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Original Article

Efficacy of wave one and Mtwo in removing endotoxins and cultivable bacteria from infected root canals- A Clinical Study

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***ABSTRACT*:**
Background: The Wave One NiTi File System and Mtwo are a new generation of NiTi rotary instruments. The present study was conducted to compare efficacy of wave one and Mtwo in removing endotoxins and cultivable bacteria from infected root canals. **Materials & Methods:** The present study was conducted on 72 patients of both genders. A 2-stage access cavity preparation was made in all teeth and teeth were divided into 2 groups of 36 each. IN group I, A size #25 Wave One file with a 0.08 taper (Dentsply Maillefer) was used in a reciprocating motion. In group II, the full length of the canals (single length technique) was prepared according to the manufacturer's instructions in a gentle in-and-out motion. **Results:** In group I, endotoxins level was 102 EUs/mL and after treatment was 1.12 EUs/mL. In group II, it was 120 EUs/mL before treatment and 2.46 EUs/mL after treatment. The difference was significant (P< 0.05). In group I, cultivable bacteria (CFUs/mL) before treatment was 1.2X 10^5 and after treatment was 2.2 X 10^2. In group II, it was 1.1X 10^5 CFUs/mL and after treatment 3.21X 10^2 CFUs/mL. The difference was significant (P< 0.05). **Conclusion:** Both systems found equally effective in removing bacteria and endotoxins from infected root canals.
Key words: cultivable bacteria, endotoxins, Wave One file.

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INTRODUCTION

One of the main goals of root canal treatment is to reduce the amount of bacteria as well as their byproducts, all contributing to the perpetuation of apical periodontitis. Lipopolysaccharides, one of the most important byproducts present on the outer layer of the membrane of gram-negative bacterial species.[1]

The Wave One NiTi File System (Dentsply/Maillefer) was first introduced to the dental market in 2010. It is a prepackaged, pre-sterilized, single-use system that is indicated to shape root canal systems to a continuously tapering preparation. In the majority of cases a single-file can be used to complete root canal preparation in single or multiple root canal systems.[2] Instead of a rotary motion, the files work in a reverse "balanced force" cutting motion and is driven by a pre-programmed motor that is capable of moving the files in a back and forth "reciprocating" motion. M*two* endodontic instruments are a new generation of NiTi rotary instruments recently introduced. The standard set for this system includes four basic instruments with variable tip sizes ranging from #10 to #25 and tapers ranging from .04 to .06. (size 10/.04 taper, size 15/.05 taper, size 20/.06 taper, size 25/.06 taper).[3] After this basic sequence, which creates a #25/.06 shape, the system is devised to permit three different approaches to the finishing of root canal preparation. The first sequence allows clinicians to achieve enlarged apical diameters using the size 30/.05 taper, 35/.04 taper or 40/.04 taper; the second leads to a .07 taper that can facilitate vertical condensation of GP, maintaining a size #25 apical preparation; and the third allows the use of the M*two* apical files.[4] The present study was conducted to

compare efficacy of wave one and Mtwo in removing endotoxins and cultivable bacteria from infected root canals.

MATERIALS & METHODS

The present study was conducted in the department of Endodontics. It comprised of 72 patients of both genders. All were informed regarding the study and written consent was obtained prior to start of the study. Ethical clearance was obtained from institutional ethical committee.

General information such as name, age, gender etc. was recorded.

A 2-stage access cavity preparation was made in all teeth and teeth were divided into 2 groups of 36 each. IN group I, A size #25 Wave One file with a 0.08 taper (Dentsply Maillefer) was used in a reciprocating motion. In group II, the full length of the canals (single length technique) was prepared according to the manufacturer's instructions in a gentle in-and-out motion.

The first endotoxin sampling was taken by introducing sterile/apyrogenic paper points (size #15) into the full length of the canal. The sample was placed in a pyrogen-free glass and immediately suspended in 1mL limulus amebocyte lysate (LAL) water according to the endotoxin dosage by using a kinetic chromogenic LAL assay. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of teeth

Gender	Group I (Wave One)		Group II (MTWO)	
	Male	Female	Male	Female
Number	20	16	15	21

Table I, Graph I shows that in group I, there were 20 males and 16 females and in group II 15 males and 21 females.

