# Radiographic evaluation of two types of resilient denture base materials in lower single denture

# تقيم اشعاعي لنوعين من المبطنات الرخويه للطقم السفلي

***Thesis***

Submitted to the Faculty of Oral and Dental Medicine,
Cairo University

***In***

Partial fulfillment of the requirements of master degree in removable prosthodontics

**By**


## Doaa Amr Heshmat Rostom

B.D.S Cairo University.

## Supervisors.


# Prof. Dr. Alaa Aboul Ela

Professor, Prosthodontics Dept. Faculty of Oral and Dental Medicine,
Cairo University

# Dr. Mohamed Farouk Abdalla

Lecturer, Prosthodontics Dept. Faculty of Oral and Dental Medicine,
Cairo University

# Acknowledgement

# Acknowledgement

I am grateful to Almighty God

To *Prof. Doctor Alaa Aboul Ela* Professor, Prosthodontics

Dept. Faculty of Oral and Dental Medicine, Cairo University

I thank you for inspiring and challenging me to accomplish this task. Your insight and encouragement throughout the entire study process, providing me with precious scientific and technical experience that I'll carry with me throughout life. Thank you for your enthusiastic support during all phases of my research.

To *Doctor Mohamed Farouk Abdalla* Lecturer,

Prosthodontics Dept. Faculty of Oral and Dental Medicine, Cairo University

Your attention to detail, your critical analysis of the scientific process, your passion for excellence, your creative insight into interpreting the data as well as your technical help in preparing this manuscript, made this project possible.

# Index

# List of figures

# List of Tables

# Introduction

Qualitative and quantitative difference between natural tooth and complete denture support has been emphasized **(Boucher, 1997)**. The difference is one of the adaptability versus mal adaptability: the natural dentition is capable of sophisticated response to occlusal demand that largely preserve functional capability, whereas mucoperiosteum bone support, is incapable of such adaptation. Unfavorable response exhibit a spectrum of severity for varying population

The degree of mandibular bone loss of alveolar portion is three or four times higher than alveolar resorption in the maxilla, which is due to a smaller denture- bearing area in the mandible and thus a greater load per square cm, which leads to bone resorption and atrophy of the mandible **. (Xie.Q et al 1997**).

Patients wearing conventional complete dentures may experience difficulties that may be attributed to atrophic and thin mucosa that bear the stress and residual ridge resorption caused by occlusal force **(Douglass et al., 2002).** In a prosthetic sense, bone is considered a base which provides support for denture, while in the physiological sense, it is an area where forces are created while biting and chewing food

A main problem of lower single conventional denture is residual ridge resorption; leading to decrease in the denture retention and support **(Szentpetery et al., 2005).**

These two problems may consequently cause the patient to ultimately reduce or completely stop wearing their dentures.

Reduction and wide distribution of loads on the mandibular bone caused by the lower single denture can be accomplished by implant (**Visser et al., 2002),** or permanent resilient denture base and liners **(Murata et al., 1998 and Kimoto et al., 2004).**

Several authors have reported that in in-vitro studies the resilient denture liners distribute the stress derived from occlusal force. Therefore, the problems attributed to occlusal force may decrease through the use of resilient denture liners, flexible denture bases use a special flexible resin allows the wearer to chew properly. It also provides a soft base that prevents the gums from being rubbed raw. **(Mustafa et. al., 2008)**

# REVIEW OF LITERATURE

# Single dentures

Single dentures is a condition where one edentulous arch opposes a natural or restored dentition

**Constructing a single denture is more demanding than of a conventional denture due to the following reasons:**

1. A small basal seat with tightly attached submucosa available for the support of the lower denture in contrast to the upper denture, therefore more stress per unit area will be applied to the residual ridge than to the upper residual ridge **(Bruce, 1971)**

2. Supereruption of the opposing natural teeth produces an unharmonious occlusal plane, and minimizes the vertical space for setting the opposing denture teeth.

3. The proximity of the mandibular denture to the tongue which cause a great denture instability

4. The heavy occlusal forces generated due to the existence of opposing natural teeth results in advanced bone loss of the residual alveolar ridges. **(Al sayed, 2008).**

## Problems and management of single dentures:

One of the major problems of single denture is unfavorable distribution of force due to extensive jaw relationship discrepancies, occlusal plane discrepancies and others:

A- When only one arch is edentulous teeth position in the dentulous arch may preclude such objectives being reached. Unfavorable force distribution may then cause adverse tissue damage that compromise optimum tissue function. Such changes include: Jaw relation extremes. In skeletal Class III relationships, extremes of jaw relation make it difficult to place denture teeth in a position that allow denture bearing area to be in occlusal support, **(Carr, 1997)**.

