Effect of the degree of palatal coverage on retention of implant retained maxillary overdenture

A thesis submitted to the Faculty of Dentistry,
Ain Shams University in Partial Fulfillment of the requirement for the Master Degree in Oral and Maxillofacial Prosthodontics

By

Mahmoud Amin Mohamed

B.D.S, (2009)

Ain Shams University

Faculty of Dentistry

Ain Shams University

2016

SUPERVISORS

Prof. Dr. Marwa Ezzat Sabet

Chairman of Removable Prosthodontics Department

Faculty of dentistry

Ain Shams University

Dr. Mohamed Shady Nabhan

Lecturer of Prosthodontics

Faculty of Dentistry

Ain Shams University

Acknowledgement

First of all, I would like to express my sincere thanks to ***Allah*** *to whom I relate any success achieved in every work in my life.*

I would like to express my great thanks and feeling of gratitude to ***Prof. Dr. Marwa Ezzat Sabet,*** *chairman of removable prosthodontics department, Faculty of Dentistry, Ain Shams University, for her valuable advice, great effort in planning and revising this study, her meticulous supervision, endless understanding and patience.*

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

I would also like to express my deepest appreciation and thanks to all staff Members of the removable prosthodontics department, Faculty of Dentistry, Ain Shams University, for their encouragement and support.

Finally, I would like to thank my family members for their sacrifice, endless support and providing me with prayers that blessed my work.

Mahmoud Amin Faty

LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Introduction

For many decades conventional complete denture was the treatment of choice for completely edentulous patients. Later a tendency toward using dental implants to support mandibular dentures was developed to overcome lower denture instability and looseness.

Retention of maxillary complete denture is highly dependent on the posterior denture border and maximum palatal coverage. When the denture border is terminated on soft displaceable tissue, a border seal may be created and the resistance to displacing forces increased.

The elements of adhesion, cohesion, and interfacial force that underlie retention are proportional to the area of supporting tissue covered by the denture base. Therefore, to achieve maximum retention and support, denture bases must extend as far as possible without interfering with the functions of the oral tissue.

However, this extension could result in gagging and may affect phonation, taste sensation, hygiene and even mastication. These drawbacks of complete palatal coverage adversely affect the acceptance of maxillary conventional complete denture as a treatment option for edentulous maxilla.

Several attempts were done to remove or decrease palatal coverage of maxillary complete denture without adversely affecting denture retention. Dental implants can be used to support and retain maxillary overdentures so as to increase their retention, stability and masticatory efficiency and thus dentures retention can depend on mechanical attachment of implants rather than physical means enhanced by extended palatal coverage and

thus palatal coverage can be removed or decreased without affecting retention.

Regarding implant-retained maxillary overdentures there is a lack of an ideal treatment concept and specific guidelines for the number of implants necessary to support a maxillary overdenture or the degree of palatal coverage.

Thus the question that this study was done to answer is ‘can we totally or partially remove the palatal portion of maxillary implant overdenture retained by four unsplinted anterior implants without affecting its retention? ’.

Review of literature

Edentulism

Edentulism is defined as loss of all permanent teeth. Complete edentulism is the terminal outcome of a multifactorial process involving biological factors and patient-related factors.(1)

Prevalence of edentulism

It is conservatively assumed that 10% of the world's population of 6 billion is partially or totally edentulous. Which means that there are millions of edentulous people worldwide who need treatment for a condition that can represent considerable disability.(2)

Over the last twenty years in most western countries number of people retaining their natural teeth were increased and the percentage of edentulism was decreased this was in contrast to less developed countries where the rate of total edentulism is still increasing, because painful teeth are often extracted rather than treated conservatively. (3,4)

Country's socioeconomic situation can partially determine edentulism in addition to cultural and psychosocial factors as well. Regional disparities of the prevalence of edentulism are also marked, for example between rural and urban areas.(5)

The eight industrialised nations organised as Great Eight in the world (Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States) experienced considerable differences in prevalence of edentulism from 16.3% in France to 58% in Canada

among people aged 65 years and over. However there were no data available from Russia.[6]

Among the developing countries this range was even wider, with the lowest prevalence being 1.3% in Nigeria and the highest being 78% in Bosnia-Herzegovina. Within the more developed nations, the lowest prevalence of edentulism among the adult population aged 65 to 74 years was 13.8% in Switzerland. [6]

Edentulism is declining due to new treatment modalities and preventive measures, but the size of the older population will continue to increase, especially in the more developed countries, along with the increasing life expectancy.[5]

Taking into account global population ageing, edentulism will not only affect persons in developing countries; there will be a relevant proportion of edentulous individuals in ageing societies worldwide. [3]

Problems of edentulism

Unrestored edentulism is very rare and there are few epidemiological data on its prevalence. According to a National Survey in Germany, the 65-74-year-old population has 89% of their missing teeth replaced, but no distinction was made between edentulous and partially edentulous persons. [3]

The few studies associated with unrestored edentulism are mostly conducted with institutionalised or disabled older adults. A French study found that among 321 elderly patients, 16.7% (upper jaws) and 18.1% (lower jaws) were edentulous and had no denture. Further data

come from developing countries where limited health care is available or affordable for large parts of the population.[7]

