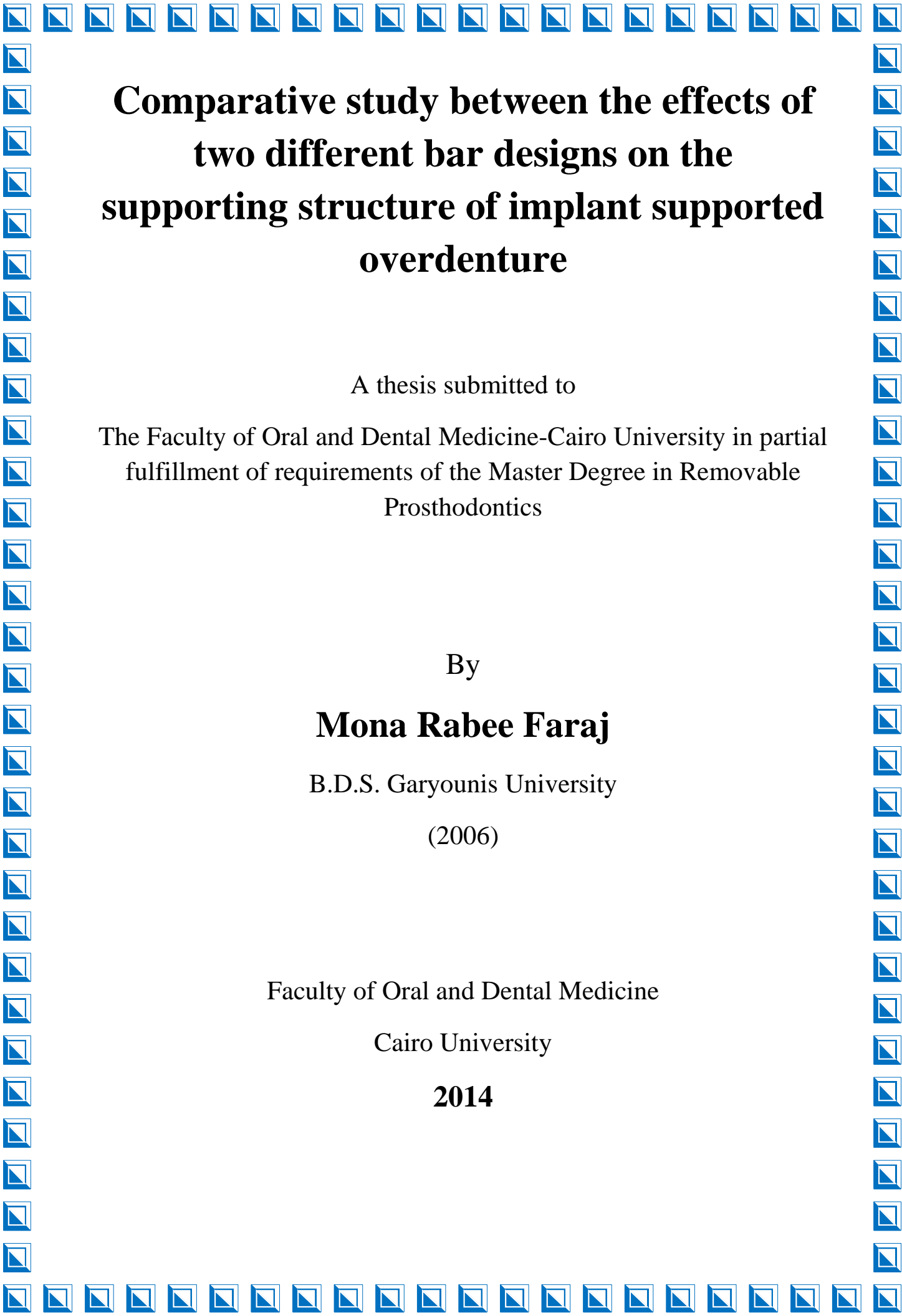


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

رب اشرح لي صدري ويسر لي أمري
واحلل عقدة من لساني يفقهوا قولي
صدق الله العظيم

[طه: 25-28]



Comparative study between the effects of two different bar designs on the supporting structure of implant supported overdenture

A thesis submitted to

The Faculty of Oral and Dental Medicine-Cairo University in partial
fulfillment of requirements of the Master Degree in Removable
Prosthodontics

By

Mona Rabee Faraj

B.D.S. Garyounis University

(2006)

Faculty of Oral and Dental Medicine

Cairo University

2014



Supervisors

Prof. Dr. Hamdy Abu Al Foutoh Hamed

Professor of Removable Prosthodontics Department

Removable Prosthodontics Department

Faculty of Oral and Dental Medicine

Cairo University

Dr. Mohamed Farouk Abdullah

Lecturer of Removable Prosthodontics Department

Removable Prosthodontics Department

Faculty of Oral and Dental Medicine

Cairo University



Dedication

*To my wonderful parents, who were always
there with their love endless support and
sacrifice throughout my life. Thank
you both for giving me strength
that kept me going and without
your encouragement after
ALLAH, this work
would have not
been possible*

Acknowledgment

First of all, I would like to thank **ALLAH** for blessing me with an elaborative network of teachers, mentors, colleagues, family and friends.

