## Effect of the Degree of Palatal Coverage on the Crestal Bone Height of Implant Retained Maxillary Overdenture

#### **Thesis**

Submitted to the Removable Prosthodontic Department Faculty of Dentistry, Ain Shams University, for Partial Fulfillment of the Requirements for the Doctor Degree in Oral and Maxillofacial Prosthodontics

By

Magda Hassan Mohammed Hassan

B. D.S., (2006)

M.D.S., (2012)

Ain Shams University

**Faculty of Dentistry** 

**Ain Shams University** 

2016

### **Supervisors**

Prof. Dr. Marwa Ezzat Sabet

Chairman of Removable Prosthodontics

Faculty of Dentistry

Ain Shams University

### Dr. Mahmoud El Moatassem Be Allah Al Homossany

Lecturer of Removable Prosthodontics

Faculty of Dentistry

Ain Shams University

### Dr. Shimaa Lotfy Mohamed

Lecturer of Removable Prosthodontics

Faculty of Dentistry

Ain Shams University



# Acknowledgement

First of all, I thank Allah for his great support in accomplishing this work.

I would like to express my most sincere gratitude and deep appreciation to **Prof. Dr. Marwa Ezzat Sabet.** Chairman of Removable Prosthodontic, Faculty of Dentistry, Ain Shams University for her generous support, faithfull supervision and valuable guidance through the whole study.

My deepest thanks and appreciation to **Dr. Mahmoud El Moatassem Be**Allah Al Homossany, lecturer of Removable Prosthodontic, Faculty of
Dentistry, Ain Shams University for his remarkable help, valuable advice,
constant support and encouragement during the course of this study.

I am extremely grateful to **Dr. Shimaa Lofty Mohamed** lecturer of Removable prosthodontics, Faculty of Dentistry, Ain ShamsUniversity, for her support and help to bring out this piece of work and from whom I learnt a lot of patience and accuracy.

Last but not least, I would like to thank all staff members of Prosthodontic Department, Faculty of Dentistry, Ain Shams University for their constant care, support, encouragement and assistance.

Magda Hassan mohamed



DedicationTo

My dear father

My great mother

My Lovely husband Ahmed

My little angles Abdallah

Basmala and Rinad

# تأثير درجة تغطية سقف الحلق على الحافة العظمية المحيطة بالغرسات السنية الداعمه للأطقم الكاملة العلوية المحمولة

الأسنان طب بكلية الصناعية لقسم الاستعاضة مقدمة رسالة على درجة الدكتوراه في للحصول شمس عين جامعة

الاستعاضة الصناعية للفم والوجه والفكين

مقدمة من

الطبيب:ماجدة حسن محمد حسن

بكالوريوس ٢٠٠٦ ماجستير ٢٠١٢ جامعة عين شمس

> كلية طب الاسنان شمس عين جامعة

> > 7.17

### المشرفون

ا.د./مروة عزت ثابت

أستاذ و رئيس قسم الاستعاضه الصناعيه كليه طب الاسنان جامعه عين شمس

د/محمود المعتصم بالله صلاح الدين الحمصائى مدرس بقسم الاستعاضه الصناعيه كليه طب الاسنان جامعه عين شمس

د/شیماء لطفی محمد مدرس بقسم الاستعاضه الصناعیه کلیه طب الاسنان جامعه عین شمس

## LIST OF THE CONTENTS

List of Figures	iii
List of Tables	V
Introduction	1
Review of Literature	3
Pattern of resorption of edentulous maxilla	3
Treatment planning of the edentulous maxilla	4
Treatment options of the edentulous maxilla	5
I- Conventional denture	
II-Fixed-detachable prosthesis retained by implants	5
III-Implant- fixed prosthesis	7
IV-Implant assisted overdenture	8
Classification of implant supported overdenture	9
Classification of dental implants	11
I - Surgical stage	11
II-Loading strategies.	11
III-Implant diameter	12
Hybrid implants	14
Factor affecting implant success in edentulous maxilla:	
a) The quality of the host site (bone density)	15
b) Implant number	17
c) Implant location	17
d) Implant length	18
e) Macroscopic and microscopic nature of implant	20
Biomechanical consideration for hybrid implants success	21
Attachments	21
Attachments used for implant supported overdenture includes:	23
a) Stud attachment	24
b) Bar attachment	25
C) Magnetic attachments	25
Palatal coverage	27
Radiographic techniques for implant evaluation	29
a) Conventional radiography	30
I) Intraoral conventional radiography	37
II) Extraoral conventional radiography	38 38
b) Digital radiography	39
I) Intraoral digital radiography	40
II) Extr aoral digital radiography	41
	41
<b>❖</b> Aim of the study	46
★ Materials and Method	47

<b>*</b>	Results	71
	Discussion	85
	Summary	96
	Conclusions	98
	References	99
	Arabic summary	

