



The fate of the labial plate of bone in immediate implant placement (with and without bone graft), versus early implant placement protocols

Thesis

Submitted in fulfillment of the requirements for Master Degree in Oral Medicine, Periodontology and Oral Diagnosis

By

Ramy Mubarak Mohammed Hussein

B.D.Sc (Ain shams University, 2006)

Supervisors

Prof. Dr. Khaled Atef Abd el-Ghaffar

Professor and chairman of Oral Medicine, Periodontology, Oral Diagnosis and Radiology Department

Faculty of Dentistry, Ain shams University

Dr. Mohamed Sherif el-Mofty

Assistant professor of Oral Medicine, Periodontology, Oral Diagnosis and Radiology

Faculty of Dentistry, Ain Shams University

Ain Shams University

2014



دراسة مصير العظم الشفي باستخدام: الزرع الفوري، الزرع الفوري مع رقعة عظمية، والمقارنة بالزرع المبكر

رسالة

مقدمة لكلية طب الأسنان - جامعة عين شمس كأحد المتطلبات للحصول
على درجة الماجستير في طب الفم والتشخيص وعلاج اللثة

مقدمة من

الطبيب / رامي مبارك محمد حسين

بكالوريوس طب الأسنان

كلية طب الأسنان - جامعة عين شمس (٢٠٠٦)

إشراف

أ.د. خالد عاطف عبد الغفار

أستاذ طب الفم والتشخيص وعلاج اللثة

كلية طب الفم والأسنان جامعة عين شمس

د. محمد شريف المفتي

أستاذ مساعد طب الفم والتشخيص وعلاج اللثة

كلية طب الفم والأسنان جامعة عين شمس

جامعة عين شمس

٢٠١٤

Dedication

To my father and grand master of principles, ethics and hard work..

To Rana, my loving wife, for providing me the ultimate support..

To Sophie Ramy Mubarak, my biggest fan and fuel of joy..



There is not enough space to acknowledge all of those who have had an impact on this work to progress and finish so I will focus on the core.

Foremost, I am in gratitude to Professor *Dr. / Khaled Abd El Ghaffar*, Dean of Faculty of Dentistry Ain Shams University for agreeing to take me under his wing and for his aspiring guidance to finishing this thesis. I recall him saying ‘Repeat this; you are able to do it better’. His overwhelming attention to detail drove me to punctuate the cons of my work. He taught me the etiquette of patient management and fueled my passion in understanding human behavior. He provided me the access to great global icons in the field that helped me much in the study design. Through him, it was easy to choose the appropriate materials of the study by having the access to several CEOs of global implant companies.

I’m especially indebted to Assistant Professor *Dr./ Mohamed El Mofty*, Assistant Professor in the Oral Medicine, Diagnosis, and Periodontology department, Faculty of Dentistry, Ain shams University, for his keen eyes on my work and his words of wisdom. He provided me with invaluable constructive criticism in presenting my work as well as useful

recommendations in the Knowhow of defense. By the end of my work, he kept a sense of humor when I lost mine.

My sincere thanks go to my professors of Oral Medicine, Diagnosis, and Periodontology, Faculty of Oral and Dental Medicine, Future University, for providing me the time out of my working hours to finish this thesis.

I am also Thankful for Dr. Henry Salama, the former director of the Implant Research Center, and Clinical Professor in the Department of Periodontics at the University of Pennsylvania, USA, for his contribution at the time of setting the study design as well as his tips in the implant placement and radiographic imaging sections.

Dr. Markus Hürzeler, Adjunct Professor by the Albert-Ludwig's University in Freiburg, Germany has provided me with many practical and technical advices for the implant positioning and selection sections. I can never forget his eagerness in providing help by word despite the geographic barrier between us.

I can never forget to acknowledge one of the masters and mentors of Mucogingival and esthetic surgeries, Dr. Giovanni Zucchelli, Professor of Periodontology at Bologna University, Italy for his support with opinion and reference in the section of soft tissue biotype assessment and measurements.

This work wouldn't have been possible without the academic advice and financial support of my father, Professor Dr. Mubarak Hussein to whom I am really indebted.

