Evaluation of the Accuracy of Two Impression Techniques for Angulated Implants

Thesis

Submitted for Partial Fulfillment of the Masters Degree Requirements in Crown and Bridge, Faculty of Dentistry, Ain Shams University

By:

Ola Adel Saied Farrag

B.D.Sc. (Ain Shams University, 2003)

Teaching Assistant at Faculty of Dentistry,

Future University in Egypt (FUE)

Faculty of Dentistry

Ain Shams University

2012

Supervisors:

Dr. Jihan Farouk Younes

Associate Professor of Crown and Bridge,
Faculty of Dentistry,
Ain Shams University

Dr. Tarek Salah Morsi

Associate Professor of Crown and Bridge,
Faculty of Dentistry,
Ain Shams University

Dr. Marwa Mohamed Wahsh

Lecturer of Crown and Bridge,
Faculty of Dentistry,
Ain Shams University

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ وَكَانَ فَصْلُ اللهِ عَلَيْكَ عَلَيْكَ عَلَيْكَ عَلَيْكَ عَظِيما"

صدَقَ الله العَظيم

سورة النساء أيه ١١٣

Acknowledgement

First and foremost, thanks are due to **ALLAH** the Most Gracious and the Most Merciful.

I would like to express my deepest gratitude and appreciation to **Prof. Dr. Jihan Farouk**, Associate Professor of Crown & Bridge, Faculty of Dentistry, Ain Shams University for her precious effort, meticulous advice, and her valuable comments.

I would like also to express my heartfull thanks and sincere gratitude to my mentor Prof. Dr. Tarek Salah Morsi, Associate Professor of Crown & Bridge, Faculty of Dentistry, Ain shams university, for his priceless help throughout the details of every part of this study, for his time and effort, his support and guidance, and for his continuous cooperation to complete this work.

I am especially & sincerely grateful to **Dr. Marwa**Wahsh, Lecturer of Crown & Bridge, Faculty of Dentistry,
Ain shams university, for her continuous and genuine

assistance, her encouragement and her valuable editing advices.

My personal appreciation & thanks to Dr. Hany El-Zoheiry, Assistant Lecturer of Radiology, Faculty of Dentistry, Ain shams university, for guiding me through the CBCT imaging.

I owe the credit for my study models to the creativity and patience of Mr. Saad Shawky, the acrylic specialist.

Last but not least, my special gratitude are to my colleagues in FUE & staff members of Crown & Bridge department in Ain Shams University especially **Dr. Ghada**Abdel Fattah, for standing by my side all through the course of this study.

Dedication

I herby dedicate this work to my parents and

My beloved husband

Without your help, support and

encouragement; I wouldn't have been here now.

And also to the joy of my life,

Yehia & Adam.

I owe you my life, my happiness and my success

List of Contents

List of tables	i
List of figures	ii
Introduction	1
Review of literature	3
Aim of the study	26
Materials and Methods	27
Results	65
Discussion	81
Summary	90
Conclusions	92
References	93
Arabic summary	

List of Figures

Figure No.	Title		
1	Internal Connection Dummy Implant		
2	Transfer impression coping with screw for closed technique	28	
3	Pick-up Impression coping with screw for open technique		
4	Internal connection analog	29	
5	Manual cutting of the model body	32	
6	The model body	33	
7	The laser cutting machine	33	
8	Acrylic sheet of 0.5cm thickness placed inside the cutting machine	34	
9	Assembling the acrylic parts by applying liquid chloroform through a plastic syringe	35	
10	The master model before drilling	35	
11	Diagrammatic illustration of the master model before drilling	35	
12	The drilling machine with arrow pointing to the adjustable plate	36	
13	Drilling of the center implant with the reference mark pointing to Zero	37	
14	Drilling of the angulated implant with the adjustable plate tilted and the reference mark pointing to 10	38	