## **List of Figures**

Figure	Page	
Fig. 1:	Completely edentulous maxilla opposed by four Mini implant supported overdenture	52
Fig. 2:	Checking complete denture in the patient mouth	52
Fig. 3:	Radiographic stent with gutta perch	53
Fig. 4:	Cone beam radiograph	53
Fig. 5:	Modification of radiographic stent into surgical stent	53
Fig. 6:	Straight /Tapered thread implant 3mm in -diameter and 13mm in length	58
Fig. 7	Implant surgical kit	58
Fig. 8:	Unilateral crestal incision	59
Fig. 9:	Reflection of flap using mucoperiostealelevator	59
Fig. 10:	Measuring bone width with bone caliber	59
Fig. 11:	Drilling of bone by pilot	60
Fig. 12:	Second implant positioning, flap repositioninand suturing	60
Fig. 13:	Incision of the other side and positioning of thirdImplants	60
Fig. 14:	Mucoperiosteal flap repositioned	61
Fig. 15:	Maxillary denture with complete palatal coverage (group!)	63
Fig.16:	Complete denture modification into partial palatal coverage (groupII)	63

Fig. 17:	Four implants after suture removal	63
Fig. 18:	Relieved areas corresponding to the inserted implants in	
1 ig. 10.	group I and II	64
Fig. 19:	Implant housings and plastic shim	64
Fig. 20:	Elastomeric shims and Metal housings in place in patient mouth	64
Fig. 21:	Denturein place to insure complete setting	65
Fig. 22:	Metal housing in proper position in group I, II	65
Fig. 23:	Cone beam CT machine	69
Fig. 24:	Rotation of the axial image as the coronal plane passing	
	through the long axis of theimplant	69
Fig. 25:	Measurement of bone height in buccal and palatalsurfaces	70
Fig. 26:	Measurement of bone height in mesial and distalsurfaces	70
Fig. 27:	Measurement of bone height distal to the last implants in both side	70
Fig. 28:	Mean values (mm) of peri-implant bone height at mesial, distal,	74
	buccal, and palatal surfaces for group I during the follow up period	
Fig. 29:	Mean values (mm) of bone height change on the distal part of the ridge for group I during the follow up period	75
Fig. 30:	Mean difference values (mm) of peri-implant bone height at mesial, distal, buccal, and palatal surfaces for group II during the follow up	78
	period	
Fig.31:	Mean values (mm) of bone height change on the distal part of the ridge for group I during the follow up period	<b>7</b> 9

Fig.32:	Mean difference value (mm), standard deviation (SD) of peri-implant bone height change measured at mesial, distal, buccal and lingual surfaces for group I and II patients during the follow-up period	81
Fig.33:	Total peri-implant bone height loss in both groups	83
Fig 34:	Total bone height loss in the distal part of the ridge in both groups	84

## LIST OF TABLES

Table No.	Description	Page
Table (I)	Mean difference value, standard deviation of peri-implant bone height in group I measured at all surfaces during the follow—up period.	72
Table (II)	Mean difference value, standard deviation on the distal part of the dge in group I during the follow –up period.	75
Tables (III)	Mean difference, standard deviation and P value of annova test of peri-implant bone height loss in group II measured at all surfaces during the follow –up period.	76
Table (IV)	Mean difference, standard deviation and P value for paired T-test on the distal part of the ridge in group II during the follow –up period.	78
Table (V)	Mean difference (mm), standard deviation (SD) and P value for T-test of peri-implant bone height change measured at mesial, distal, buccal and lingual surfaces for group I and II patients during the follow-up period.	80
Table (VI)	Mean difference value (mm), standard deviation (SD) and P value of T test of peri-implant bone height change for group I	82

and II patients during the follow-up period.

Table (VII) Mean difference value (mm), standard deviation (SD) and P value of T 83 test of peri-implant bone height change for group I and II patients during the follow-up period.

Introduction

### Introduction

Edentulous patients often experience problems with their complete dentures. A lack of stability and retention of their denture, together with a decreased chewing ability, are the main complaints of these patients.

Success rates in the maxilla are significantly different than in the mandible and have been related to differences in anatomy, bone quality and quantity, biomechanics, phonetics, and aesthetic requirements. A great diversity of opinions exists regarding treatment of the maxilla, and many fundamental questions remain unanswered. (1)

Success rates reported for implant-supported and implant-retained overdentures still under investigation, higher failure rates in the maxilla are common to both fixed and removable prostheses. Furthermore, some implants don't meet the advocated minimally acceptable criteria for implant success. (2)

The Hybrid and Mini implant have been approved for a long-term use in 1997 by the FDA, hybrid implant have recently show high success rates in using as a transitional fixation, orthodontic anchorage and in ridges with low bone quantity as narrow inter dental spaces areas, knife edge ridges, and immediately loaded implant-supported overdentures. Hybrid implant is indicated in cases with inadequate bone in a facio-lingual dimension, and when patients refuse significant bone grafting procedures giving the opportunity for more patients with severe cases to gain implant therapy

Implant numbers needed to support maxillary overdenture is not determined. A minimum of four implants is often recommended for support or retain maxillary-overdenture. The increased number of implants in maxilla