Ramy Mubarak Hussein

ومن ثم ينزق مر التعلم ساعة..... تخرج قول الجهد طول حياته
ومن فاته التعلم وقت شبابه..... فكلير عليه اربعاً لوفاته
وفلاس الفنى والله بالعلم والنقى..... اذلا لم يكونا للاعتبار لزلاته
الإمام الشافعي

LIST OF CONTENTS

	Pages
LIST OF FIGURES	I
LIST OF TABLES	VIII
List of Abbreviations	X
Introduction	1
Review of Literature	5
Aim of the Study	48
Subjects and Methods	49
Results	99
Discussion	126
Summary	149
Conclusions	152
Recommendations	154
References	155
Arabic Summary	-

LIST OF FIGURES

Fig. No.	Figure Title	Page
1	Unfavorable Vs Excellent esthetic outcomes	1
2	Esthetic failures exist in the form of midfacial recession	6
3	Thin wall phenotype in association with IIP	7
4	No BG with a wide JGD with a CBCT follow up	10
5	BG used to fill the JGD	12
6	EIP with GBR	14
7	Loss of bundle bone followed by loss of LPB	18
8	Socket seal procedure	29
9	SCTG to correct midfacial recession	39
10	LPB preserved at the site of root fragment	45
11	Modified socket seal procedure	45
12	Root Submergence Technique	47
13	Time line for Group 1	51
14	Time line for Group 2	51
15	Time line for Group 3	52
16a	The use of periosteal elevator for severing the gingival and periodontal fibers	54
16b	The use of Remaining root forceps for tooth extraction	54
17	Calibrated probe is used in measuring the root length	55
18	Showing the hard and soft tissue condition before osteotomy preparation	56
19a	Facial view of tooth to be extracted	57
19b	Periosteal elevator severs Gingival and periodontal fibers	57
19c	Occlusal view following extraction	57
19d	Facial view following extraction	58
20	Graduated implant probe used in tooth length	58

Fig. No.	Figure Title	Page
	measurement	
21a	Manual implant driver is used to seat the implant	59
21b	Occlusal view of implant in place	59
22a	GB obtained with a periodontal probe	60
22b	Measurement transferred on a ruler	60
23a	Implant in place as viewed on CBCT	61
23b	Close up view of the readings of bone thickness on facial aspect of the implant at Baseline	61
24a	Facial view 3 months postoperatively	62
24b	Occlusal view 3 months postoperatively	62
25a	Occlusal view showing the punch applied to the implant site	63
25b	Occlusal view showing the implant before abutment connection	63
26a	Facial view showing the adjusted abutment in place	64
26b	Profile view of the connected abutment	64
27a	Facial view showing the marginal soft tissue level during recording the PES	65
27b	Facial view showing mesial papilla assessment for PE scoring	65
27c	Facial view showing distal papilla assessment for PE scoring	65
28a	Implant in situ on CBCT and KLONK measurements at 3 months postoperatively	66
28b	Close up view of the readings of bone thickness on facial aspect of the implant at three months postoperatively	66
29a	Occlusal view at 6 months postoperatively after provisional crown removal	67
29b	Facial view of the final crown	67

Fig. No.	Figure Title	Page
30a	KLONK measurement tool showing the bone thickness of the LPB at 6 months postoperatively	68
30b	Close up view of the readings of bone thickness on facial aspect of the implant at six months postoperatively	68
31a	Facial view of a non salvageable remaining root	69
31b	Occlusal view of the remaining root to be extracted	69
32	Calibrated probe used in obtaining root length	70
33a	Occlusal view of the surgical site following extraction	70
33b	Facial view of the paralling pin in place	70
34a	Xenograft mixed with sterile saline	71
34b	Bone graft in sit	71
35a	Implant in place as viewed on CBCT	72
35b	Close up view of the readings of bone thickness on facial aspect of the implant at Baseline	72
36a	Facial view of the implant three months postoperatively	73
36b	Occlusal view of the implant three months postoperatively	73
36c	Adjusted anatomical abutment in situ	74
36d	Provisional crown in situ	74
37a	Implant in situ on CBCT and KLONK measurements at 3 months postoperatively	75
37b	Close up view of the readings of bone thickness on facial aspect of the implant at three months postoperatively	75
38	Final crown in situ	76
39a	KLONK measurement tool showing the bone thickness of the LPB at 6 months postoperatively	76
39b	Close up view of the readings of bone thickness on	76

Fig. No.	Figure Title	Page
	facial aspect of the implant at six months postoperatively	
40a	Facial view of the Remaining root to be extracted	77
40b	Periotomes used in severing the gingival and periodontal fibers	77
40c	Surgical site following extraction	78
41	Remaining root following extraction	78
42a	Mucosal thickness obtained at a point during ridge mapping	79
42b	Transfer of explorer readings on a sewed study ridge on the cast	80
43a	Facial view for the healed extraction site 6 weeks post operative	81
43b	Occlusal view for the healed extraction site 6 weeks post operative	81
44a	Occlusal view following the pouch preparation	81
44b	Facial view of the papilla elevator extending the reflection mesially	82
45a	prepared particulate Xenograft with sterile saline	83
45b	Occlusal view for the implant in situ	83
45c	Trimmed and Moistened collagen barrier membrane	84
45d	Barrier membrane introduced in the pouch	85
45e	Occlusal view following implant, bone and membrane placement	85
46	Facial view suturing	86
47a	Implant in place as viewed on CBCT	86
47b	Close up view of the readings of bone thickness on facial aspect of the implant at baseline	87
48a	Facial view 3 months post implant insertion	87
48b	Occlusal view showing Implant exposure	88

