

# بسم الله الرحمن الرحيم





# شبكة المعلومات الجامعية

## التوثيق الالكتروني والميكروفيلم



# جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



## يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار





# بعض الوثائق الأصلية تالفة







# بالرسالة صفحات لم ترد بالأصل



**Assessment of Distortion and Separation of New Rotary Ni-Ti  
Files under Clinical Standardized Simulation:  
A New Method**

**Thesis**

**Submitted to the Faculty of Oral and Dental Medicine  
Cairo University**

**In partial fulfillment of the requirements for  
Master Degree in  
Restorative dentistry  
(Endodontics)**

**By**

**Ahmad Rawhi Al-Qaisi, B.D.S (2006)  
M.U.S.T University**

**2010**

# ***SUPERVISORS***

## ***Professor Dr Salsabyl Mohamed Ibrahim***

Professor of Endodontics, Endodontic Department

Faculty of Oral and Dental Medicine

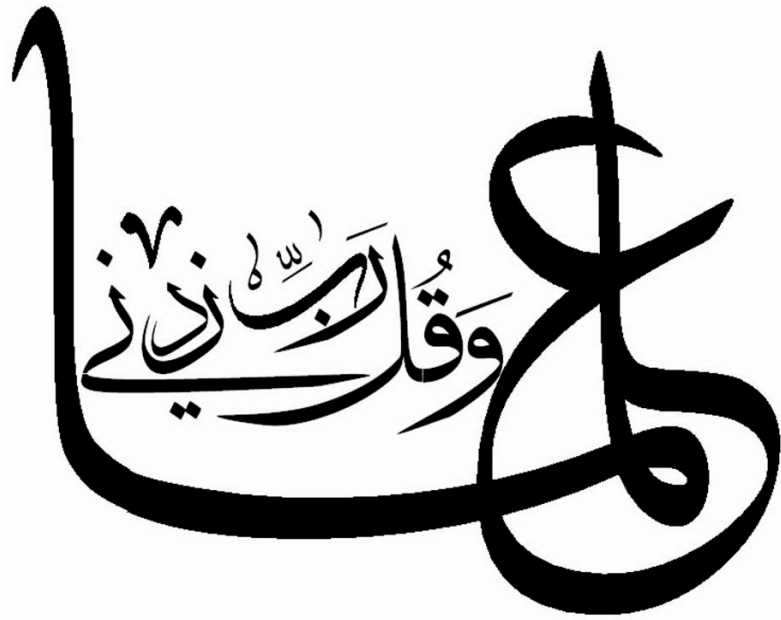
Cairo University

## ***Dr. Mohamed Hassan El-Sabry***

Lecturer of Endodontics, Endodontic Department

Faculty of Oral and Dental Medicine

M.U.S.T University



سورة طه (113)



## ***Acknowledgement***

First and forever thanks and gratitude to “**ALLAH**” the kindest and the most merciful.

It is more than gratefulness, which I owe to **Professor Dr Salsabyl Mohamed Ibrahim** Professor of Endodontics, Endodontic Department, Faculty of Oral and Dental Medicine, Cairo University. Who taught me a lot, guided me in all aspects of this work and helped me scientifically, spiritually and even socially. Appreciating her efforts is less than she deserves, from her I learned how to help the others. Without her supportive, sincere effort and unlimited patience this work would have never been accomplished.

I would like to gratefully acknowledge the support, supervision and kindness of **Dr. Mohamed Hassan El-Sabry** Lecturer of Endodontics, Faculty of Oral and Dental Medicine, MUST University. His moral support and continuous guidance enabled me to begin and complete my work successfully and he gave me a generous help throughout my study.

I am endless thankful to **Dr. Reham Mohammad Siam** Lecturer of Endodontics, Faculty of Oral and Dental Medicine, Cairo University, for her continuous guidance and useful suggestions, patience and support.

Thanks are also due to engineer Nabeel Hasan at MUST University for his help in constructing the electric parts used in this study.

Endless thanks to all my Professors, staff members and colleagues, in Endodontic department, Cairo University and MUST University in for their friendly support and concern.

Deep appreciation and very special thank to *Dr. Mona Al-Saeed* for her kindness and support throughout this work.

Finally this work could not have happened without **my lovely family** who always supported me in everything.

# ***DEDICATION***

***This work is dedicated to my Father and Mother***

***To my brother and loving sister***

## **List of Contents**

|                                  |       |            |
|----------------------------------|-------|------------|
| <b>List of Tables</b>            | ..... | <b>ii</b>  |
| <b>List of figures</b>           | ..... | <b>iii</b> |
| <b>Introduction</b>              | ..... | <b>1</b>   |
| <b>Review of Literature</b>      | ..... | <b>2</b>   |
| <b>Aim of Study</b>              | ..... | <b>39</b>  |
| <b>Materials and Methods</b>     | ..... | <b>40</b>  |
| <b>Results</b>                   | ..... | <b>52</b>  |
| <b>Discussion</b>                | ..... | <b>73</b>  |
| <b>Summary &amp; Conclusions</b> | ..... | <b>81</b>  |
| <b>References</b>                | ..... | <b>84</b>  |
| <b>Appendix</b>                  | ..... | <b>v</b>   |
| <b>Arabic Summary</b>            |       |            |

