Stress Assessment Of Hybrid Implants Distribution On The Maxillary Supporting Structures (Strain Gauge Analysis)

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بسم الله الرحمن الرحيم

(قَالُوا سُبْحَانَكَ لا عِلْمَ لَنَا إِلاَّ
مَا عَلَّمْتَنَاإِنَّكَ أَنْتَ الْعَلِيمُ
الْحَكِيمُ)

صدق الله العظيم

سورة البقرة :

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Dedication

To the memory of my great and Beloved

Father may Allah Rest his soul in peace…

My Beloved Mother…

My Lovely Wife…

And my little Angels Mariam & Youssef

For their love and support

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Introduction

The residual ridge supporting a complete denture is inherently unstable due to the gradual reduction of the ridge.This is considered by some authors as a major oral disease entity. Others believe that it is a normal physiologic process. Some patients have very little reduction of residual ridges, while others show gross reduction in a short period of time. Resorption of the residual ridge disturbs the comfort and retention of complete denture, which, in turn, can irritate the peripheral mucosa to produce an epulis fissuratum. [1-4]

For many years, complete dentures were the only solution for edentulism. Some patients feel their social life is affected significantly because of the embarrassment they feel from using their complete dentures. Denture movement, discomfort and poor function (mastication, speech and appearance) are the major complaints of these patients. [5]

One possibility of solving the problems of complete denture is the use of implants to which an overdenture can be attached. The use of dental implants and implant retained overdentures resulted in a significantly better chewing experience, masticatory performance, less complaints and higher overall satisfaction when compared with conventional complete denture. The stability is superior when compared with that of the conventional denture. The

retention is enhanced by the mechanical attachment to the implants. [6-8]

Lack of bone width prevents the placement of conventional implants. Therefore, in these situations, augmentation procedures are prerequisites to implantation.[7]

Mini dental implants are similar to traditional dental implants in that they are inserted directly into jawbone. The primary difference is that Mini implants are so narrow that this placement can often be done without incision. This not only reduces the time required for implant placement, it makes them available to people who have not been ideal candidates for dental implants in the past.

Like traditional dental implants, Mini implants are used to secure dentures. Also providing additional strength for biting. Implants help protect the structure of jaw, preventing jaw shrinkage which can occur when dentures are secured with adhesives.

Mini dental implants are an effective line of treatment to secure mandibular dentures. With the innovation of Hybrid implants (2.9mm), which enhanced the use of maxillary dentures, it’s now possible to be applied with the consideration of the maxillary bone type.

Questions then arise about the number of Hybrid implants required to effectively secure a maxillary denture without causing unfavorable stresses on the maxillary supporting structures.

Edentulism

Edentulism is a state of partial or complete loss of teeth. A person may lose one or more but not all teeth and become partially edentulous or may lose the whole set of natural teeth and becomes completely edentulous. (4)

Complete edentulism is the terminal outcome of a multifactorial process involving biological factors and patient related factors. It is most often the result of repeated tooth extraction from combined pathological processes of dental caries, periodontal disease or a method to reduce the costs associated with dental treatment. (9)

Similar to other pathologic outcome of disease, the occurance of total loss of teeth is directly related to the age of the patient. (10)

Edentulism affects approximately 158 million people globally as of 2010 (2.3% of population). It is more common in women at 2.7% versus men at 1.9 %.(11)

The rate of edentulism increases at 4%per 10 years in elderly adult and increases to more than 10%per decade after age 70. The average total rate of edentulism around the world is 20% at age 60, although there is wide disparity from the countries. (12)

Several systemic diseases and conditions as diabetes and bone disease, osteoporosis and cyst and tumors may

contribute to loss of teeth. Also, medication required to control systemic disorders may have an adverse effect on oral tissues resulting in tooth loss. [4]

Non disease factors contributing to loss of tooth include patient's attitude, oral care measures, and behaviour of patients, dental attendance and frequency of dental follow up service, socioeconomic status, health care and insuranceand finally aging. [4]

Consequences of Edentulism

Loss of teeth especially complete loss of teeth is one of the worst tragedies in a person's life. It ranges from felling of inconvenience to the feeling of being handicapped. [1, 4]

Loss of teeth results in biomechanical impact due to changes in the biomechanics of the oral and paraoral structures. Edentulism also results in compromise in the integrity of the dental arch and in the masticatory system which is usually followed by adverse function. [1]

A) Bony Consequences:

Teeth are necessary for development of alveolar bone and stimulation of bone is required to maintain its density and volume. [13]

Teeth transmit compressive and tensile forces to the surrounding bone. When teeth are lost, the lack of stimulation to the residual bone causes a decrease in trabeculae and bone