Tooth loss implies the loss of several orofacial structures, such as bony tissues, nerves, receptors and muscles. Consequently, most orofacial functions are diminished in edentate subjects. [3]

An intimate relationship exists between teeth and alveolar process. The lack of mechanical stimulation resulting from the loss of teeth in the edentulous state results in loss of the bone mass. This is accompanied by a decrease in the bone trabeculae and bone density in the area in addition to loss of bone width followed by loss in bone height. [8]

Once teeth are lost, remodelling of the alveolar bone begins. Within a few weeks significant parts of the former tooth-bearing alveolar tissue are lost and the alveolar ridge loses vertical height as it rounds off. [9]

The gradual reduction of the residual alveolar ridge is considered by some authors a major oral disease entity. Others believe that it is a normal physiologic process; it is chronic, progressive, irreversible, and cumulative and shows wide variation. The amount of bone reduction is usually greater in mandible than that in maxilla owing to muscle attachments and functional surface area. [10]

Loss of bone in the maxilla or mandible is not limited to alveolar bone; portions of the basal bone may be resorbed also, especially in the posterior aspect of the mandible where severe resorption may result in more than 80% bone loss.[8]

The marked reduction in mandibular residual ridge compared to that of the upper residual ridge increased 4:1 at the seven-year stage.[11]

This atrophy is progressive and has been reported to slow down to an annual rate of 0.05mm in the upper and 0.20mm in the lower alveolar ridge 10 years after tooth extraction. The degree of residual ridge resorption is strongly related to the duration of edentulism. [12]

In case of tooth loss, parts of the jaw bone are resorbed and the oral mucosa loses its morphological characteristics, the muscular fibers become atrophic, a great part of motor neurons and their receptors are lost, and there is also a reduction of neurotransmitters[13]

As bone losses width, then height, then width, and then height again, the attached gingiva gradually decreases. A thin attached tissue usually lies over the advanced atrophic mandible or absent entirely.[8]

The tongue of the patient with edentulous ridges often enlarges to accommodate the increase in space formerly occupied by teeth.[11]

As tooth loss occurs, masticatory efficiency declines, and it is natural for humans to alter their dietary intake to compensate for the greater difficulty of eating certain foods. Edentulous individuals report significantly more chewing difficulties than dentate people, and they therefore constitute the group most likely to change their diets.[14]

Harder and more coarse foods such as fruits, vegetables and meats, which are typically major sources of vitamins, minerals and proteins, come to be regarded as either difficult or nearly impossible to chew. Consequently, a tendency to favour softer, more processed foods develops. However, these latter foods are typically fairly high in fat and cholesterol content and may also be lacking in vitamins and minerals.[14]

Edentulous people do, in fact, lack specific nutrients and that these nutritional deficiencies could ultimately result in an increase in the incidence of various health disorders.[14]

Chewing movements are generated by a Central Pattern Generator in the brain stem. The rhythmic muscular activity patterns are constantly modified by sensory input of the oral-facial structures.[3]

It was shown in animal experiments that after the extraction of all teeth there is loss of afferent nerve fibres in the mandibular canal. Therefore, sensory input is considerably reduced in edentulous individuals who were found to have a threshold to active tactile stimuli which is 7 to 9-fold higher than in dentate individuals. [15]

The facial changes that naturally occur in relation to the aging process can be accelerated and potentiated by the loss of teeth. Several esthetic consequences result from the loss of alveolar bone. A decrease in the facial height from a collapsed vertical dimension causes several facial changes. The loss of labiomental angle and deepening of vertical lines in the area create a witch like appearance.[8]

As the vertical dimension progressively decreases, the occlusion evolves towards a pseudo-Class III malocclusion. As a result the chin rotates forward and creates a prognathic facial appearance. These conditions result in a decrease in horizontal labial angle at the corner of the lips; the patient appears unhappy when the mouth is at rest.[8]

A thinning of the vermillion border of the lips results from the poor lip support; this is related to the loss of premaxilla ridge, and the loss of the muscle tone. Deepening of the nasolabial groove and an increase in the

depth of other vertical lines in the upper lip are related to normal aging but are accelerated with bone loss.[8]

Difficulty in accepting tooth loss is a relatively common experience for edentulous people, with almost half feeling that their confidence had been affected. In general, the emotional effect of tooth loss is significant.[16]

In each case, the loss of all teeth is difficult to accept. Careful psychological preparation of the patient by the dentist prior to the extraction of teeth was recommended. [17]

Management of edentulism

For many decades complete denture was considered the only treatment option for edentulous patients. [18]

Lack of ideal denture supporting ridge with adequate bone height, flat crest and parallel or nearly parallel sides covered by firmly attached fibrous mucoperiosteum leads to the need of Pre-prosthetic surgical techniques which are used to reshape the ridge in order to provide an optimum denture supporting area suitable for the future prosthesis. [18,19]

Removable denture function in fully edentulous patients is often inadequate. In particular, severe resorption of the alveolar ridges frequently makes it very difficult for patients to wear conventional dentures due to the lack of retention and the instability of the denture. Together with the poor load-bearing capacity of the tissues, this situation can lead to oral pain, discomfort and poor oral function.[20]