.000081 grams in group I, 0.000241 grams in group II, 0.000185 grams in group III, 0.000154 grams in group IV, 0.000323 grams in group V and 0.000192 grams in group VI. The difference was significant (P< 0.05). **Conclusion:** More debris was extruded by manual K-files than by One G rotary glide path files. Apical debris extrusion was unaffected by glide path preparation prior to root canal preparation with a WaveOne Gold file.

Keywords: root canals, apical debris, nickel-titanium

INTRODUCTION

Endodontic files and irrigation solutions are used in chemomechanical preparation to clean and shape the root canal system.[1] For many years, stainless steel hand tools were utilized for mechanical preparation; nevertheless, they have a number of drawbacks, such as the propensity to cause perforation, canal transportation, and zip development, particularly in curved root canals. The creation of nickel-titanium (NiTi) rotary files reduced operator fatigue and sped up the process of preparing root canals that were well-tapered and centered.[2]

Notwithstanding the benefits of NiTi rotary instruments, high torsional and flexural loads are the primary reason of the elevated risk of file fracture. When the file tip is instrumented and locked in the root canal while the handpiece is still rotating (the taper lock effect), torsional stresses rise due to increased apical pressure.[3] Coronal expansion and preflaring of the root canal to provide a glide path prior to mechanical preparation with NiTi rotary files may help reduce taper lock, torsional fracture risk, and shape aberrations.[4]

Glide path preparation might be achieved using hand files or rotary glide path files. Stainless steel K-files have been recommended for manual glide path preparation to reduce the fracture rate of NiTi instruments.[5] However, using stainless steel hand files during glide path preparation can be time-consuming and difficult, especially in severely curved or multiple narrow root canal.[6] The present study was conducted to assess effects of different glide path files on apical debris extrusion in curved root canals.

MATERIALS & METHODS

This invitro study was carried out on 30 recently extracted mandibular first molar teeth with curved mesial roots.

Samples were divided into 6 groups according to the root canal preparation (n = 5): group IV-File, a glide path with G-Files + WaveOne Gold preparation; group I, a glide path with One G+ WaveOne Gold preparation; group II, a glide path with ProGlider+ WaveOne Gold preparation; group III, a glide path with PathFiles+ WaveOne Gold; group V, a glide path with a K-file + WaveOne Gold preparation; and group without a glide path, WaveOne Gold preparation without a glide path file. Roots were attached to pre-

DOI: 10.69605/ijlbpr_13.10.2024.93

weighed Eppendorf tubes. Apically extruded debris was collected in Eppendorf tubes. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

