



Homogeneity and Ability to Fill Simulated Lateral Canals using Guttacore Obturator

Thesis

Submitted to the Faculty of dentistry, Ain Shams
University for Partial Fulfillment of the
requirements for Master Degree in Endodontics

By

Muneera Ghaithan Gumaan Ghaithan

B.D.S, Faculty of Dentistry
University of Aden -Yemen
(2008)

**Faculty of Dentistry
Ain Shams University
2018**

Supervisors

Prof. Dr. Abeer AbdelHakim Elgendy

Professor of Endodontics

Faculty of Dentistry, Ain Shams University

Dr. Tarek Moustafa Abdel Aziz

Lecturer of Endodontics

Faculty of Dentistry, Ain Shams University

**Faculty of Dentistry
Ain Shams University
2018**

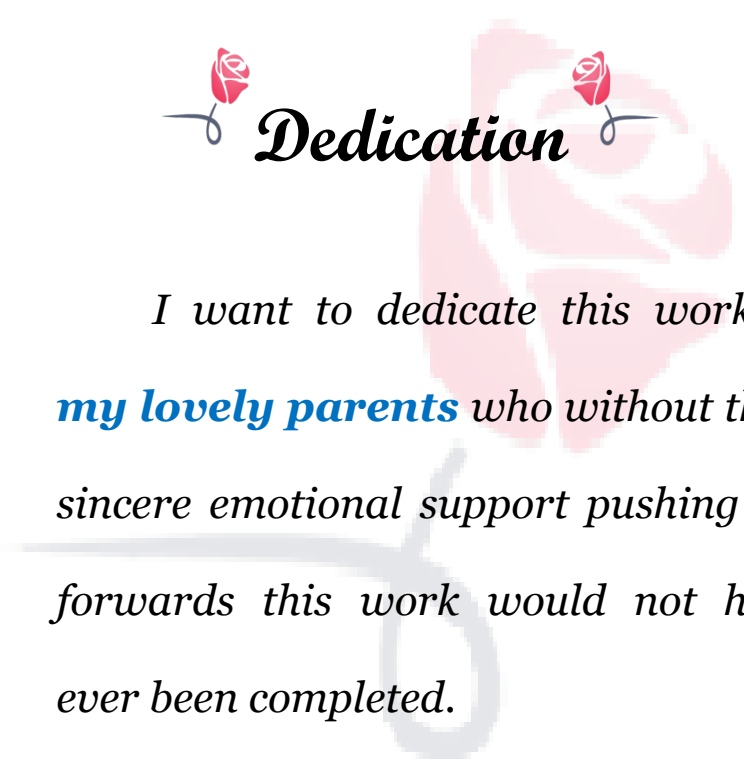
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالَ

سَبَّحَانَكَ لَا إِلَهَ إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْعَظِيمُ

صدق الله العظيم

سورة البقرة الآية: ٣٢



Dedication

*I want to dedicate this work to
my lovely parents who without their
sincere emotional support pushing me
forwards this work would not have
ever been completed.*

Acknowledgment

*First and foremost, I feel always indebted to **ALLAH**, the Most Kind and Most Merciful.*

*I'd like to express my respectful thanks and profound gratitude to **Prof. Dr. Abeer AbdelHakim Elgendy**, Professor of Endodontics Faculty of Dentistry, Ain Shams University for her keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

*I am also delighted to express my deepest gratitude and thanks to **Dr. Tarek Moustafa Abdel Aziz**, Lecturer of Endodontics Faculty of Dentistry, Ain Shams University, for his continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

Sincere thanks to my family, relatives and friends who gave me encouragement and support

Finally, I am also delighted to express my deepest gratitude to German Academic Exchange Service (DAAD) for their generous support towards my higher education.

Muneera Ghaithan Gumaan Ghaithan



Dedication



*I want to dedicate this work to **my lovely parents** who without their sincere emotional support pushing me forwards this work would not have ever been completed.*

List of Contents

	Page
List of Tables	vi
List of Figures	viii
List of Abbreviations	xii
Introduction	1
Review of Literature	4
Aim of the Study	38
Materials & Methods	39
Results	61
Discussion	91
Summary	101
Conclusion	104
References	105
Arabic Summary	- -

List of Tables

No.	Table	Page
1-	Instruments, devices and materials	39
2-	Summary of mixed model ANOVA for percentage of guttapercha (%).	61
3-	Mean, standard deviation values of Percentage of Gutta-percha filled area	63
4-	Summary of mixed model ANOVA for percentage of sealer (%)	65
5-	Mean, Standard deviation (SD) values of percentage of sealer filled area (%) for different groups and sections	67
6-	Summary of mixed model ANOVA for percentage of voids (%)	68
7-	Mean Standard deviation (SD) values of percentage of voids (%) for different groups and sections	70
8-	Frequencies (n), Percentages (%) for canals detectionby radiographic analysis in different groups within different locations	74
9-	Mean, Standard deviation (SD) values of percentage of linear extension (%) for different groups and locations	77
10-	Mean Standard deviation (SD) values of percentage of filled area (%) for different groups and locations	79
11-	Mean Standard deviation (SD) values of percentage of linear extension (%) for different groups and locations	82
12-	Mean Standard deviation (SD) values of percentage of filled area (%) for different groups and locations	84

