Comparison between marginal bone loss around mini implants supporting cantilevered and non-cantilevered bar retained overdenture using digital radiography.

A Thesis submitted to Faculty of Dentistry Ain Shams University

Oral and Maxcillofacial Prosthodontics department

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Dedication

To my beloved family

I dedicate this work to my father, my mother, my wife and my daughters for whom I live, and for whom any effort is devoted.

مقارنة في كمية العظام المتآكلة حول الغرسات الصغيرة المتصلة التي تحمل طقم فوقي في حالة وجود كابولي من عدمه باستخدام الاشعة الرقمية

رسالة مقدمة لقسم الاستعاضة الصناعية بكلية طب الأسنان جامعة عين شمس للحصول على درجة الدكتوراة في الاستعاضة الصناعية للفم و الوجه و الفكين.

مقدمة من

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(I don't have time to be concise)

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List of contents

List of figure

List of tables

Introduction

Over the past forty years several different interventions have been proposed to alleviate the difficulties associated with mandibular dentures use and continued resorption of the alveolar ridges. Achieving stability and retention of the mandibular denture can be difficult when using conventional denture techniques.

For many years clinicians realized that placement of endosseous implants under a removable prosthesis bring considerable benefits including preservation of bone increase the denture stability, functional efficiency, causing a degree of occlusal support. For this reason not in few cases these treatment options has become elective and improves quality of life.

In the last decade mini dental implants grew more and more popular and using it under an overdenture gain everyday new territories, mainly because of their small size which allow it to be inserted in thin ridges with reasonable qualities of bone, their relative cheapness, and because it is less invasive, taking into consideration the increase of longevity .

Cantilevering the bar connecting implants was used routinely to decrease loads on the posterior area in the mandible when it's especially thin and cannot withstand the normal stresses but that was always on the expense of increasing stresses with subsequent bone loss on the distal implants.

Assessment of the success and failure became more and more intrigue and needs more scrutiny, so using cone beam computerized tomography and resonance frequency analysis was mandatory in assessing these implants.

Cone beam computerized tomography is a 3D image that allows the clinician to assess more accurately the position of the implant to the bone boundaries in the mandible and to the vital structure.

In this study we have used the cone beam, resonance frequency analysis and periodontal probing to assess the effect of cantilevering a bar connecting mini-implants supporting a mandibular overdenture.

REVIEW OF LITERATURE

Edentulism

Oral health is a definite factor in general health, quality of life and economy.[1],Teeth are necessary for development and maintenance of alveolar bone through stimulation of bone which is mandatory to keep its density and volume.[2] Teeth transmit compressive and tensile forces to the surrounding bone enhancing bone remodeling.

Loss of teeth result in mechanical and esthetic adverse consequences, such an effect is aggravated when this loss encompasses all the teeth resulting in the debilitating and unaesthetic condition called edentulism [3].

The most common causes of complete edentulism is tooth extractions due to caries and periodontal diseases.[4]
History of high tobacco consumption is also a risk factor for tooth loss.[5]

In USA 10% of the population is edentulous constituting about half the population above 75 years [6].

The aging process causes physiological changes that affect the whole organism specifically in relation to the oral system. In addition to tooth loss, there is reduced masticatory force, alveolar bone

decomposition, and reduction in the number of functional motor units, leading to decreased muscular activity [6]

Edentulism results in deterioration of oral health and for a long time the conventional complete denture which was the treatment choice of the dental practitioner was clearly sub optimal, especially concerning the efficiency of mastication. [8, 9]

The sub physiological amount of stimulation to the bulk of the residual ridge affect the trabeculae and bone density combined with the high stresses on the superficial surface of the bone cause finally loss in the width and height of the ridge .[10]

The loss of bone width and height result in a narrow ridge with thin mucosa causing discomfort for the patient [10] The total surface area of the mandible is half that of the maxilla but it it's subjected to the same amount of stress [11] Resorption of the mandible especially in the posterior area may extend and result in sharp internal and external oblique ridge with its thin painful unattached mucosa and also in the superior immigration of the genial tubercles.[12]

Resorption may extend to the basal bone reaching the mental foramen which can become a supporting structure for the lower denture which may cause parasthesia and fracture of the mandible [13]

Resorption of the maxilla has a peculiar pattern, in the anterior region bone loss occurs mainly labially, while in the premolar area it

occurs evenly buccally and palatally, and in the posterior area, it occurs mainly buccally [3]

Following the extraction of teeth, the bony socket and adjacent soft tissue undergo a series of tissue repair processes. Histologic evidence of active bone formation at the bottom of the socket and bone resorption at the edge of the socket are seen as early as two weeks after tooth extraction, and the socket is progressively filled with newly formed bone until about six months.[14] Rapid bone remodeling subsides by this time but continuous bone resorption may persist at the external surface of the crestal area of the residual alveolar bone, resulting in considerable morphologic changes of the bone and overlying soft tissues over the years.[15]

The bone remodeling activity after tooth extraction is localized primarily at the crestal area of the residual ridges, resulting not only in reduced height of the ridge but also in the creation of various three-dimensional shapes of the residual ridge. If the bone resorption is greater at the crestal area than at the lingual or buccal aspects, the residual ridges tend to be flat. In contrast, greater bone resorption at the lingual and buccal areas compared with resorption at the crestal area may result in the so-called knife-edge type of residual ridges. [16]

A real problem for these patients is that they miss food with high nutritional value because it's harder the chew e.g. fruits and vegetables; so their health is generally compromised. [17]

Mastication is a process that has a reflexive character with the involvement of higher centers in the nervous system; the afferent