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Original Research

Comparison of multiple-file vs single-file endodontics

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ABSTRACT:

Background: Reciprocating single-file (SF) systems are the latest stage of development of nickel titanium (NiTi) instruments for the preparation of root canals. The present study was conducted to compare multiple-file vs. single-file endodontics. **Materials & Methods:** 60 patients of both genderswere divided into 2 groups based on method employed. In group I, teeth all endodontic treatments were performed with rotary NiTi MF systems. All MF systems were used accordingto the manufacturer's instructions. In group II, single file WaveOnesystem was used. Pain score (VAS) was assessed om follow up. Oral-health-related quality of life (OHRQoL) with the german short version of the oral health impact profile (OHIP-G14) and treatment time of root canal preparation was recorded. **Results:** The mean VAS was 3.6 in group I and 3.8 in group II. The difference was non- significant (P> 0.05).OHIP-G-14 score in group I was 9.2 and in group II was 8.5. The difference was non- significant (P> 0.05).The mean treatment time per root canal was 233.4 seconds in group I and 145.7 seconds in group II. The difference was significant (P< 0.05). **Conclusion:** Both file systems were comparable in terms of pain reduction andOHIP-G-14. WaveOne-prepared root canals significantly faster than MF systems.

Key words: endodontic instruments, WaveOne, Single file

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INTRODUCTION

An ideal endodontic instrumentation technique should uniformly prepare all the surfaces of the canal while simultaneously preserving the sound peripheral dentin. The stainless steel (SS) K files have been the principal endodontic instruments to prepare the root canals, but a major limiting factor when dealing with curved canals has been excessive stiffness of the larger file sizes, thus increase the incidence of canal aberrations, such as zips, elbows, ledges and perforations.[1]

Reciprocating single-file (SF) systems are the latest stage of development of nickeltitanium (NiTi) instruments for the preparation of root canals. During the last years several systems as Reciproc, WaveOne, Genius files or the Twisted Files Adaptive System with a combination of rotary and reciprocating movement were introduced into the market.[2]

The novel Wave One NiTi single- file system (Dentsply Maillefer) is another example of new brands offered in 2011. This system is intended for use with a special reciprocating file motion. It is composed of three single- use files: Small (ISO 21 tip and 0.06 taper) for fine canals, primary (ISO 25 tip and 0.08 taper) for most canals, and large (ISO 40 and 0.08 tapers) for large canals. Files are manufactured by grinding M- Wire NiTi alloy. Few studied investigated single and multiple file systems for endodontic treatment regarding pain reduction after treatment and improvement in quality of life.[3] It is unclear if there exists an effectiveness-gap between the results of these controlled studies under the optimal treatment conditions of specialized treatment

providers and the use of rotary multiple-file (MF) and SF systems in general dental practice.[4]The present study was conducted to compare multiple-file vs. single-file endodontics.

MATERIALS & METHODS

The present study comprised of 60 patients of both genders. All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups based on method employed. In group I, teeth all endodontic treatments were performed with rotary NiTi MF systems. All MF systems were used accordingto the manufacturer's instructions. IN group II, single file WaveOnesystem was used. During rotary or reciprocating preparation the root canals were rinsed with 1–3% NaOCl between every rotary instrument or in case of the SF system between every 3–4 picks with the WaveOne file. After complete preparation of the root canals they were irrigated with a final irrigation of NaOCl 1–3% and a calcium hydroxide dressing or the root canal filling was placed. After that the tooth was sealed provisionally bacteria-proof with a temporary bacteria tight seal. Pain score (VAS) was assessed om follow up. Oral-health-related quality of life (OHRQoL) with the german short version of the oral health impact profile (OHIP-G14) and treatment time of root canal preparation was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Method	Multiple file system	Single file system
No of patients	30	30

Table I shows distribution of patients based on file system used. Each group had 30 patients.

Table II Comparison of pain

Groups	Mean (VAS)	P value
Group I	3.6	0.92
Group II	3.8	

Table II shows that mean VAS was 3.6 in group I and 3.8 in group II. The difference was non- significant (P> 0.05).

Table III Comparison of oral health impact profile-G- 14

Groups	OHIP-G-14	P value
Group I	9.2	0.74
Group II	8.5	

Table III shows that OHIP-G-14 score in group I was 9.2 and in group II was 8.5. The difference was non-significant (P> 0.05).

Table IV Comparison of treatment time

Groups	Mean (second)	P value
Group I	233.4	0.02
Group II	145.7	

Table IV shows that mean treatment time per root canal was 233.4 seconds in group I and 145.7 seconds in group II. The difference was significant (P< 0.05).

DISCUSSION

The goal of instrumentation is to produce a continuously tapered preparation that maintains the canal anatomy, without any deviation from the original canal curvature, facilitating optimal irrigation, debridement, and placement of local medicaments and permanent root filling, at the same time retaining the integrity of the radicular structures.[5,6] Although several techniques have been developed to minimize preparation errors deriving from root canal instrumentation there are still difficulties in effectively preparing curved canals because of their complex internal anatomy.[7] Instruments that can follow the path of the canal and are able to remain centered in the canal, are good choices for root canal preparation.[8]The present study was conducted to compare multiple-file vs. single-file endodontics.

We found that mean VAS was 3.6 in group I and 3.8 in group II. Sajad et al[9]compared the shaping ability of two different Nickel-Titanium file systems in mesial roots of mandibular first molars. Forty freshly extracted mandibular molars were used for the study. The specimens were randomly divided into the following two groups: Group l: Prepared using Wave One rotary files. Group 2: Prepared using Pro-Taper rotary files. In the study the Wave One file system exhibited better centering ability than Pro-Taper Universal file system.

We found that OHIP-G-14 score in group I was 9.2 and in group II was 8.5. Bartoals et al[10] in their study ten general dental practitioners (GDPs) participated. In the first five-month period of the study, the GDPs treated patients with MF systems. After that, the GDPs treated the patients in the second five-month period with a SF system (WaveOne). The GDPs documented the clinical findings at the beginning and on completion of treatment. A total of 599 patients were included in the evaluation. 280 patients were in the MF group, 319 were in the SF WaveOne group. In terms of pain reduction and improvement in OHIP-G-14, the improvement in both study groups (MF and SF) was very similar based on univariate analysis methods. Pain reduction was 34.4 VAS (MF) vs. 35.0 VAS (SF) and the improvement in OHIP-G-14 score was 9.4 (SD 10.3) (MF) vs. 8.5 (SD 10.2) (SF) ($p = 0.365$). The treatment time per root canal was 238.9 s (SD 206.2 s) (MF) vs. 146.8 sec. (SD 452.8 sec) (SF) ($p = 0.003$).

We observed that mean treatment time per root canal was 233.4 seconds in group I and 145.7 seconds in group II. Relvas et al[11]compared one reciprocating SF system (Reciproc (VDW, Munich, Germany) with a MF system (ProTaper (Dentsply). Only asymptomatic teeth with apical periodontitis were included in the trial. Therefore, patients were pain-free before treatment. Pain measurement was not performed with the VAS. The different instrument systems showed no statistically significant differences in postoperative pain scores after 24 hours and 72 hours.

Burklein et al[12] found no significant difference between the single- file technique and a full NiTi file sequence technique. The shaping ability of NiTi instruments is a multifactorial phenomenon that is related to the method of manufacture, microstructure of the alloy, taper, cross- sectional design, type of movement, and system composition.

The limitation the study is small sample size.

CONCLUSION

Authors found that both file systems were comparable in terms of pain reduction andOHIP-G-14. WaveOne-prepared root canals significantly faster than MF systems.

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