I want to thank **Prof. Dr. Hamdy Abu Al Foutoh Hamed** Professor of Removable Prosthodontics Department Removable Prosthodontics Department Faculty of Oral and Dental Medicine Cairo University He has always been there for me, as my mentor, and trustworthy friend. All the words cannot express my appreciation for his treasured help.

I want to thank **Dr. Mohamed Farouk Abdullah** Lecturer of Removable Prosthodontics Department Removable Prosthodontics Department Faculty of Oral and Dental Medicine Cairo University for her acceptance to continue and finish this study with me.

LIST OF CONTENTS

	Page No.
List of Tables	i
List of Figures	ii
Introduction	1
Review of Literature	2
Aim of the study	54
Patients and Methods	55
Results	78
Discussion	85
Summary and Conclusions	93
References	95
Appendix	123
Arabic Summary	

List of Tables

Table No.	Title	Page No.
1	One-way ANOVA evaluating effect of time on bone height in each group and independent student “t” test comparing both groups at each interval.	78
2	One-way ANOVA evaluating effect of time on bone density in each group and independent student “t” test comparing both groups at each interval	80
3	Independent student “t” test comparing change in bone height and bone density (mean difference) in both groups	82

List of Figures

Figure No.	Title	Page No.
1.	Pre-operative view for one of selected cases	57
2.	Pre-operative panoramic radiograph (1:1)	57
3.	Lower and upper alginate primary impression	58
4.	Upper and lower zinc oxide and Eugenol final impression	59
5.	Sterolithographic surgical guide	60
6.	Root form implants 3.7 diameter and 11.5 length	61
7.	High torque surgical motor	61
8.	Surgical kit	62
9.	Surgical stent firmly seated on mandibular ridge	63
10.	site of implants placement	64
11-a	Drilling of implant ostetomy with surgical guide and key in place	64
11-b	Drilling of implant ostetomy with surgical guide and key in place	65
12.	Paralleling rods to evaluate parallelism of prepared implant sites.	65
13.	Implant inserted to it`s bed manually	66
14.	Implant fixed by ratchet	66
15-a	Implant top flushed with alveolar bone surface	67
15-b	Implant top flushed with alveolar bone surface	67
16.	Rubber base impression with transfer copies	68
17-a	Screwing the retaining screws of transfer coping	68

17-b	Removed transfer coping	68
18.	Master cast with fixture analoge	69
19.	Finished and polished fabricated bar	70
20.	Denture with relief area to accommodate the bar attachment	71
21.	Check up the bar in patient mouth	71
22.	Plastic clip on the bar attachment	72
23.	Finished and polished denture	73
24.	Image acquisition using i-CAT CBCT machine	76
25.	Axial reference lines	76
26-a	Measurement of bone height (mesial and distal)	77
26-b	Measurement of bone height (buccal and lingual)	77
27.	Measurement of bone density	77
28.	A bar chart showing mean values of bone height in both groups throughout the study period.	79
29.	Effect of time on bone height in each group	79
30.	A bar chart showing mean values of bone density in both groups throughout the study period	81
31.	Effect of time on bone density in each group	81
32.	A bar chart showing mean change of bone height in both groups	82
33.	A bar chart showing mean change of bone density in both groups	83

INTRODUCTION

Edentulism is considered a poor health outcome and may compromise quality of life. The prosthetic management of the edentulous patient has long been a major challenge for dentistry.

The classical treatment plan for the edentulous patient is the conventional complete removable maxillary and mandibular denture. However, this treatment has several drawbacks specially that of the lower denture.

Treatment of edentulous patients with implant-retained removable prostheses has been shown to provide a predictable and successful outcome that overcomes the functional deficiencies that are associated with conventional dentures.

Recently the most basic restoration for the edentulous mandible should be an implant retained overdenture with two implant placed in the anterior mandible. In completely edentulous patients, implants can be used in conjunction with attachments to enhance the retention and stability of the overdentures.

Different types of attachments systems had been suggested for retaining implant supported overdentures including stud, bar, telescopic and magnetic attachments. All these types of anchorage systems had different retentive capacities and have it's effect on supporting structures of implant, Thus, the present study is designed to compare the effect of two different bar design on implant supporting structure.

