Comparison of postoperative pain among patients undergoing root canal therapy by manual and rotary instrumentation

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ABSTRACT

Background: The present study was conducted for assessing and comparing postoperative pain among patients undergoing root canal therapy by manual and rotary instrumentation.
Materials & methods: A total of 60 patients scheduled to undergo root canal therapy were enrolled. Complete demographic and clinical details of all the patients was obtained. All the patients were broadly divided into two categories as follows: Group 1: Patient scheduled to undergo root canal therapy using manual hand files, and Group 2: Patients scheduled to undergo root canal therapy using rotary file system. Pain was assessed postoperatively at 2 hours, 4 hours, 6 hours and 8 hours on a VAS scale. As per VAS scale, scoring was done from 0 to 10 with 0 indicating no pain while 10 indicating maximum unbearable pain.
Results: Mean VAS among the patients of Group 1 at 2 hours, 4 hours, 6 hours and 8 hours was 2.3, 2.1, 1.8 and 1.5 respectively. Mean VAS among the patients of Group 2 at 2 hours, 4 hours, 6 hours and 8 hours was 2.2, 1.9, 1.9 and 1.6 respectively. Non-significant results were obtained while comparing the mean VAS at different time intervals in between the two study groups.
Conclusion: Postoperative pain among patients undergoing root canal therapy by manual and rotary instrumentation was comparable.

Key words: Manual, Rotary, Instrumentation, Pain
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INTRODUCTION

Biomechanical preparation is one of the most important procedures in endodontic treatment, influencing irrigation and root canal filling. It is important to preserve the anatomy in order to reduce damage to dental structures when contaminated dentin is removed and the root canals are formed. Ideally, root canal shaping should create a continuous tapered preparation from crown to apex while maintaining the original path of the canal and keeping the foramen size as small as is practical. However, root canal instrumentation can produce apical

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transportation, changes in the shape of the root canal and even perforations.[1- 3]

In recent years, clinicians have used different rotary and reciprocating systems that differ in symmetry, cross-section, number of uses, alloy, etc. Currently, a new generation of endodontic systems made from nickel-titanium alloys has arrived, with changes in design to improve flexibility, cyclic fatigue resistance and cutting efficiency, with more predictable results and less iatrogenic damage, but these modifications do not improve all the properties of endodontic files.[4- 6]Hence; the present study was conducted for assessing and comparing postoperative pain among patients undergoing root canal therapy by manual and rotary instrumentation.

MATERIALS & METHODS

The present study was conducted for assessing and comparing postoperative pain among patients undergoing root canal therapy by manual and rotary instrumentation. A total of 60 patients scheduled to undergo root canal therapy were enrolled. Complete demographic and clinical details of all the patients was obtained. All the patients were broadly divided into two categories as follows:

Group 1: Patient scheduled to undergo root canal therapy using manual hand files,

Group 2: Patients scheduled to undergo root canal therapy using rotary file system

Pain was assessed postoperatively at 2 hours, 4 hours, 6 hours and 8 hours on a VAS scale. As per VAS scale, scoring was done from 0 to 10 with 0 indicating no pain while 10 indicating maximum unbearable pain. All the results were recorded and analyzed by SPSS Software.

RESULTS

Mean age of the patients of the Group 1 was 35.6 years while that of group 2 was 38.1 years respectively. Majority proportion of patients of both the study groups were males. Mean VAS among the patients of Group 1 at 2 hours, 4 hours, 6 hours and 8 hours was 2.3, 2.1, 1.8 and 1.5 respectively. Mean VAS among the patients of Group 2 at 2 hours, 4 hours, 6 hours and 8 hours was 2.2, 1.9, 1.9 and 1.6 respectively. Non-significant results were obtained while comparing the mean VAS at different time intervals in between the two study groups.

Table 1: VAS at different time intervals

Time intervals	Group 1	Group 2	p- value
2 hours	2.3	2.2	0.325
4 hours	2.1	1.9	0.139
6 hours	1.8	1.9	0.455
8 hours	1.5	1.6	0.338

DISCUSSION

The use of nickel-titanium (NiTi) rotary instruments for root canal system preparation has increased due to their undeniably favorable qualities; however, unexpected fracture is an important disadvantage of these instruments. Controversy remains regarding the contribution of torsional fracture, fatigue fracture and the combination of both to the separation of NiTi rotary instruments. Some have implicated fatigue fracture to be a main reason for the separation of endodontic files in the clinical setting. Fatigue fracture occurs due to repeated compressive and tensile stresses accumulated at the point of maximum flexure of an instrument rotating in a curved canal without the instrument being bind to the root canal. It should also be noted that controversy exists regarding the effect of un-retrieved separated files in root canals on the outcome of endodontic treatments. Considering that the retrieval of separated

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instruments from the root canal system is very difficult and in some cases impossible and that un-retrieved fractured files may have an adverse effect on the outcome of endodontic treatments, overcoming or reducing the risk of this problem is of high clinical significance.[6- 10]Hence; the present study was conducted for assessing and comparing postoperative pain among patients undergoing root canal therapy by manual and rotary instrumentation.