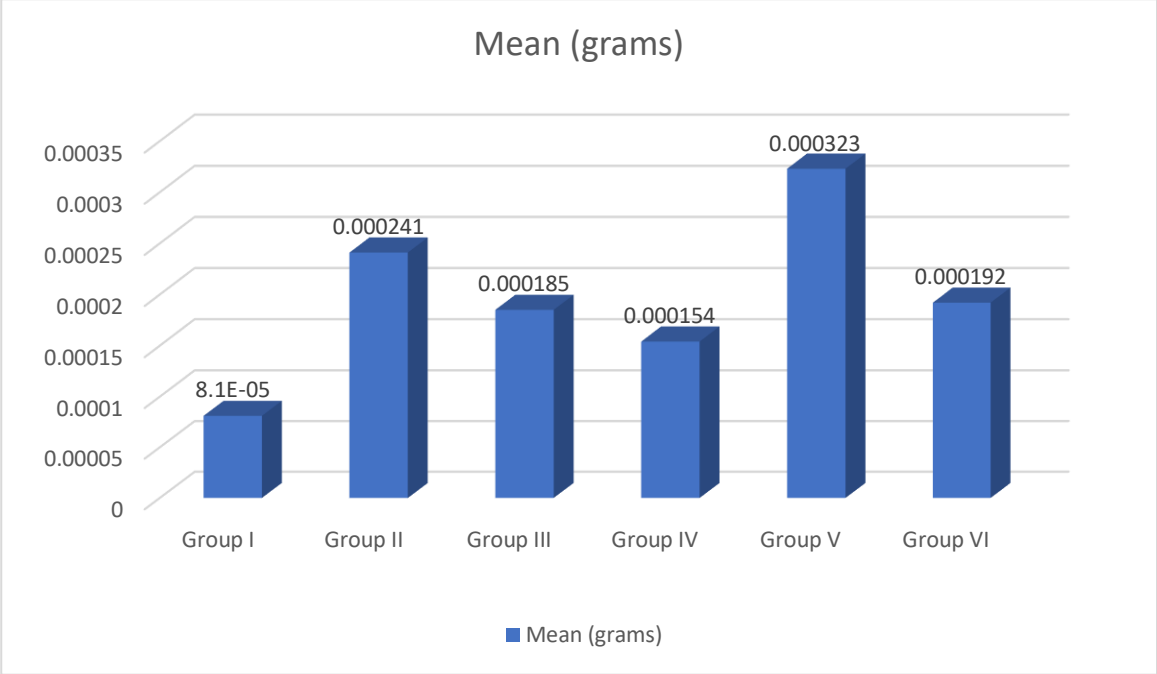
RESULTS

Table I Assessment of apical debris extrusion

Groups	Mean (grams)	P value
Group I	0.000081	0.01
Group II	0.000241	
Group III	0.000185	
Group IV	0.000154	
Group V	0.000323	
Group VI	0.000192	

Table I, graph I shows that the mean apical debris extrusion was 0.000081 grams in group I, 0.000241 grams in group II, 0.000185 grams in group III, 0.000154 grams in group IV, 0.000323 grams in group V and 0.000192 grams in group VI. The difference was significant (P< 0.05).

Graph I Assessment of apical debris extrusion



DISCUSSION

A number of businesses have recently produced various rotational pathfinding methods for establishing a glide path.[7] One G and ProGlider are single-file systems designed for glide path preparation. The One G file has a taper of 3% and a tip diameter of 0.14 mm.[8,9] Three cutting edges in the file design ensure improved debris removal. M-Wire NiTi technology is used in the production of ProGlider, increasing the file's flexibility and resistance to cycle fatigue.

The ProGlider file's tip diameter is 0.16 mm, and its cross section is square.[10,11] Over the cutting surface, the file's taper gradually shifts from 0.02 to 0.08. Smoother glide path preparation and preflaring of the coronal and middle portions of the root canal are made possible by the file's progressive taper.[12,13] The present study was conducted to assess effects of different glide path files on apical debris extrusion in curved root canals.

We found that the mean apical debris extrusion was 0.000081 grams in group I, 0.000241 grams in group II, 0.000185 grams in group III, 0.000154 grams in group IV, 0.000323 grams in group V and 0.000192 grams in group VI. Gunes et al[14] enrolled sixty extracted mandibular first molar teeth with curved mesial roots. A statistically significant difference was observed between the One G and K-File groups. The One G group was associated with significantly less debris extrusion than the K-file group. There was no statistically significant difference between K-files and ProGlider, G-Files, PathFiles, and WaveOne Gold without a glide path, and also there was no statistically significant difference between One G and ProGlider, G-Files, PathFiles, and WaveOne Gold without a glide path. All experimental groups caused apical debris extrusion.