Following tooth extraction result in a generally a smaller maxilla when compared with the dentulous state ,this creates horizontal discrepancies between the arches anteriorly and posteriorly it's difficult to direct the occlusal force to the denture bearing surface because the support is at a distance from the denture tooth position**.**

The management is to place the teeth in reverse horizontal overlap or cross bite arrangement, **(Zarb, et,al,.2004)**

B- When maxillary complete denture opposed by anterior mandibular teeth only or mandibular arch restored by Kennedy class I removable partial denture that has not maintained denture support .Both conditions are characterized by occlusal force that concentrated exclusively on the premaxilla region, when such a force distribution is allowed to go uncorrected ,the premaxilla layer undergo destructive changes, that allow displacement of the denture superiorly, and the resultant change in the occlusal plane can allow a downward growth of maxillary tuberosity .If not addressed through the necessary preprosthetic surgery as well as maintenance of posterior occlusion ,such a combination of changes in the maxillary arch may predispose new prosthesis to failure due to inability to prescribe a normal occlusal plane and denture foundation that provide occlusal force distribution and support around the arch. This is known as Kelly's syndromes. **(Driscoll and Masri 2004).**

The management is to place the posterior teeth in a reverse horizontal overlap or cross bite relationship, (**Ahmad et. al., 2008**).

C- An irregular occlusal plane is often seen as tilting and/or extrusion of the teeth following the extraction of a first mandibular molar and the second and the third molar exhibit an anterior inclination and superior position compared to normal relationship, this result in unfavorable force distribution.

The management is to make selective grinding (occlusal modification) where it can be achieved by many technique using template or curved occlusal plane such as to aid in setting of denture teeth. **(Bose, 2007)**.

D- Other adverse squeal to single complete denture treatment include natural tooth wear and denture fracture, the use of porcelain denture teeth especially when adjusted during occlusal correction phase can lead to rapid wear to opposing natural dentition.

The management could be the use of artificial teeth restored with cast restoration or the use of new generation of acrylic/composite resin denture teeth. **(carl et,al,.2004)**

A common complication is the fracture of the denture base a specific condition that encourage such fracture include heavy anterior occlusal contact ,deep labial frontal notch(especially when in conjunction with midline diastema) and high occlusal force due to strong elevator musculature.

The management is to make an adequate denture base thickness and control of the denture labial notch are frequently all that is required to protect from fracture .or use a cast metal base to resist deformation and fracture **(Pasam et. al., 2006)**.

## OCCLUSAL MODIFICATION

Occlusal modification of the remaining natural teeth is usually required prior to the construction of single complete denture. It is a preprosthetic procedure where occlusal discrepancies in natural teeth are corrected, **(Bose, 2007)**. It can be done in one of the following methods:

### Swenson technique:

A tentative teeth arrangement is done using a diagnostic cast the occlusal discrepancies are marked and reduction is done in the patients mouth, this method described by Swenson **(Swenson, 1947)**

### Yurkstas technique:

**Yurkstas 1965** construct a ‘U” shaped slightly convex metal plate is positioned over natural teeth and the occlusal discrepancies are recorded. These discrepancies are reduced in the diagnostic cast. The reduced cast is used as guide to reduce the natural tooth.

### Bruce technique:

The occlusal discrepancies are arbitrary reduced in the diagnostic cast. An acrylic resin template is made over the reduced cast. The natural teeth are reduced till acrylic plate seats properly against them, **(Bruce, 1971).**

**Boucher technique**:

The interferences are removed by movement of the maxillary porcelain teeth over the mandibular stone teeth. Pre-maturities are identified and removed by grinding the natural teeth. The procedure is repeated for right and lateral excursions until a harmonious balanced occlusion is established, (**Boucher, 1997),**

## The Mandibular single denture

Mandibular single dentures can either be opposing a fully dentulous maxilla or a maxillary partial denture.

According to **Boucher 1997**; The single mandibular denture opposing a complete or partial maxillary dentition is accompanied by severe residual ridge resorption of the edentulous mandible ,because the limited quantity of mucosa ,the amount of denture border adjacent to movable mucosa, and the impact of the occlusal force from mandible contacting the static dentate maxillary arch The main problem of lower single conventional denture is residual ridge resorption; accordingly the denture retention and support decrease.