Telescopic crown versus anterior splint bar attachment of implant supported removable partial denture restoring kennedy classI modification one

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

By

Hythem Hamed Abdelatif

B.D.S (2003)

Faculty of Dentistry

Ain Shams University

Faculty of Dentistry

Ain Shams University

2011

SUPERVISORS

Prof. Dr. Ingy Talaat Lebshtien

Professor of Prosthodontics and Chairman of
Prosthodontic Department
Faculty of Dentistry
Ain Shams University

Dr.Rami Maher Ghali.

Lecturer of Prosthodontics
Prosthodontic Department
Faculty of Dentistry
Ain Shams University

أعوذ بالله من الشيطان الرجيم

بسم الله الرحمن الرحيم
ولسوف يعطيك ربك فترضى

صدق الله العظيم

سورة الضحى – الاية ٥

LIST OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Introduction

Distal extension edentulous base with anterior modification area restored with removable partial denture is not satisfactory from the biomechanical point of view. The addition of an anterior segment to this distal extension partial denture results in teeter-tooter action with inevitable torque and damage to the denture supporting structures.

Biomechanically, it is better to replace missing anterior segment with fixed restoration rather than being included in the partial denture. However, in some situations it is necessary to replace the missing anterior teeth with a removable partial denture rather than the fixed restoration due to the length of the edentulous span, loss of large amount of the residual ridge by resorption, accident or surgery resulting into much vertical space preventing the use of fixed restoration or in which esthetics requirements can be better met through the use of teeth added to the denture framework.

Applegate reported that cases with Kennedy class one with anterior modification space are countered with only few remaining teeth which will be weakened and should be preserved, in this situation an anterior splint bar provides a fixed splint that lightly rest on the gingival tissues to support the removable partial denture. The use of internal clip attachment with connecting bar provides support, retention and stability for the anterior modification area and serves to eliminate both occlusal rests and retentive clasps on the adjacent abutment teeth. [(1)]

Telescopic crowns have also been used successfully in removable partial dentures and fixed partial dentures. Telescopic crowns are known as double crown, crown and sleeve coping, or as konuskrone, a German term that described a cone shaped design. These crowns consist of an inner or primary telescopic coping, permanently cemented to an abutment tooth and a congruent detachable outer or secondary crown which is rigidly anchored in the detachable prosthesis. Copings were designed to protect the abutment from dental caries and thermal irritations and also provide retention and stability for the secondary crown. The secondary crown engages the primary coping to form a telescopic unit and serves as an anchor for the remaining of the dentition.[(2)]

Different taper angles preparation for the telescopic crown to retain overdenture have been introduced .A non tapered (zero degree) ,a two degree ,a six degree and a twelve degree taper angle have been suggested to control the load transmitted to the overdenture supporting structures.

Recently, it has been reported that free standing single dental implant can be used to solve problems with mandibular bilateral distal extension in removable partial denture if posterior abutment had been lost.

Removable partial dentures that incorporate osseointegrated implants have provided satisfactory alternatives to conventional partial dentures. An effective approach in the implant supported overdentures offers improved retention, stability, support, function and comfort. [(3)]

In-vitro stress analysis studies have been widely used to provide good understanding of the nature of stresses and strains acting on dental structures, even more than in-vivo studies. This can be explained by the fact that any valid in-vivo test has to be repeated under the same conditions every time standardizing all the variables except the one under investigation which is clinically impossible. Thus, comparative studies would be more accurate and practical if they were laboratory performed.

Many experimental stress analysis methods have been employed to evaluate biomechanical loads. These techniques compromise photo- elastic stress analysis, strain gauge analysis, holographic interferometer and finite element stress analysis.

Review of literature

Distal extension removable partial dentures

Extension base removable partial denture is defined according to the Academy of Prosthodontic terms as “A removable partial denture that is supported and retained by natural teeth only at one end of the denture base segment and in which a portion of the functional load is carried by the residual ridge”. [4]

DeVan stated that "Preservation of what is remaining is preferred over meticulous replacement of what is missing". The main requirement of the successful removable partial denture is to restore missing teeth as well as maintaining the oral and paraoral structures in a good condition. [5]

Removable partial dentures continue to be the treatment of choice for patients, especially those with distal extension bases, financial concerns, technical and biologic conditions that contraindicate treatment with fixed prostheses or implant supported prostheses. [6, 7]

Among the various partially edentulous conditions that necessitated removable partial denture construction, removable partial denture restoring a bilateral distal extension edentulous span is the most common clinical situation. [8] As a result of the general pattern of tooth loss, it is more frequently encountered in the mandible than the maxilla. [9]

Problems of distal extension removable partial dentures:

In distal-extension removable partial dentures, the occlusal force tends to cause the base to move in a tissueward direction, since the sink of the posterior denture teeth is not protected by an abutment tooth on the distal of the base.[10,11]

The distal extension removable partial denture gains its support from two different supporting oral structures; the mucoperiosteum covering the residual ridge and the periodontium of the abutment teeth. These structures have disparate viscoelastic behavior which creates a problem in distributing the functional stresses between them. [12]

The resiliency of the mucoperiostium of the residual ridge is about twenty five times greater than that of the periodontal ligaments of the abutment teeth. This difference in degree of support results in rotation of the distal extension removable partial denture about its most posterior abutment inducing stresses on the abutment teeth and excessive bone resorption of the underlying residual ridge. [13]

Monteith et al., (1984) and Lammie and Laird (1986) reported that the movement of the distal extension base is generated as a result of multidirectional forces transmitted vertically, laterally and anteroposteriorly. These forces subsequently induce multidirectional movements and rotation of the extension base saddle around a vertical, horizontal and anteroposterior axes. These movements create heavy cantilever forces on the abutment teeth and trauma to the residual ridge followed by ridge resorption. [8, 13]