15	Top view of AD master model showing the implants flushing with the top surface of the model with diverging angulation			
16	Diagrammatic illustration of AD master model a. Top view of 3D design b. Side view showing its dimensions (in cm)	39		
17	Top view of AC master model showing the implants flushing with the top surface of the model with converging angulation	40		
18	Diagrammatic illustration of AC master model a. Top view of 3D design b. Side view showing its dimensions (in cm)	40		
19	Top view of BD master model showing the implants embedded below the top surface of the model with diverging angulation	41		
20	Diagrammatic illustration of BD master model a. Top view of 3D design b. Side view showing its dimensions (in cm)	41		
21	Top view of BC master model showing the implants embedded below the top surface of the model with converging angulation	42		
22	Diagrammatic illustration of BC master model a. Top view of 3D design b. Side view showing its dimensions (in cm)	42		
23	Custom Closed tray	43		
24	Closed tray seated on a master model with transfer copings	44		
25	Custom Open tray	45		

26	Open tray seated on a master model with pick-up impression coping screws projecting through the holes of the tray		
27	Mechanical mixing unit (Pentamix 3)		
28	The elastomer syringe attached to the mixing tip of the mixing unit		
29	The impression material syringed around the impression coping		
30	The impression tray fully loaded with the impression material	48	
31	Open tray fully seated on the master model with coronal end of pick-up coping screws projecting through the openings in the tray		
32	Inner surface of open tray impression showing the pick-up copings retained inside the impression		
33	The analogs attached to the pick-up copings	50	
34	Closed tray fully seated on the master model	50	
35	Inner surface of closed tray impression	51	
36	The 3 analog/coping assemblies	51	
37	Inner surface of closed tray impression after repositing the analog/coping assembly		
38	Duplicated casts by open technique a. ADO group b. BDO group	53	
39	Duplicated casts by closed technique a. ACS group b. BCS group		

40	The 4 master models with the pick-up impression copings attached to the dummy implants a. AC group b. BC group c. AD group and d. BD group		
41	Planmeca Romexis Viewer software		
42	CBCT image of angle measurement of straight implant		
43	Diagrammatic illustration of angle measurement of straight implant		
44	CBCT image of angle measurements of angulated implants in AD model	59	
45	Diagrammatic illustration of angle measurements of angulated implants in AD model	59	
46	CBCT image of angle measurements of angulated implants in AC model	60	
47	Diagrammatic illustration of angle measurements of angulated implants in AC model		
48	CBCT image of depth measurement of straight implant		
49	Diagrammatic illustration of depth measurements of straight implant	62	
50	CBCT image of depth measurements of angulated implants in BD model	63	
51	Diagrammatic illustration of depth measurements of angulated implants in BD model	63	
52	CBCT image of depth measurements of angulated implants in BC model	64	
53	Diagrammatic illustration of depth measurements of angulated implants in BC model	64	

54	Mean depth measurements of master and experimental models regarding straight implants		
55	Mean angle measurements of master and experimental models regarding straight implants		
56	Mean depth measurements of master and experimental models regarding angulated implants		
57	Mean angle measurements of master and experimental models regarding angulated implants	71	
58	Mean dimensional changes of depth measurements of implants placed on or below the surface		
59	Mean dimensional changes of angle measurements of implants placed on or below the surface	74	
60	Mean dimensional changes of depth measurements of converging and diverging implants	76	
61	Mean dimensional changes of angle measurements of converging and diverging implants	77	
62	Mean dimensional changes of depth measurements of open and closed tray impression techniques	79	
63	Mean dimensional changes of angle measurements of open and closed tray impression techniques	80	

List of Tables

Table No.	Title	
1	Specifications of Implantium system	27
2	Experimental Factorial Design	31
3	The mean, standard deviation (SD) values and results of paired t-test for depth and angle measurements for the straight implants of the master and experimental models	66
4	The mean, standard deviation (SD) values and results of paired t-test for depth and angle measurements for the angulated implants of the master & experimental models	69
5	The mean, standard deviation (SD) values and results of Mann-Whitney U test for the effect of vertical placements on depth measurements	72
6	The mean, standard deviation (SD) values and results of Mann-Whitney U test for the effect of vertical placements on angle measurements	74
7	The mean, standard deviation (SD) values and results of Mann-Whitney U test for the effect of implant angulations on depth measurements	75
8	The mean, standard deviation (SD) values and results of Mann-Whitney U test for the effect of implant angulations on angle measurements	77
9	The mean, standard deviation (SD) values and results of Mann-Whitney U test for the effect of impression techniques on depth measurements	78
10	The mean, standard deviation (SD) values and results of Mann-Whitney U test for the effect of impression techniques on angle measurements	80