REVIEW OF LITERATURE

Problems of the Conventional Complete Denture

The factors that adversely affect successful use of a complete denture on the mandible include: mobility of the floor of the mouth, thin mucosa lining the alveolar ridge, reduced support area and the movement of the mandible (**Chee and Jivraj 2006**).

Removable complete dentures have been considered as a traditional and common way to restore edentulous patients.

Edentulous patient with severely resorbed mandible often experience problems with their conventional complete denture, especially with regard to mandibular denture. These problem include: difficulty with prosthesis retention, stability and comfort .this in turn may negatively affect functional ability such as speech, aesthetic and mastication (**Hutton et al. 1995, Block et al. 1998**).

Furthermore, when complete dentures lack sufficient retention they continuously drag over mucosal tissue .This may lead to tissue irritation and its corresponding to changes as hyperplasia and/or inflammation (**Van der Wal and Van der Kuij I, 1994**).

The increased mobility of conventional complete dentures not only affects the masticatory function, but also adversely affects the patient's confidence and social life (**Yoshida et al. 2001**).

The problems of conventional complete dentures can be summarized as continued alveolar bone loss leading to lack of stability and retention

especially of the lower denture which in turn causes lack of self-confidence and reduction in biting force and chewing efficiency, so most difficulty with complete denture prostheses arises from the inability to function with the mandibular prostheses. **(Doundoulakis et al. 2003).**

Dental implants

Dental implant can be defined as prosthodontics device made of alloplastic material implanted into the oral tissue beneath the mucosal and/or the periosteal layers and/or within the bone to provide retention for fixed or removable prosthesis (**Academy of prosthodontics, 2005**).

Classification of dental implants

Branemark et al. (1977) and Worthington (1988) have classified the dental implant according to anatomical relation to bone into:

- **Endodontic stabilizer**

Craninet al. (1999) stated that it is smooth or threaded metal pin implant that extends through the root canal into the periapical bone to stabilize the mobile tooth.

- **Mucosal inserts**

Weiss and Judy (1975) defined it as collar-button shaped titanium projection attached to the fitting surface of the prosthesis. These projections mechanically engage into surgically prepared soft tissue folds in the mucosa.

- **Subperiosteal implant**

It has been defined by (Academy of prosthodontics,2005) as cast metal framework that fits on the residual ridge beneath the periosteum and provides support for a dental prosthesis by means of posts or other mechanisms protruding through the mucosa.

– **Distraction implant**

It was introduced according to the (**Academy of prosthodontics, 2005**) classification of dental implant, who noted that the alveolar ridge distraction has been introduced for augmentation of the atrophied mandible or maxilla by the use of distraction implants, made of titanium and contain two mobile endosteal parts. It combines the qualities of screw implant with those of a callus distraction device, which heightens the alveolar ridge.

– **Endosteal dental implant**

It is placed into the alveolar and/or basal bone of mandible or maxilla and transecting only one cortical plate.

According to the **Academy of prosthodontics, 2005** it is composed of an anchorage component, implant body placed in the bone, a retentive component, implant abutment connected to the implant body passing through the oral mucosa to retain and support the prosthesis.

Classification of endosseous dental implant

– **Transosteal dental implants**

According to **Academy of prosthodontics (2005)** they are composed of a metal plate with retentive pins to attach it to inferior border of the mandible, that support transosteal threaded posts that penetrate the full thickness of mandible to the oral cavity in parasymphysal region.

– **Ramus blade and ramus frame implants**

(**Richard, 1992**) described it as attached in part to the mandibular ramus. Ramus blade implant is one piece system made of chromium-nickel based

alloy. The ramus frame is a triple-blade one piece device designed for relatively atrophied mandibles.

– **Blade form implant**

Craninet al. (1999) described it as it composed of abutment head, neck, body vents and a recess in the shoulder. It is wedge shaped, buccolingually narrowed dental implant bodies with the widest dimension at the shoulder and narrowest dimension at apical end, with vents through which tissue may grow. They are mainly indicated in knife edge ridges, especially for posterior free end saddle areas of mandible.

– **Root-form implants.**

It is endosteal implant shaped In the approximate form of a tooth root This implant requires a vertical column of bone (more than 13mm vertical height and more than 6mm buccolingual). They are preferred over other types due to better stress distribution, abutment designs, and faster healing, good esthetics, and less skill requirements (**Cranin and Klein, 1993**).

Classification of root form implants

a- According to design

Root form implants are either cylinder or screw in form. Cylinders may be tapered, may have external threads or hollowed with fenestrations called baskets; solid may have external fins rather than threads (**Misch, 2005**).