Graph I

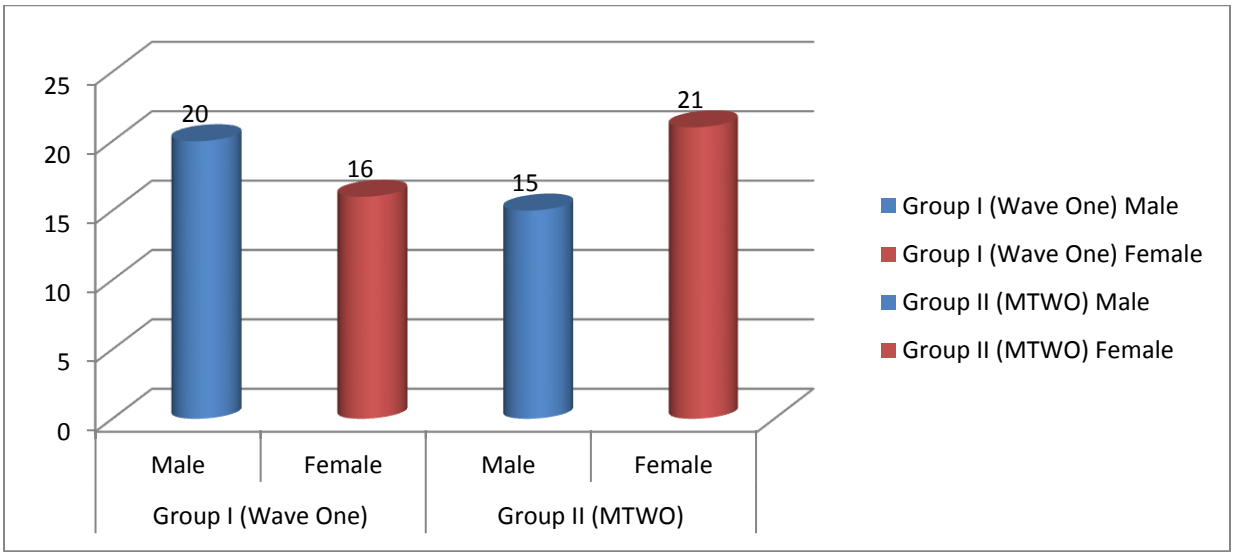

Table II Estimation of Endotoxins (EUs/mL) in both groups

System	Before treatment	After treatment	P value
Wave One	102	1.12	0.01
MTwo	120	2.46	

Table II, Graph II shows in group I, endotoxins level was 102 EUs/mL and after treatment was 1.12 EUs/mL. In group II, it was 120 EUs/mL before treatment and 2.46 EUs/mL after treatment. The difference was significant (P< 0.05).

Graph II

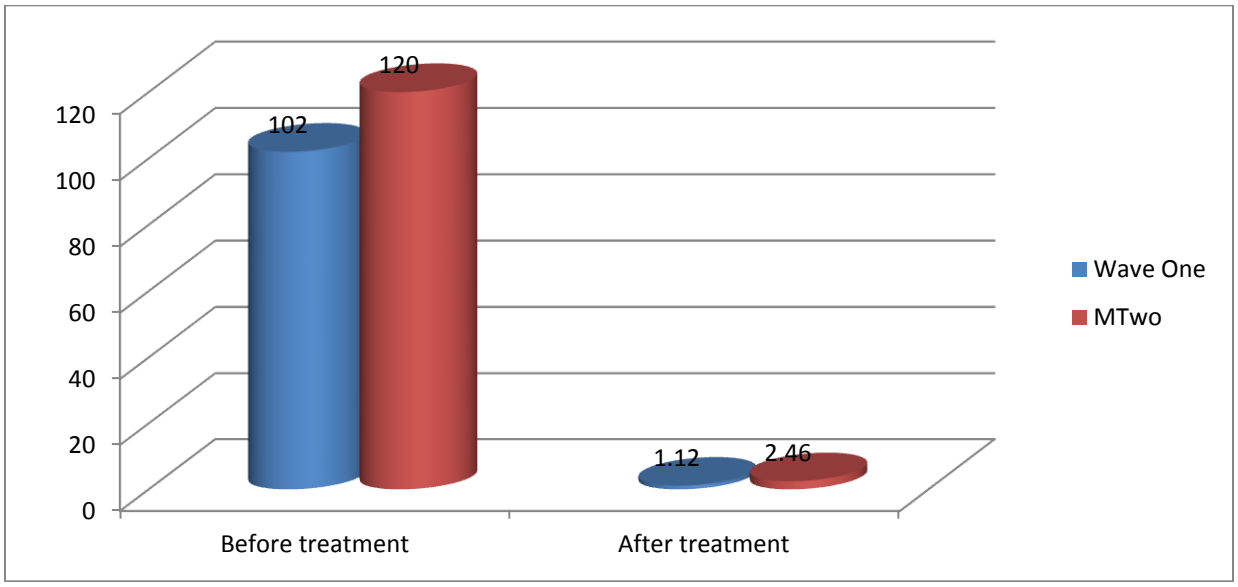

Table III Estimation of Cultivable bacteria (CFUs/mL) in both groups

System	Before treatment	After treatment	P value
Wave One	$1.2X\ 10^5$	$2.2\ X\ 10^2$	0.01
MTwo	$1.1X\ 10^5$	$3.21X\ 10^2$	

Table III, Graph III shows that in group I, cultivable bacteria (CFUs/mL) before treatment was $1.2X\ 10^5$ and after treatment was $2.2\ X\ 10^2$. In group II, it was $1.1X\ 10^5$ CFUs/mL and after treatment $3.21X\ 10^2$ CFUs/mL. The difference was significant ($P< 0.05$).