Paleker et al[15] compared the mean preparation time of manual instrumentation with K-files, G-Files, and the ProGlider instrument to prepare a glide path in curved

DOI: 10.69605/ijlbpr_13.10.2024.93

root canals. The mesial canals of 90 mandibular molars (with curvature angles between 25° and 35°) were selected. The specimens were randomly divided into 3 groups with 30 canals each, and canal preparations were performed by an endodontist who used #10-15-20 stainless steel manual K-files (group KF), #10 stainless steel manual K-file followed by #12-17 G-File instruments (group GF), and #10 stainless steel manual K-file followed by #16 ProGlider instrument (group PG). The total time it took to prepare the glide paths was recorded with an electronic stopwatch. New instruments were used for each canal. Glide path enlargement with the PG group (27.9 ± 8.6 seconds) and GF group (41.9 ± 20.1 seconds) was shown to be statistically significantly faster than stainless steel KF group (74.9 ± 24.1 seconds) by using analysis of variance ($P < 0.05$). There was no statistically significant difference observed between the mean preparation times of the PG and GF groups ($P < 0.05$).

CONCLUSION

Authors found that more debris was extruded by manual K-files than by One G rotary glide path files. Apical debris extrusion was unaffected by glide path preparation prior to root canal preparation with a WaveOne Gold file.

REFERENCES

1. Burklein S, Schafer E. Apically extruded debris with reciprocating single-file and full-sequence rotary instrumentation systems. J Endod 2012;38:850–2.
2. Puri N, Rathore A, Dharmdeep G, Vairagare S, Prasad BR, Priyadarshini R, et al. A clinical study on comparative evaluation of the effectiveness of carbamazepine and combination of carbamazepine with baclofen or capsaicin in the management of Trigeminal Neuralgia. Niger J Surg 2018;24:95-9..
3. Kumar K, Shetty DC, Wadhwan V, Dhanapal R, Singh HP. Dentinoameloblastoma with ghost cells: A rare case report with emphasis on its biological behavior. Dent Res J (Isfahan). 2013 Jan;10(1):103-7. doi: 10.4103/1735-3327.111809. PMID: 23878572; PMCID: PMC3714810.
4. Kirchhoff AL, Fariniuk LF, Mello I. Apical extrusion of debris in flat-oval root canals after using different instrumentation systems. J Endod 2015;41:237–41.
5. Schneider SW. A comparison of canal preparations in straight and curved root canals. Oral Surg Oral Med Oral Pathol 1971;32:271–5.
6. Myers GL, Montgomery S. A comparison of weights of debris extruded apically by conventional filing and canal master techniques. J Endod 1991;17:275–9.
7. Ha JH, Kim SK, Kwak SW, et al. Debris extrusion by glide-path establishing endodontic instruments with different geometries. J Dent Sci 2016;11:136–40.
8. Topcuoglu HS, Duzgun S, Akpek F, et al. Influence of a glide path on apical extrusion of debris during canal preparation using single-file systems in curved canals. Int Endod J 2016;49:599–603.
9. Hulsmann M, R€odig T, Nordmeyer S. Complications during root canal irrigation. Endod Topics 2009;16:27–63.
10. Siqueira JF, Rocas IN, Favieri A, et al. Incidence of postoperative pain after intracanal procedures based on an antimicrobial strategy. J Endod 2002;28:457–60.
11. Farmakis ET, Sotiropoulos GG, Abramovitz I, Solomonov M. Apical debris extrusion associated with oval shaped canals: a comparative study of WaveOne vs SelfAdjusting File. Clin Oral Investig 2016;20:2131–8.
12. Ferraz CC, Gomes NV, Gomes BP, et al. Apical extrusion of debris and irrigants using two hand and three engine-driven instrumentation techniques. Int Endod J 2001;34: 354–8.
13. Borges AH, Pereira TM, Porto AN, et al. The influence of cervical preflaring on the amount of apically extruded debris after root canal preparation using different instrumentation systems. J Endod 2016;42:465–9.
14. Gunes B, Yeter KY. Effects of different glide path files on apical debris extrusion in curved root canals. Journal of endodontics. 2018 Jul 1;44(7):1191-4.
15. Paleker F, van der Vyver PJ. Glide path enlargement of mandibular molar canals by using K-files, the ProGlider file, and G-files: A comparative study of the preparation times. J Endod 2017;43:609–12.