

Analysis of the Internal Anatomy of Permanent Mandibular first and second Molars in Egyptians

Thesis

Submitted to the Faculty of Dentistry,
Ain Shams University

For

Partial fulfillment of requirements of the master degree in
Endodontics

By

Amany Effat El-Azab

B.D.S

(Faculty of Dentistry, Ain Shams University, 2005)

2014

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَقُلْ أَعْمَلُوا فَلْيَسِّرْ لَكُمْ اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ

وَلْيَسِّرْ لَكُمْ دَارَ الْغَيْبِ وَالْشَّاهِدَةِ

فَيَسِّرْ لَكُمْ مَا كُنْتُمْ عَمَلُونَ

(صدق الله العظيم)

سورة التوبة - آية (١٠٥)

Supervisors

Prof.Dr.Ehab Hasanein

Professor of endodontics
Endodontic department,
Faculty of dentistry, Ain Shams University

Dr.Shehab Eldin M.Saber

Assistant professor of endodontics
Faculty of dentistry, Ain Shams University

Dedication

To my father and my mother, they are the source of strength and support from the early start.

To my mother, the greatest gift I had ever got from God, her name is another name for giving and love...

To my sisters, the angels with precious hearts....

To my brothers for their inspiration.....

To my best friend Amera, she always being there for me.....

To Sara and Maha for their help and positivity...

Acknowledgement

My deepest gratitude and heartfelt thanks and appreciation to Dr.Ehab Hasanein, professor of endodontics, endodontic department, faculty of dentistry, Ain Shams University for being a worthy role model and teacher to always follow and consult. I am lucky to be one of your students.

I am also grateful to Dr.Shehab Eldin M.Saber, assistant professor of endodontics, faculty of dentistry, Ain Shams University for his enthusiasm and encouragement.

I wish to thank all members of endodontics department for their highly appreciated effort.

List of contents

List of figures	i
List of tables	iv
Introduction	1
Review of Literature	3
Aim of the study	63
Materials and method	64
Results	71
Discussion	97
Summary and Conclusions	104
Reference	108
Arabic summary	

List of figures

Figure 1	Teeth positioned in round foam plates (top view)	64
Figure 2	The foam plates with teeth inserted into them (A) were positioned on the platform of the tomography apparatus PLANMECA PROMAX 3D CBCT UNIt (B)	65
Figure 3	Planmeca Romexis 3D Software	66
Figure 4	Weine's classification	66
Figure 5	CBCT images presented Weiné's classification: (A) Type I, (B) Type II, (C) Type III, (D) Type IV	67
Figure 6	Photograph for mandibular first molar showing pulpal floor after ultrasonic troughing	68
Figure 7	C+ files inserted into the root canals to determine root canals configuration: A; type II, B; type III	69
Figure 8	Pie chart representing prevalence of roots number for first molar when using CBCT	72
Figure 9	Pie chart representing prevalence of canals number at mesial root for first molar when using CBCT	72
Figure 10	Pie chart representing prevalence of canals number at distal root for first molar when using CBCT	72
Figure 11	Pie chart representing prevalence of canals type for two canaled mesial root for first molar when using CBCT	72
Figure 12	Pie chart representing prevalence of canals type for three canaled mesial root for first molar when using CBCT	72
Figure 13	Pie chart representing prevalence of canals type at distal root for first molar when using CBCT	72
Figure 14	Pie chart representing prevalence of roots number for first molar when using ex-vivo	74
Figure 15	Pie chart representing prevalence of canals number at mesial root for first molar when using ex-vivo	74
Figure 16	Pie chart representing prevalence of canals number at distal root for first molar when using ex-vivo	74
Figure 17	Pie chart representing prevalence of canals type for two canaled mesial root for first molar when using ex-vivo	74

Figure 18	Pie chart representing prevalence of canals type for three canaled mesial root for first molar when using ex-vivo	74
Figure 19	Pie chart representing prevalence of canals type at distal root for first molar when using ex-vivo	74
Figure 20	Pie chart representing prevalence of roots number for second molar when using CBCT	76
Figure 21	Pie chart representing prevalence of canals number at mesial root for second molar when using CBCT	76
Figure 22	Pie chart representing prevalence of canals number at distal root for second molar when using CBCT	76
Figure 23	Pie chart representing prevalence of canals type at mesial root for second molar when using CBCT	76
Figure 24	Pie chart representing prevalence of canals type at distal root for second molar when using CBCT	76
Figure 25	Pie chart representing prevalence of c-shaped canal for second molar when using CBCT	76
Figure 26	Pie chart representing prevalence of roots number for second molar when using ex-vivo	78
Figure 27	Pie chart representing prevalence of canals number at mesial root for second molar when using ex-vivo	78
Figure 28	Pie chart representing prevalence of canals number at distal root for second molar when using ex-vivo	78
Figure 29	Pie chart representing prevalence of canals type at mesial root for second molar when using ex-vivo	78
Figure 30	Pie chart representing prevalence of canals type at distal root for second molar when using ex-vivo	78
Figure 31	Pie chart representing prevalence of c-shaped canals for second molar when using ex-vivo	78
Figure 32	Bar chart representing comparison between molars regards number of roots when using CBCT	79
Figure 33	Bar chart representing comparison between molars regards number of canals at mesial root when using CBCT	80
Figure 34	Bar chart representing comparison between molars regards number of canals at distal root when using CBCT	80
Figure 35	Bar chart representing comparison between molars regards type of canals for two canaled mesial root (CBCT)	82