## List of Tables

| <b>Table</b> | <b>Titles</b>   | <b>Page</b> |
|--------------|---|-------------|
| <b>1</b>     | <b>Frequent incidence and percent distribution of file surface topography defects as seen by SEM 350-X in RaCe and TF files as received.</b>                                  | <b>54</b>   |
| <b>2</b>     | <b>Frequent incidence and percent distribution of file tip defects as seen by SEM 350-X in RaCe and TF files as received.</b>   | <b>54</b>   |
| <b>3</b>     | <b>Frequent incidence and percent distribution of interpreted surface defects seen by stereomicroscope 40-X of RaCe and TF files after 6 uses.</b>                            | <b>58</b>   |
| <b>4</b>     | <b>Frequent percent distribution of surface topography distortions of RaCe files as received versus after use as interpreted from photomicrograph of SEM at 350-X.</b>        | <b>62</b>   |
| <b>5</b>     | <b>Frequent percent distribution of surface topography distortions of TF files as received versus after 6 uses as interpreted from photomicrograph of SEM at 350-X.</b>       | <b>62</b>   |
| <b>6</b>     | <b>Frequent incidences and percent distribution of surface topographic distortions of RaCe and TF files after 6 uses as interpreted from photomicrograph of SEM at 350-X.</b> | <b>63</b>   |
| <b>7</b>     | <b>Frequent percent distribution of tip distortions of RaCe files as received versus after 6 uses as interpreted from photomicrograph of SEM at 350-X.</b>                    | <b>64</b>   |
| <b>8</b>     | <b>Frequent percent distribution of tip defects of TF files as received versus after 6 uses as interpreted from photomicrograph of SEM at 350-X.</b>                          | <b>64</b>   |
| <b>9</b>     | <b>Frequent incidences and percent distribution of tip distortions of RaCe and TF files after 6 uses as interpreted from photomicrograph of SEM at 350-X.</b>                 | <b>65</b>   |
| <b>10</b>    | <b>Frequent incidence and percent distribution of interpreted surface defects of RaCe and TF files after 7-9 uses.</b>  | <b>69</b>   |
| <b>11</b>    | <b>Frequent incidence and percent distribution of fractured segment position of both files as related to maximum point of curvature.</b>                                      | <b>70</b>   |

## List of Figures

| <b>Figure</b> | <b>Titles</b>   | <b>Page</b> |
|---------------|---|-------------|
| <b>1</b>      | <b>A photograph of the assembled device A) mechanical components, B) electric circuit and C) endodontic motor.</b>  | <b>41</b>   |
| <b>2</b>      | <b>Schematic illustration diagrams of the constructed A) constructed device and B) electric circuit.</b>  | <b>42</b>   |
| <b>3</b>      | <b>digital radiograph of the prepared sample demonstrating the external angle of curvature of A) mesiobuccal root canal of mandibular molar (the internal angle equals 23.7°) and B) mesiobuccal root canal of maxillary molar (the internal angle equals 28.6°).</b> | <b>45</b>   |
| <b>4</b>      | <b>Diagram illustrating the grouping of the samples according to canal curvature and type of file used in preparation of the root canal space.</b>  | <b>46</b>   |
| <b>5</b>      | <b>A photograph of open roof metallic mould cube with 4 screws to adjust and secure the specimen in place.</b>  | <b>48</b>   |
| <b>6</b>      | <b>Stereomicroscopic photograph at 40-X magnification at 1-3-mm from tip as received showing A) RaCe file and B) TF file.</b>   | <b>55</b>   |
| <b>7</b>      | <b>Stereomicroscopic photograph at 40-X magnification at 4-7-mm from tip as received showing A) RaCe file and B) TF file.</b>   | <b>55</b>   |
| <b>8</b>      | <b>Photomicrograph of RaCe file as received at 350-X magnification A) side view showing metal strip and B) top view showing pitting and scratches on the tip.</b>   | <b>56</b>   |
| <b>9</b>      | <b>Photomicrograph of TF file as received at 350-X magnification A) side view showing edge irregularities, metal peel and metal rollover and B) top view showing pitting on tip and tip geometry defect.</b>  | <b>56</b>   |
| <b>10</b>     | <b>Histogram of frequent percent distribution of stereomicroscopic defects for RaCe and TF files after 6 uses.</b>  | <b>58</b>   |
| <b>11</b>     | <b>Stereomicroscopic photograph at 40-X magnification at 2-4-mm from tip showing A) straightened TF file and B) fractured RaCe file.</b>  | <b>59</b>   |

|    |   |    |
|----|---|----|
| 12 | Stereomicroscopic photograph at 40-X magnification at 4-6-mm from tip showing twisting of A) RaCe file and B) TF file.  | 59 |
| 13 | Histogram of frequent percent distribution of surface topographic distortions of RaCe and TF files after 6 uses as interpreted from photomicrograph of SEM at 350-X.                                | 63 |
| 14 | Histogram of frequent percent distribution of the tip distortions of RaCe and TF files after 6 uses as interpreted from photomicrograph of SEM at 350-X.  | 65 |
| 15 | Photomicrograph of RaCe files at 350-X magnification side view showing A) edge irregularities, and pitting and grooving and B) micro-cracks on edge.  | 66 |
| 16 | Photomicrograph of TF file at (350-X) magnification side view showing A) edge irregularities, metal peel and B) metal rollover.   | 66 |
| 17 | Histogram of frequent percent distribution of stereomicroscopic defects for RaCe and TF files after 7-9 uses.   | 69 |
| 18 | Histogram of frequent percent distribution of fractured segment position of both files as related to maximum point of curvature.  | 70 |
| 19 | Photomicrograph of the fractured surface RaCe file at 800-X and 1500-X showing A) fatigue striations, B) micro-voids and C) micro-crack. Cyclic fatigue fracture mode.                              | 71 |
| 20 | Photomicrograph of the fractured surface TF file at 800-X and 1500-X showing A) circular abrasion, B) fatigue striations C) micro-voids and D) micro-crack. Cyclic torsional fracture mode (mixed). | 72 |