DISCUSSION

The use of nickel titanium (NiTi) rotary files has become a standard technique because of their more rapid procedures, more centered preparations, and less apical extrusion of debris. Although ProTaper rotary systems have provided significant bacterial/endotoxin reductions, no instrument can optimally make root canal systems free of bacteria and endotoxins. A new concept has recently proposed the use of a single-file system to shape the root canal completely from start to finish, particularly the Reciproc (VDW) and WaveOne (Dentsply Maillefer) systems, which are 2 M-wire reciprocating systems. However, evidence on their cleaning and disinfecting abilities is only incipient.[5]

Wave One instruments are also manufactured using M-Wire technology to improve the fracture resistance of the instruments. M-Wire is a new nickel titanium alloy that is prepared by a special thermal process that is claimed to increase flexibility and resistance to cyclic fatigue.4,5 It is reported that instruments made from M-Wire with a profile instrument design exhibit nearly 400% more resistance to cyclic fatique than super elastic wire instruments of the same size. The present study was conducted to compare efficacy of wave one and Mtwo in removing endotoxins and cultivable bacteria from infected root canals.[6]

In group I, there were 20 males and 16 females and in group II 15 males and 21 females. In group I, endotoxins level was 102 EUs/mL and after treatment was 1.12 EUs/mL. In group II, it was 120 EUs/mL before treatment and 2.46 EUs/mL after treatment. It is in agreement with Xavier et al.[7]

Martinho et al[8] found that in the baseline samples endotoxins and cultivable bacteria were recovered from 100% of the root canal samples. No differences were found in the median percentage values of endotoxin reduction achieved with reciprocating systems (ie, Wave One [95.15%] and Reciproc [96.21%]) and with rotary systems (ie, ProTaper [97.98%] and Mtwo [96.34%]) ($P < .05$). Both single-file reciprocating systems (ie, Wave One [99.45%] and Reciproc [99.93%]) and rotary systems (ProTaper [99.85%] and Mtwo [99.41%]) were effective in

reducing the cultivable bacteria (all P < .05). Moreover, the culture analysis revealed no differences in bacterial load reduction.

Single-file techniques have been used for root canal preparation because of its convenience; a single file is required to shape the root canal completely from start to finish, requiring a shorter period of time to prepare curved canals. New instruments were launched based on opinion and convenience rather than proven effectiveness. However, up to now, evidence on their cleaning and disinfecting abilities is limited to in vitro studies but is not reported in clinical practice.[9]

We found that in group I, cultivable bacteria (CFUs/mL) before treatment was 1.2 X 10^5 and after treatment was 2.2 X 10^2. In group II, it was 1.1X 10^5 CFUs/mL and after treatment 3.21X 10^2 CFUs/mL.

Wave One cause elimination of repeated usage of instruments can reduce the instrument fatigue with a general decrease in instrument fracture. It eliminates the possibility of cross contamination that is associated by the inability to adequately clean and sterilize previously used instruments. There is no need for disinfecting, cleaning, sterilizing and organizing because the instruments are disposed after each use.[10]

CONCLUSION

Both systems found equally effective in removing bacteria and endotoxins from infected root canals.

REFERENCES

1. Alves FR, R^oc¸as IN, Almeida BM, et al. Quantitative molecular and culture analyses of bacterial elimination in oval-shaped root canals by a single-file instrumentation technique. Int Endod J 2012;45:871–7.
2. Machado ME, Nabeshima CK, Leonardo MF, et al. Influence of reciprocating single file and rotary instrumentation on bacterial reduction on infected root canals. Int Endod J 2013; 46:1083–7.
3. Schein B, Schilder H. Endotoxin content in endodontically involved teeth. J Endod 1975;1:19–21.
4. Pitts DL, Williams BL, Morton TH Jr. Investigation of the role of endotoxin in periapical inflammation. J Endod 1982;8:10–8.
5. Nair PN. Pathogenesis of apical periodontitis and the causes of endodontic failures. Crit Rev Oral Biol Med 2004;15:348–81.
6. Martinho FC, Chiesa WM, Leite FR, et al. Correlation between clinical/radiographic features and inflammatory cytokine networks produced by macrophages stimulated with endodontic content. J Endod 2012;38:740–5.
7. Xavier AC, Martinho FC, Chung A, et al. One-visit versus two-visit root canal treatment: effectiveness in the removal of endotoxins and cultivable bacteria. J Endod 2013;39:959–64.
8. Martinho FC, Gomes BP. Quantification of endotoxins and cultivable bacteria in root canal infection before and after chemomechanical preparation with 2.5% sodium hypochlorite. J Endod 2008; 34:268–72.
9. Horiba N, Maekawa Y, Abe Y, et al. Correlations between endotoxin and clinical symptoms or radiolucent areas in infected root canals. Oral Surg Oral Med Oral Pathol 1991;71:492–5.
10. Guelzow A, Stamm O, Martus P, et al. Comparative study of six rotary nickel-titanium systems and hand instrumentation for root canal preparation. Int Endod J 2005;38: 1-2.