Bacterial reduction after root canal preparation using single and multifile preparation systems with different activation methods (An *in vitro* study)

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By

Sherien Ali Ibrahim Ahmed Orabi

B.D.S.

(Ain Shams University, 2005)

Department of Endodontics
Faculty of Dentistry
Ain Shams University
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Supervisors

Dr. Shehab El-Din Mohamed Saber

Associate Professor of Endodontics

Faculty of Dentistry, Ain Shams University

Dr. Mohamed Mokhtar Nagy

Lecturer of Endodontics

Faculty of Dentistry, Ain Shams University

Dr. Soha Abdelrahman Al Hady

Associate Professor of Microbiology

Faculty of Medicine, Ain Shams University

بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم
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التقليل البكتيرى بعد تحضير القنوات الجذرية باستخدام نظام أحادى ومتعدد المبارد بإستخدام طرق مختلفة من تنشيط الإرواء

(دراسه معمليه)

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جامعة عين شمس

٢٠١٦

تحت إشراف

د/ شهاب الدين محمد صابر

أستاذ مساعد قسم علاج الجذور

كلية طب الأسنان – جامعة عين شمس

د/ محمد مختار ناجي

مدرس قسم علاج الجذور

كلية طب الأسنان – جامعة عين شمس

د/ سها عبد الرحمن الهادى

أستاذ مساعد قسم الميكروبيولوجى

كلية الطب – جامعة عين شمس

Dedication

I would like to dedicate my Master thesis to my Father & Mother, who have given me day by day support and helped me to reach this level.

I dedicate it also to my dear Husband without him none of my success would be possible.

I dedicate it also to my lovely daughter

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Sherien Ali Orabi

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Introduction

The outcome of root canal treatment is dependent on mechanical preparation, irrigation, microbial control and complete obturation of the root canal system. Root canal preparation is a chemomechanical procedure.

The main microbiologic goals of this chemomechanical procedure of infected root canals are to completely eliminate intracanal bacterial populations or at least to reduce them to a level below that required to induce or sustain diseases. Bacteria persisting after chemomechanical procedures at levels detectable by culturing techniques might influence negatively the treatment outcome. Therefore, efforts should be driven to establish chemomechanical protocols that predictably promote negative cultures.

Enterococcus faecalis (E. faecalis) are normally found in the human intestine, but may temporarily be found in the oral cavity, where they have been associated with pathogenic oral manifestations such as mucosal lesions in immunocompromised patients, as superinfecting organisms in periodontitis and, most importantly, in persistent root canal infections.[1]
*E. f*aecalis are gram positive anaerobic facultative cocci, have the ability to withstand prolonged periods of nutrient limitation, allowing them to persist as a pathogen within the root canal and this explain their resistance to various intracanal treatment procedures.

Mechanical instrumentation is the core method for bacterial reduction during endodontic treatment of infected root canals.[2] but due to the complex

nature of root canal anatomy, some areas can not be reached by mechanical instrumentation like lateral canals, isthmi, fins, webs and anastomoses.
Therefore, instrumentation must be combined with adequate irrigation to complete the cleaning process and decrease the microbial load within the root canal system.[3]

The introduction of rotary NiTi enlarging instruments has revolutionized the old method of canal instrumentation. These recent systems offer an easy, efficient and safe method for canal enlargement.
Rotary NiTi instruments can be divided into single file systems and multifile systems.

There are 2 factors directly correlated with efficient irrigation, the irrigant and the delivery system.[3]

Root canal irrigation systems can be divided into 2 broad categories, manual agitation techniques and machine-assisted agitation devices.
Manual techniques include positive pressure irrigation, which is commonly performed with a syringe and a sidevented needle. On the other hand, machine-assisted agitation techniques include sonic and ultrasonic devices.[3]
Recently, the Vibringe System, an irrigation device that combines manual delivery and sonic activation of the solution, has been introduced.[4]

Two important factors that should be considered during the process of irrigation are whether the irrigation system can deliver the irrigant to the whole extent of the root canal system, particularly at the apical third, and whether it is capable of reducing bacteria and debriding areas that could not be reached with mechanical instrumentation, such as lateral canals, isthmi and apical deltas.[3]