Mean age of the patients of the Group 1 was 35.6 years while that of group 2 was 38.1 years respectively. Majority proportion of patients of both the study groups were males. Mean VAS among the patients of Group 1 at 2 hours, 4 hours, 6 hours and 8 hours was 2.3, 2.1, 1.8 and 1.5 respectively. Mean VAS among the patients of Group 2 at 2 hours, 4 hours, 6 hours and 8 hours was 2.2, 1.9, 1.9 and 1.6 respectively. Non-significant results were obtained while comparing the mean VAS at different time intervals in between the two study groups. Rubio J et al compared the cutting are, root canal anatomy preservation and non-instrumented areas of F360®, F6-SkyTaper®, Hyflex-EDM®, iRACE®, Neoniti®, O.Shape®, P.Next®, Reciproc®, Revo-S® and Wave-One-Gold® size 25 files. 300 teeth with a single straight root and a circular or elliptical root canal were divided into 10 groups (1-F360®, 2- F6-SkyTaper®, 3-Hyflex-EDM®, 4-iRACE®, 5-Neoniti®, 6-O.Shape®, 7-P.Next®, 8-Reciproc®, 9-Revo-S® and 10-Wave-One-Gold®) cut into 3 cross sections using an ultrafine cutting disc. They were photographed under a stereo microscope and preinstrumentation analyses were made before rebuilding the teeth with# 10 K- File and epoxy glue. A glide path was created with #10 and #15 K files and each group was instrumented using rotary or reciprocating systems. Levene's test showed no equality of variances (P<0.05), therefore Welch´s and Games-Howell's tests were applied to cutting areas, showing significant differences in all thirds and overall (P<0.05). No differences in root canal anatomy preservation were observed (P>0.05). In non-instrumented areas, significant differences were found (P<0.05) in middle third being better in Reciproc®, Neoniti® and WaveOneGold®, and in apical thirds being higher P.Next®, Reciproc®, HyflexEDM®, Neoniti® and WaveOneGold®. In cutting area, P.Next® and Reciproc® were superior in coronal third, Neoniti® and Hyflex EDM® medially and apically and Neoniti® and Reciproc® overall.[11]

Waly AS et al compared two rotary file systems and hand instrumentation for root canal preparation in regard to canal transportation, centering ability ratio, and dentin thickness using cone-beam computed tomography (CBCT).A total of 72 canals from 24 freshly extracted mandibular deciduous second molars were divided into a set of 8 teeth, then prepared using 2 rotary files systems: the Kedo-S pediatric file system (Group A) and Pro AF Baby Gold file system (Group B) were compared to hand instrumentation (Group C). CBCT scans before and after root canal preparation were used to evaluate tested parameters. Instrumentation time for all three techniques was also measured using a chronometer.Although rotary file systems have shown superior results in root canal preparation as compared to hand instrumentation, no significant differences were observed between all the groups for canal transportation and dentin thickness at all three levels of prepared canals. A comparison of centering ability ratio between all the groups was found to be statistically significant only at the cervical level. A significant difference was observed between hand instrumentation using K-files (117.3 s) and both rotary systems (Kedo-S (81 s) and Pro AF Baby Gold (81.5 s)) in terms of canal preparation time (P < 0.001). Both tested rotary systems and hand instrumentation demonstrated comparable canal preparation results, with differences

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that were statistically non-significant in most tested parameters, without shaping errors.[12]

CONCLUSION

Postoperative pain among patients undergoing root canal therapy by manual and rotary instrumentation was comparable

REFERENCES

1. García M, Duran-Sindreu F, Mercadé M, Bueno R, Roig M. A comparison of apical transportation between ProFile and RaCe rotary instruments. J Endod. 2012;38(7):990–2.
2. Cabanillas C, Monterde M, Pallarés A, Aranda S, Montes R. Assessment using AutoCAD Software of the preparation of dentin walls in root canals produced by 4 different endodontic instrument systems. Int J Dent. 2015;517203.
3. Olivieri JG, Stöber E, García Font M, González JA, Bragado P, Roig M, et al. In vitro comparison in a manikin model: increasing apical enlargement with K3 and K3XF rotary instruments. J Endod. 2014;40(9):1463–7.
4. Pruett JP, Clement DJ, Carnes DL., Jr Cyclic fatigue testing of nickel-titanium endodontic instruments. J Endod. 1997. February; 23 (2): 77– 85.
5. Kim HC, Yum J, Hur B, Cheung GS. Cyclic fatigue and fracture characteristics of ground and twisted nickel-titanium rotary files. J Endod. 2010. January; 36(1): 147–52.
6. Gambarini G, Grande NM, Plotino G, Somma F, Garala M, De Luca M, et al. Fatigue resistance of engine-driven rotary nickel-titanium instruments produced by new manufacturing methods. J Endod. 2008. August; 34(8): 1003– 5.
7. Kuhn G, Tavernier B, Jordan L. Influence of structure on nickel-titanium endodontic instruments failure. J Endod. 2001. August; 27(8): 516– 20.
8. Cheung GS, Peng B, Bian Z, Shen Y, Darvell BW. Defects in ProTaper S1 instruments after clinical use: fractographic examination. IntEndod J. 2005. November; 38(11): 802– 9
9. Nabavizadeh M, Abbaszadegan A, Khojastepour L, Amorhosseini M, Kiani E. A comparison of apical transportation in severely curved canals induced by Reciproc and BioRace systems. Iran Endod J. 2014;9(2):117–22.
10. Iqbal MK, Karabucak B, Brown M, Menegazzo E. Effect of modified Hedstrom files on instrumentation area produced by ProFile instruments in oval canals. Oral Surg Oral Med Oral Pathol Oral RadiolEndod. 2004;98(4):493–8.
11. Rubio J, Zarzosa JI, Pallarés A. Comparison of Shaping Ability of 10 Rotary and Reciprocating Systems: an In Vitro Study with AutoCad. ActaStomatol Croat. 2017 Sep;51(3):207-216
12. Waly AS, Yamany I, Abbas HM, A Alsairafi MA, F Bazzaz RM, Bogari DF, Alhazzazi TY. Comparison of two pediatric rotary file systems and hand instrumentation in primary molar: An ex vivo cone-beam computed tomographic study. Niger J ClinPract. 2021 Oct;24(10):1492-1498.

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