The effect of number of abutments on the stresses induced by bar supported and retained mandibular overdenture (Strain gauge analysis)

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{رب اشرح لي صدري

و يسر لي أمري و احلل عقدة من لساني

يفقهوا قولي}

سورة طه

آية (25-28)

إلى أبي و أمي....
أدين بكل ما أنا فيه وكل ما أنا عليه
بكل ما أحلم به وكل ما وصلت إليه...

إلى زوجي الحبيب....
الذي طالما تحملني وتحمل عنّي
ساندني وشد من أزري...

مَنْ يترقبُ الصباحَ

صابرًا

يُلاقي الصباحَ قويًا

جُبْران خليل جُبْران

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INTRODUCTION

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Tooth supported overdenture is one of the most effective preventive prosthetic measures for the treatment of the pre-edentulous patients with severely mutilated dentition. Numerous articles have addressed the functional benefits of complete dentures supported by few remaining natural roots [1-3].

These natural physiologic abutments offer more support and stability for dentures, reducing stresses transmitted to the alveolar bone and thereby preserve the alveolar bone height. The role of proprioceptors present in their retained roots is not only feedback mechanism, but also direction, tactile force sensitivity, dimensional discrimination and motor responses. In addition, tactile sensitivity, vertical and horizontal stabilization contribute to better masticatory performance encountered in overlaid denture wearers. Moreover, overdenture enables the patient to adapt and with relatively few problems compared to a complete denture. Improving the crown root ratio has a favorable impact on the periodontium of a potential abutment due to reduced lateral forces.The improvement in function together with the preservation of the mandibular ridge points out the legitimacy of overdenture in this treatment modality [4].

The use of a wide variety of attachment system, including stud, magnet and bar attachments have proven both clinically predictable and effective results [5]. An attachment is defined as “A mechanical device for retention and stabilization of a prosthesis made up of two parts. One part is connected to a root, a tooth or an implant and the other part to prosthesis[6].

Bar attachments have been used, because they provide a splinting mechanism between the overdenture abutment teeth. A bar overdenture is

an excellent prosthetic option that many patients choose over less expensive alternatives for a number of reasons. Bar attachment retained prosthesis can provide more retention, better support, more stability and being more comfortable to the patient. Bar attachment consists of a sleeve, incorporated in the overdenture which clips over a bar attached to the abutment teeth [2, 7-9].

An important principle in selecting abutment teeth is the achievement of stability of the overdenture. This is made possible by distributing the abutments over the arch [7]. Whenever possible bilateral abutments symmetrically located in the dental arch should be used , this arrangement will offer the most satisfactory support for the denture and will minimize the possibility of fatigue fracture of the base or excessive loading of the abutments[8].

Four widely separated abutments provide ideal support and stability for an averdenture. The overdenture support is nearly a tooth borne. Two canines and two molars are the most common pattern for four abutments. Three abutments, two canines and a premolar or a molar can be used where a fourth abutment is unavailable. A use of three abutments, is two maxillary canines and one central incisor. This distribution provides a tripode of support for the overdenture and is effective particularly when opposed by natural dentition. Two canine abutments are the abutment pattern used most frequently [9]. Overdenture abutments are preferably located where the occlusal force on the residual ridges has the greatest destructive potential. In edentulous ridges, the anterior parts of both arches are very susceptible to resorption, so it is advantageous to retain canines or premolars in these regions [10].

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. Many experimental stress

analysis methods have been employed to evaluate biomechanical loads. These techniques comprise photo elastic stress analysis, strain gauge analysis, holographic interferrometry and finite element stress analysis. The theory of strain gauges is based upon the fact that elongating a metal element such as a wire changes its resistance. Accordingly, strain gauges are constructed so that the strains in the body which they are attached are accompanied by a proportional change in the ohm resistance of the gauge. These changes are registered as strain indices [11-19]. So strain gauge analysis technology was used in this study to evaluate the effect of abutments number on the stresses transmitted to the supporting structures of mandibular tooth tissue supported and retained overdenture.

REVIEW OF LITERATURE