Fig. No.	Figure Title	Page
49a	Facial view showing abutment in situ	88
49b	Facial view showing the provisional crown in place	88
49c	Profile view showing the emergence profile of the temporary crown	89
50a	Implant in situ on CBCT and KLONK measurements at 3 months postoperatively	89
50b	Close up view of the readings of bone thickness on facial aspect of the implant at three months postoperatively	89
51	Facial view for the final crown in place	90
52a	KLONK measurement tool showing the bone thickness of the LPB at 6 months postoperatively	90
52b	Close up view of the readings of bone thickness on facial aspect of the implant at six months postoperatively	90
53a	Snap shot obtained by windows snipping tool from the i-CAT software	92
53b	Three parallel lines are extended from the implant platform parallel to the implant length tangent. Lines have lengths of 2,4, and 6 mm	93
53c	Three perpendicular lines are extended from the drawn lines towards the LPB	94
53d	Horizontal lines were adjusted in length to extend from the implant surface to the external surface of the LPB	94
53e	A mouse pen was used on a graphic tablet to trace the surface of the LPB	95
53f	After zooming in, the lengths of the three horizontal lines were calculated by the program according to the preset scale (implant length)	95
53g	Final image of the traced CBCT section	96

Fig. No.	Figure Title	Page
54	Illustration for the different variables used in PES scoring	97
55	The mean change in height of LPB for each group.	101
56	The mean loss in the height of labial plate of bone calculated for the first group was statistically significant ($p= 0.017$) in comparison with the other two groups.	102
57	Changes in the mean bone height during follow up for all groups	103
58	The mean thickness of the LPB for the three groups at 2 mm from the implant platform at baseline.	105
59	The mean thickness of the LPB for the three groups at 4 mm from the implant platform at baseline.	106
60	The mean thickness of the LPB for the three groups at 6 mm from the implant platform at baseline.	108
61	The Range of thickness of the LPB for the three groups at 2 mm from the implant platform through follow up period of the study.	109
62	The mean changes in bone thickness at 2mm during follow up period for all three groups.	110
63	The Range of thickness of the LPB for the three groups at 4 mm from the implant platform through follow up period of the study.	111
64	The mean changes in bone thickness at M during follow up period for all three groups.	64
65	The Range of thickness of the LPB for the three groups at 6 mm from the implant platform through follow up period of the study.	113
66	The mean changes in bone thickness at A during follow up period for all three groups.	114

Fig. No.	Figure Title	Page
67	Descriptive analysis for the distribution of patients according to GB	115
68	The effect of GB on the mean changes of Labial bone height as well as thickness at C, M, and A through follow up.	119
69	The mean PES for the three groups at 3 and six months	120
70	The mean change in PES for all three groups through follow up.	121
71	The effect of groups on the mean VAS values by the end of the study.	122
72	The correlation between the GB and the mean changes in bone height through follow up	123
73	Showing the correlation between the GB and the mean changes in bone thickness 2 mm from the implant platform through follow up.	124
74	The correlation between the GB and the mean changes in bone thickness 4 mm from the implant platform through follow up.	124
75	The correlation between the GB and the mean changes in bone thickness 6 mm from the implant platform through follow up	125

LIST OF TABLES

Table No.	Title	Page
(1)	Types of implant placement	5
(2)	Extraction socket classification by Elian	24
(3)	The variables used in calculating Pink Esthetic Score	98
(4)	Cause of tooth extraction and implant distribution in group 1, 2 and 3.	100
(5)	Descriptive statistics and test of significance for the effect of groups on the mean change in LPB height during the follow up period.	102
(6)	Descriptive statistics on the mean change in LPB height in relation to the GB.	103
(7)	Descriptive statistics and mean for bone thickness recorded for the three groups at Baseline.	104
(8)	Descriptive statistics and mean for bone thickness recorded for the three groups at 3 months.	106
(9)	Descriptive statistics and mean for bone thickness recorded for the three groups at 6 months.	107
(10)	Descriptive analysis and test of significance for the effect of groups on the mean changes in bone thickness at C during follow up period.	109
(11)	Descriptive analysis and test of significance for the effect of groups on the mean changes in bone thickness at C during follow up period.	111