The Effect of Three Attachment Types on the Retention Characteristics and Load Distribution in Implant Supported Mandibular Overdentures (In-vitro Study)

Thesis
Submitted to Faculty of
Oral and Dental Medicine
Cairo University
In

Partial Fulfillment of the Requirements of
Master Degree in Prosthodontics

By

KHALED AZIZ A. WAHAB DEABES
B.D.S (Cairo University)

٢٠٠٨

Supervisors

Dr. Khaled A. Zekry

Professor of Removable Prosthodontics

Faculty of Oral and Dental Medicine

Cairo University

Dr. Azza Abd Elzaher Hashim

Professor of Bio-Dental Materials

Faculty of Oral and Dental Medicine

Cairo University

ACKNOWLEDGMENT

This Work would not have been possible without faith, belief and continuous guidance from ***GOD****, to whom we owe our very existence and all our knowledge.*

I would like to express my deepest gratitude to my professor, ***Dr. Khaled Zekry****. Professor of Prosthodontics, Cairo University, for his valuable help and priceless advice, and for all the patience and kind encouragement he had shown me throughout this work.*

I am also sincerely grateful to ***Dr. Azza Hashim****, Professor of Dental Bio-materials, Cairo University, for her dedication, through observation and excellent suggestions along the course of this study.*

I would like to express my deepest appreciation to ***DR. Iman Abd El Wahab****, lecturer of Prosthodontics, Cairo University, for her generous assistance, continuous guidance and kind encouragement throughout this work. I will remain thankful for her.*

I wish to express my deepest appreciation to ***Dr. Mohamed Salah****, Lecturer of Dental Bio-materials, Ain Shams University, for his interest valuable advice and for the time he devoted during the practical part of this study.*

Last but not least, many thanks to all my friends and colleagues in the department of Prosthodontics for their continuous encouragement and support.

To my dearest ***mother, father*** *and* ***brother*** *for their continuous love and support all the way along.*

I can not find sufficient words to express my deepest gratitude to my lovable wife ***Dalia*** *for her love and generous support during difficult times in my life.*

To my adorable son ***Hassan*** *who brings joy and happiness to all the people around.*

Khaled Aziz Deabes

CONTENTS

Contents

List of Tables

List of Figures

INTRODUCTION

Introduction

Most of the completely edentulous patients turned to be dissatisfied with their dentures, especially the mandibular one. By time, the complete denture proved not to be the ideal treatment modality from the patient's perspective, due to lack of good retention and stability, increased denture movements, which leads to mucosal irritation and marked decrease in the masticatory performance. It must be accepted, that patient who wear complete denture will experience considerable difficulty adapting to their prostheses. Other patients may be adaptive for several years, but may loose adaptation later on as a result of regressive tissue changes. Other people may perfectly adapt but regret that this is the only treatment option **(Boerrigter et al, ١٩٩٥; Zarb et al, ١٩٩٧ and Steffen et al, ٢٠٠٤).**[١٦-١٨٦-١٥٥]

With the introduction of endosseous implants, implant-supported overdentures appeared as a useful treatment modality for comprised completely edentulous patients.

Various alternatives of anchorage systems had been suggested for retaining implant-supported overdentures including ball and socket, bar and magnetic attachments. All these types of anchorage systems have different patterns of stress distribution to the supporting structures, as well as different capacities for retaining the overdenture. An ultimate goal during implant-supported overdenture construction would be to minimize the stresses transmitted to the implants and residual alveolar ridge as well as provide well retained overdenture **(Frederick and Caputo, ١٩٩٦).**[٥٣]

Thus, a question arises, which attachment type provides the optimal stresses distribution to the supporting structures and is there any difference in their retentive capacities?

REVIEW OF LITERATURE

Review of literature

The complete loss of teeth is a great problem that might faces people especially at old age that may result in decreased masticatory function, loss of vertical dimension, defective speech, psychological problems and change in dietary selection leading to impaired nutritional status.

The conventional treatment for all edentulous patients was to fabricate a complete denture, but by time, this treatment modality did not prove to be an ideal one. The success of this treatment is influenced by many factors, for example; patient's motivation, psychology, neuromuscular ability and oral perception. One of the problems facing the dentist in complete denture construction is the change in the mechanism of support when natural teeth are replaced by artificial ones **(Budtz-Jorgenson, ١٩٩٩ and Zarb et al, ١٩٩٧).**[١٨٦-٢١]

Mish et al, ١٩٩٩ [١١٠] preformed a study of ١٠٤ completely edentulous patients seeking complete dentures. In this study, ٨٨% of the patients claimed difficulty with speech, ٦٣.٥% complained of mandibular discomfort, ٦٢.٥% of them complained of the movement of the lower denture although the maxillary one stayed in place, ٥٠% of the patients avoided many foods, ١٧% claimed they were able to masticate more effectively without the prosthesis and ١٦.٥% stated they never wear the denture.

Nevertheless, many authors reported that the average annual alveolar ridge resorption was approximately ٠.٤ mm in the anterior area of edentulous mandible. This resulted in many consequences including loss of vertical dimension, anterior positioning of the mandible and subsequent

changes of jaw relationship **(Atwood et al., ١٩٧١; Tallgren, ١٩٧٢ and Owell et al, ١٩٩٦).** [٥-١٦٠-١٢٣]

Redford et al (١٩٩٦) [١٣٩] showed that over ٥٠% of mandibular complete dentures have problems with retention and stability. A cross arch comparison showed that mandibular denture treatment produced more problems than the maxillary one did, due to lack of retention.

Completely edentulous patients often complain that dentures are loose causing discomfort, pain and difficulty during mastication and speech. Such complaints are always attributed to lake of retention and stability **(Smith et al, ١٩٨٨ andOwell et al, ١٩٩٦).** [١٥٢-١٢٣]

There is always a relationship between denture retention and stability as for a denture to be stable it should be retentive and should have adequate support. Retention could be compromised by many factors related to the anatomy of the patients and other factors related to the denture construction. Consistency and film thickness of saliva is a factor as very viscous saliva is associated with relatively poor retention due to the discontinuous film of saliva between the denture and the mucosa. Absence of bony undercuts might lead to defective retention. Ridge form also affects retention as the denture is more retentive in well developed ridges than in atrophied ones. As well as tongue size and mobility affects the retention of the lower denture as big and hypermobile tongue leads to continuous denture dislodgment during function. Shape of the polished surface is a very important factor in denture retention as it should have proper and harmonious slope to conform to the surrounding muscles. Faulty impression, lack of border seal, over or under extensions or uncompensated polymerization shrinkage which may leads to poor fit are factors that