

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 فَضْلُ اللَّهِ عَلَيْكَ
عَظِيمًا”

صَدَقَ اللَّهُ الْعَظِيمُ

سورة النساء آية 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 hereby 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	Page No.
1	Internal Connection Dummy Implant	28
2	Transfer impression coping with screw for closed technique	28
3	Pick-up Impression coping with screw for open technique	29
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	39
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	45
27	Mechanical mixing unit (Pentamix 3)	46
28	The elastomer syringe attached to the mixing tip of the mixing unit	47
29	The impression material syringed around the impression coping	48
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	49
32	Inner surface of open tray impression showing the pick-up copings retained inside the impression	49
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 re-positing the analog/coping assembly	52
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	53

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	54
41	Planmeca Romexis Viewer software	56
42	CBCT image of angle measurement of straight implant	58
43	Diagrammatic illustration of angle measurement of straight implant	58
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	60
48	CBCT image of depth measurement of straight implant	62
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	67
55	Mean angle measurements of master and experimental models regarding straight implants	67
56	Mean depth measurements of master and experimental models regarding angulated implants	70
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	73
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	Page No.
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

