

# EVALUATION OF RETROGRADE ROOT CANAL PREPARATION FOLLOWING THE USE OF CONTROLLED MEMORY FILES VERSUS ULTRASONIC TIPS ON CRACK FORMATION USING STEREOMICROSCOPE. (AN IN-VITRO STUDY)

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## INTRODUCTION

Retrograde preparation is used to accessibly remove irritating materials from the root canal system when coronal entry is not applicable. The presence of microcracks is of great concern to the clinician because they may increase the risk of root fracture, failure to properly seal the root-end preparation, and raise the chance of further contamination. As it is still debatable whether microcracks can form during ultrasonic root-end instrumentation (1). A new technique using controlled memory files has shown promise as a viable technique in retrograde instrumentation (2). Therefore, this study was conducted to compare the effect of root-end cavity preparation using controlled memory rotary files and ultrasonic retro-tips on root dentin walls in terms of microcrack formation and propagation using stereomicroscope.

## METHODOLOGY

Thirty-six human maxillary anterior teeth were divided into three groups (n=12) following root end resection. Group I: prepared using controlled memory rotary files (Hyflex EDM), Group II: prepared using ultrasonic surgical retrotips (Acteon/Setalec), and Group III: Control group without retrograde preparation. Following retrograde preparation to the depth of 9mm under the operating dental microscope the specimens were horizontally sectioned at 3, 6, and 9mm from the apex with a microtome precision cut-off machine (Metkon). The sections were stained with 1% methylene blue dye and scanned under the stereomicroscope (Olympus). Digital images of each section (Figure 1) were evaluated by two blinded observers and microcracks were recorded according to number, type (intra-canal, extra-canal, intra-dentinal and complete) and location (narrower and wider) (3-5). Data were collected and statistical analysis was performed using Pearson Chi Square test with Monte Carlo simulation test. Significance level was set at p value 0.05.

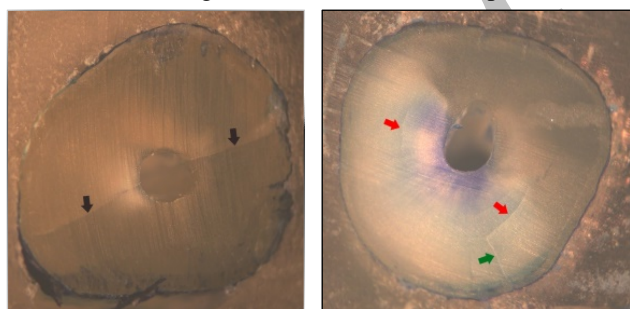


Figure (1): Two sections showing different types of cracks. Black arrow: complete crack; Red arrow: incomplete intra-dentinal crack; Green arrow: incomplete extra-canal crack

## RESULTS AND DISCUSSION

The results showed that the controlled memory files group had a significantly low number of cracks, the greatest number of cracks was found in the ultrasonic group while the control group showed the least number of cracks, thus a statistically significant difference between the three groups regarding the total number of cracks was

found ( $\leq 0.010$ ). No statistically significant difference was detected among the three study groups regarding the section level, type and location of crack (Table 1).

Our results were in agreement with Hatzke et al. who stated that using controlled memory files provides a potentially advantageous outcome when compared to ultrasonic tips for use in retroinstrumentation (2).

Table (1): Comparison cracks number, type, and location among the study groups

	Memory shape	Ultrasonic	Control	Test (P value)	
Total number of cracks N= 28 cracks	6(21.4%)	19 (67.9%)	3(10.7%)	<b>9.131 (0.010*)</b>	
Level of cracks	Pre 0 mm	0 (0%)	2 (10.5%)	1(33.3%)	11.084 (0.197)
	0 mm	3 (50%)	9 (47.4%)	1(33.3%)	
	3 mm	3 (50%)	1 (5.3%)	1(33.3%)	
	6 mm	0 (0%)	2 (10.5%)	0 (0%)	
Type of cracks	Complete	0 (0%)	6 (31.6%)	0 (0%)	3.617 (0.164)
	Incomplete	6 (100%)	13 (68.4%)	3 (100%)	
Sub type of cracks	Complete	0 (0%)	6 (31.6%)	0 (0%)	6.171 (0.404)
	Extra-canal	1(16.7%)	4 (21.1%)	0 (0%)	
	Intra-canal	3 (50%)	4 (21.1%)	1(33.3%)	
Location of cracks	Intra-dentinal	2(33.3%)	5 (26.3%)	2(66.7%)	2.551 (0.279)
	Wider	4(66.7%)	9 (47.4%)	0 (0%)	
Location of cracks	Narrower	2(33.3%)	10 (52.6%)	3 (100%)	

## CONCLUSION

This study showed that controlled memory files are more convenient and induces less microcracks in intact roots so they might be safer to use in retrograde root canal preparation than ultrasonics tips.

## ACKNOWLEDGMENT

I would like to express my deep gratitude to Dr. Hams Abdelrahman for her help with the statistical analysis.

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