Figure 36	Bar chart representing comparison between molars regards type of canals at distal root (CBCT)	82
Figure 37	Bar chart representing comparison between molars regards c-shaped canals (CBCT)	82
Figure 38	Bar chart representing comparison between molars regards number of roots when using ex-vivo assessment	83
Figure 39	Bar chart representing comparison between molars regards number of canals at mesial root (ex-vivo)	84
Figure 40	Bar chart representing comparison between molars regards number of canals at distal root	84
Figure 41	Bar chart representing comparison between molars regards type of canals for two canaled mesial root (ex-vivo)	86
Figure 42	Bar chart representing comparison between molars regards type of canals at distal root (ex-vivo)	86
Figure 43	Bar chart representing comparison between molars regards C-shaped canals	86
Figure 44	Stacked bar chart representing comparison between CBCT and ex-vivo regards number of roots among first molars	87
Figure 45	Stacked bar chart representing comparison between CBCT and ex-vivo regards number of canals at mesial root among first molar	89
Figure 46	Stacked bar chart representing comparison between CBCT and ex-vivo regards number of canals at distal root among first molar	89
Figure 47	Stacked bar chart representing comparison between CBCT and ex-vivo regards canal type for two canaled mesial root among first molar	90
Figure 48	Stacked bar chart representing comparison between CBCT and ex-vivo regards canal type at distal root among first molar	90
Figure 49	Stacked bar chart representing comparison between CBCT and ex-vivo regards number of roots among second molar	91
Figure 50	Stacked bar chart representing comparison between CBCT and ex-vivo regards number of canals at mesial root among second molar	93

Figure 51	Stacked bar chart representing comparison between CBCT and ex-vivo regards number of canals at distal root among second molar	93
Figure 52	Stacked bar chart representing comparison between CBCT and ex-vivo regards c-shaped canal among second molar	95
Figure 53	Stacked bar chart representing comparison between CBCT and ex-vivo regards canal type at mesial root among second molar	95
Figure 54	Stacked bar chart representing comparison between CBCT and ex-vivo regards canal type at distal root among second molar	95
Figure 55	Possible locations of AMC: (A); at the center between MB and ML canals (B); close to MB canal (C); close to ML canal	96

List of tables

Table 1	Prevalence of number of roots, number of canals and canals type among first molar using CBCT assessment	71
Table 2	Prevalence of number of roots, number of canals and canals type among first molar using ex vivo assessment	73
Table 3	Prevalence of number of roots, canals and canals type among second molar using CBCT assessment	75
Table 4	Prevalence of number of roots, number of canals and canals type among second molar using ex vivo assessment	77
Table 5	Comparison between molars regards number of roots (CBCT)	79
Table 6	Comparison between molars regards number of canals (CBCT)	80
Table 7	Comparison between molars regards type of canals (CBCT)	81
Table 8	Comparison between molars regards c-shaped canals	82
Table 9	Comparison between molars regards number of roots (Ex vivo)	83
Table 10	Comparison between molars regards number of canals (Ex vivo)	84
Table 11	Comparison between molars regards type of canals (Ex vivo)	85
Table 12	Comparison between molars regards c-shaped canals (Ex vivo)	86
Table 13	Comparison between CBCT and ex-vivo regards number of roots among first molar	87
Table 14	Comparison between CBCT and ex-vivo among first molars regarding number of canals (mesial root)	88
Table 15	Comparison between CBCT and ex-vivo among first molars regarding number of canals in (distal root)	88
Table 16	Comparison between CBCT and ex-vivo among first molars regarding type of canal for two canaled mesial root	89
Table 17	Comparison between CBCT and ex-vivo among first molars regarding type of canal for three canaled mesial root	89
Table 18	Comparison between CBCT and ex-vivo among first molars regarding type of canal (distal root)	90
Table 19	Comparison between CBCT and ex-vivo among second molars regarding number of roots	91
Table 20	Comparison between CBCT and ex-vivo among second molars regarding number of canals (mesial root)	92
Table 21	Comparison between CBCT and ex-vivo among second molars regarding number of canals (distal root)	92
Table 22	Comparison between CBCT and ex-vivo among second molars regarding type of canals (mesial canal)	93
Table 23	Comparison between CBCT and ex-vivo among second molars regarding type of canals (distal canal)	94
Table 24	Comparison between CBCT and ex-vivo among second molars regarding type of canals (C-shaped canal)	94

Introduction

The study of root and canal anatomy has endodontic significance as successful root canal treatment depends on thorough mechanical and chemical cleaning and shaping and complete filling of the root canal system. Post-treatment disease occurs in many cases because the operator has failed to recognize the presence of an additional root canal. Therefore, a meticulous knowledge of the presence of unusual root canal morphology is imperative for the success of the root canal treatment.

Cone beam computed tomography (CBCT) is a recent technology that has been used in achieving the knowledge of root canal morphology, identification of anatomic features and variations of the root canal system because it provides the clinician with the ability to observe an area in three different planes and thus to acquire three-dimensional (3D) information. The combination of sagittal, coronal, and axial CBCT images eliminates the superimposition of anatomic structure. Root morphology can be visualized in three dimensions, as can the number of root canals and their convergence or divergence from each other. These advantages allow the clinician a more thorough understanding of the true morphology of root canal system and to clean, shape, and obturate it more efficiently.

Unfortunately there is no documentation of morphology of permanent teeth of Egyptians using this recent modality.

Therefore, conducting a study to analyze the internal anatomy of permanent mandibular first and second molars in an Egyptian subpopulation using CBCT was thought to be of value.

Review of Literature