List of Tables

No.	Table	Page
13-	Frequencies (n), Percentages (%) of simulated lateral canals (SLCs) penetrated with Gutta-percha related to GuttaCore (GC) and continuous wave of condensation (CWT) techniques. within different locations	86
14-	Mean percentages and standard deviation of the linear extension percentage of GP Penetration into Simulated Lateral Canals	88

List of Figures

No.	Figure	Page
1-	GuttaCoreobturators&thermaprep 2 oven	40
2-	Ischemic diagram illustrates sample classification	43
3-	A. size verifier in place, verifying the canal space at working length and passive fit of the obturator. B. GuttaCoreObturator placed inside the root canal	46
4-	Section of GC group samples.	48
5-	A) Dino Lite Digital microscope, B) Photographic image obtained by digital microscope	48
6-	Image J software	49
7-	8 and #10 K-files were inserted through the labial and lingual root surfaces to create the simulated lateral canals	55
8-	A, Samples immersed in alcohol for dehydration. B, Samples immersed in methyl salicylate	55
9-	Cleared sample after been removed from methyl salicylate	55
10-	Aiming device	57
11-	UTHSCSA Image Tool for Windows version 3.0	57
12-	Obtured samples soaked in methyl salicylate	58
13-	Photographic image of cleared sample from GC group	59
14-	Radiographic &photographicimages imported into UTHSCSA Image Tool software	59
15-	Bar chart illustrates average percentage of Gutta-percha filled area for different groups within different sections	64
16-	Bar chart illustrates average percentage of Gutta-percha filled area (%) for different sections within different groups	64
17-	Bar chart illustrates average percentage of sealer filled area (%) for different groups within different sections	67

List of Figures

No.	Figure	Page
18-	Bar chart illustrates average percentage of sealer filled area (%) for different sections within different group	68
19-	Bar chart illustrates average percentage of voids area (%) for different groups within different sections	70
20-	Bar illustrates average percentage of voids (%) for different sections within different groups	71
21-	Coronal cross-sections of a tooth sample from each group	71
22-	Middle cross-sections of a tooth sample from each group	72
23-	Apical cross-sections of a tooth sample from each group	72
24-	Bar chart illustrates percentage of canals detected by radiographic analysis in different groups within different locations	74
25-	Bar chart illustrates average percentage of linear extension (%) for different groups within different locations	78
26-	Bar chart illustrates average percentage of linear extension (%) for different locations within different groups	78
27	Bar chart illustrates average percentage of filled area (%) for different groups within different locations	79
28-	Bar chart illustrates average percentage of filled area (%) for different locations within different groups	80
29-	Bar chart illustrates average percentage of linear extension (%) for different groups within different locations	83
30-	Bar chart illustrates average percentage of linear extension (%) for different locations within different groups	83

List of Figures

No.	Figure	Page
31-	Bar chart illustrates average percentage of filled area (%) for different groups within different locations	84
32-	Bar chart illustrates average percentage of filled area (%) for different locations within different groups	85
33-	Bar chart illustrates percentage of canals within which Gutta-percha was detected in different groups within different locations	87
34-	Bar chart illustrates average percentage of Gutta-percha linear extension (%) for different groups at different locations	88
35-	Photographic and radiographic images of a tooth sample from each group	89
36-	Illustrates gutta-percha inside coronal and middle lateral canals of CWT group sample, white arrows	90
37-	Illustrates gutta-percha inside middle and apical lateral canals of GC group sample (white arrows)	90
38-	Illustrates coronal, middle and apical lateral canals filled only with sealer (LCT group sample)	90

List of Abbreviations

Abb.	Full term
CLT	Cold lateral condensation
CWT	Continuous wave of condensation
GC	Gutta-Core
GP	Gutta-percha
NaOCl	Sodium hypochlorite
PGFA	Percentage of Gutta-percha-filled area
PSFA	Percentage of sealer filled areas
PVA	Percentage of voids area
SD	Standard deviation
SLCs	Simulated lateral canals
WL	Working length

The three-dimensional obturation of the root canals is the final step of an intricate therapeutic chain of procedures that comprises cleansing, disinfection and shaping of the canals. Nevertheless, despite the indisputable advancements of Endodontics, completely sealing the canals after biomechanical preparation remains a critical phase of the endodontic treatment.

The difficulty in adequately obturating the root canal system is attributed to its anatomical complexity and peculiar morphological configuration, which includes multiple foraminas, apical deltas, accessory and lateral root canals. Since these components may constitute a pathway for passage of bacteria and products of tissue degradation between the root canal space and the surrounding extradental periodontal environment, the hermetic filling of the entire canal system consists of an essential approach to yield the healing of periapical tissues. Therefore, the overall success of an endodontic treatment is closely related to the filling materials and techniques utilized.

Many materials and techniques for obturation are available on the market. Although Gutta-percha is not the ideal filling material for root canals, it has satisfied most of the criteria for an ideal root filling material. It, since the middle of the 19th century, has marked endodontics.