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

Eman A. Abu Hamda1*, BDS, Salma MH. Genena2 PhD, Moustafa Aboushelibi PhD,
Sybel Mokhtar Moussa4 PhD

1. Masters candidate, Conservative Dentistry Department, Faculty of Dentistry, Alexandria University, Egypt.
2. Lecturer of Endodontics, Conservative Dentistry Department, Faculty of Dentistry, Alexandria University, Egypt.
3. Professor of Dental Biomaterials, Dental Biomaterials Department, Faculty of Dentistry, Alexandria University, Egypt.
4. Professor of Endodontics, Conservative Dentistry Department, Faculty of Dentistry, Alexandria University, Egypt.

CORRESPONDING AUTHOR
Eman A. Abu Hamda
1* BDS
Lecturer of Endodontics, Conservative Dentistry Department, Faculty of Dentistry, Alexandria University, Egypt.
Masters candidate, Conservative Dentistry Department, Faculty of Dentistry, Alexandria University, Egypt.

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 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 9 mm under the operating dental microscope the specimens were horizontally sectioned at 3, 6, and 9 mm 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 (intracanal, 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.

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 (≤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

<table>
<thead>
<tr>
<th>Total number of cracks</th>
<th>Memory shape</th>
<th>Ultrasonic</th>
<th>Control</th>
<th>Test (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N= 28 cracks</td>
<td>Pre 0 mm</td>
<td>6 (21.4%)</td>
<td>19 (67.9%)</td>
<td>0 (10.7%)</td>
</tr>
<tr>
<td>Level of cracks</td>
<td>0 mm</td>
<td>3 (50%)</td>
<td>9 (47.4%)</td>
<td>1 (33.3%)</td>
</tr>
<tr>
<td></td>
<td>3 mm</td>
<td>2 (33.3%)</td>
<td>5 (26.3%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>6 mm</td>
<td>1 (16.7%)</td>
<td>6 (31.6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Type of cracks</td>
<td>Complete</td>
<td>4 (66.7%)</td>
<td>9 (47.4%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Sub type of cracks</td>
<td>Extra-canal</td>
<td>1 (16.7%)</td>
<td>4 (21.1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Intra-canal</td>
<td>3 (50%)</td>
<td>4 (21.1%)</td>
<td>1 (33.3%)</td>
</tr>
<tr>
<td></td>
<td>Intra-dentinal</td>
<td>2 (33.3%)</td>
<td>5 (26.3%)</td>
<td>2 (66.7%)</td>
</tr>
<tr>
<td>Location of cracks</td>
<td>Wider</td>
<td>3 (100%)</td>
<td>3 (100%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Narrower</td>
<td>0 (0%)</td>
<td>10 (52.6%)</td>
<td>3 (100%)</td>
</tr>
</tbody>
</table>

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.

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REFERENCES

Eman Ahmed Saleem Abu Hamda, 24, 18 street Sidi Bishr Bahri, Alexandria, Egypt, aoesmm7@gmail.com, 01158332215