

**The Effect Of Implants Number Splinted On
Stress Distribution Under Mandibular
Overdenture**

(An In-Vitro Stress Analysis Study)

Thesis

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LIST OF CONTENTS

INTRODUCTION	1
LITERATURE REVIEW	3
<i>The implant-supported overdenture</i>	3
<i>Indications of implant-supported overdenture</i>	4
<i>Contraindications to implant-supported overdenture</i>	5
<i>Advantages of implant-supported overdenture</i>	6
<i>Disadvantages of implant-supported overdenture</i>	6
<i>Classification of implant-supported overdenture</i>	7
<i>Attachment systems used for implant-supported overdentures</i>	9
<i>Types of attachments based on resiliency</i>	9
<i>Various Movements Allowed by Resilient Attachments</i>	12
<i>Bar-clip attachment</i>	13
<i>Classification of bar-clip attachments</i>	15
<i>Types of bar attachment</i>	17
<i>Cantilevers</i>	22
<i>Number of implants</i>	26
<i>Mandibular implant site selection</i>	28
<i>Methods of stress analysis</i>	29
AIM OF THE STUDY	43
MATERIALS AND METHODS	44
<i>Construction of the acrylic model</i>	44
<i>Implant installation</i>	46
<i>Construction of the bar</i>	46
<i>Model preparation for strain gauges installation</i>	51
<i>Installation of the strain gauges</i>	52
<i>The universal testing machine</i>	55
<i>Stress-strain measurements</i>	57
<i>Loading the device and micro-strain recording</i>	61
<i>Statistical analysis</i>	64

RESULTS	65
DISCUSSION	82
<i>Discussion of Methodology</i>	82
<i>Discussion of Results</i>	88
CONCLUSION	91
SUMMARY	92
REFERENCES	93
الملخص العربي	

LIST OF FIGURES

Figure 1.	The acrylic resin model used in the study.	45
Figure 2.	The three implants into their prepared sites on the model.	45
Figure 3.	Three tapered abutments were screwed to the implant	47
Figure 4.	Three plastic castable tapered abutment copings were screwed over the tapered abutments	47
Figure 5.	A castable OT- multiuse bar	49
Figure 6.	Diagrammatic representation showing the cross-section of the bar .	49
Figure 7.	The cantilever bar frameworks screwed to the implants (occlusal view)	50
Figure 8.	The cantilever bar frameworks screwed to the implants (frontal view)	50
Figure 9.	Hex driver and torque wrench.	53
Figure 10.	The cantilever bar frameworks, which six points for load application were selected.	53
Figure 11.	The active strain gauges were bonded to their respective sites on the model.	54
Figure 12.	The dummy strain gauges were bonded to their respective sites on the acrylic plate.	54
Figure 13.	The universal testing machine (Lloyd instrument LR5K)	55
Figure 14.	A load cell is attached to its cross head to control the speed and its direction.	56
Figure 15.	The first phase of the experiment the load was applied to the cantilever bar framework when supported by two implants.	58
Figure 16.	In the second phase of the experiment the load was applied to the cantilever bar framework when supported by three implants.	58
Figure 17.	Multi-channel strain meter device .	59
Figure 18.	The wheatstone bridge had active and a dummy gauges constituting half of the bridge.	59
Figure 19.	The connection between each active and dummy strain gauge to multi-channel strain- meter.	60
Figure 20.	A diagram showing the six sites of load applications	61
Figure 21.	A load of 60 Newtons was applied to the each point of the six predetermined loading point	62
Figure 22.	The experiment was repeated at the same previously described loading conditions	63
Figure 23.	A histogram showing the recorded mean micro-strain values when the load was applied on two and on three implants.	66
Figure 24.	A histogram showing the recorded mean micro-strain values between right and left implants when the load was applied on two implants.	67
Figure 25.	A histogram showing the recorded mean micro-strain values between labial and distal surfaces when the load was applied on two implants.	69
Figure 26.	A histogram showing the recorded mean micro-strain values between right and left implants when the load was applied on three implants.	71
Figure 27.	A histogram showing the recorded mean micro-strain values between right and middle implants when the load was applied on three implants.	73
Figure 28.	A histogram showing the recorded mean micro-strain values between the left and middle implants when the load was applied at three implants.	74
Figure 29.	A histogram showing the recorded mean micro-strain values between labial and proximal surfaces when the load was applied at three implants.	76
Figure 30.	A histogram showing the recorded mean micro-strain values of the six sites of load when was applied in case of three implants design.	77
Figure 31.	A histogram showing the recorded mean micro-strain values of the six sites of load when was applied in case of two implants design.	80

LIST OF TABLES

Table 1	Comparison between the recorded mean micro-strain values in both designs when the load was applied at two implants and when the load was applied at three implants	65
Table 2	Comparison of the recorded mean micro-strain values between the right and the left implants when the load was applied at two implants	67
Table 3	Comparison of the recorded mean micro-strain values between the labial and the distal surfaces when the load was applied at two implants	69
Table 4	Comparison of the recorded mean micro-strain values between the right and the left implants when the load was applied at three implants	71
Table 5	Comparison of the recorded mean micro-strain values between the right and the middle implants when the load was applied at three implants	72
Table 6	Comparison of the recorded mean microstrain values between the left and the middle implants when the load was applied at three implants	74
Table 7	Comparison of the recorded mean micro-strain values between the labial and the distal surfaces when the load was applied at three implants	75
Table 8	Comparison of the recorded mean micro-strain values between the six sites of load when applied in case of three implants design	77
Table 9	Comparison of the recorded mean micro-strain values between the six sites of load when applied in case of two implants design	80

ملخص عربى

استهدفت هذه الدراسة تقييم تأثير عدد الغرسات المعدنية المترابطة الداعمة للأطقم المحمولة السفلية فى حالات الفك الدرورى عن طريق تحليل الإجهادات المنقولة إليها.

وقد تم استخدام نموذج من الأكريليك لحالة فقدان كلى للأسنان بالفك السفلى محاكيا للصفات التشريحية للأنسجة الدعامية. تم تجهيز النموذج لاستقبال ثلاث غرسات فى منطقة الانياب والقاطع الأيسر, طول كل منهما ١٣ مم و قطر كل منهما ٣.٧٥ مم و كانت المسافة بينهما حوالى ١٠ مم و ٥ مم.

ثم تثبتت ثلاث دعامات قابلة للصب فى كل الغرسات وتم تثبيت قضيب رابط متعدد الاستخدامات بينهم بامتداد وحشى ١٠ مم خلف كل غرسة وحشية, يتميز هذا القضيب بأن له سطحان احدهما مستدير (التصميم الصلب) والآخر مسطح مستوى (التصميم المرن) ويمكن استعمال كل منهما, وفى هذه الدراسة تم استخدام التصميم المرن.

تم صب الدعامات و القضيب متعدد الاستخدامات كوحدة واحدة و تم تثبيتهم على الغرسات الموجودة بالنموذج الاكريليكى.

وقد تم تقسيم هذه الدراسة الى مرحلتين, إحداهما استخدم فيها عدد اثنين من الغرسات وعدد ثلاثة من الغرسات فى المرحلة الثانية.

تم لصق مقاييس الإجهادات على الناحية الشدقية والوحشية لكل من الغرسات المعدنية تم تحضير ستة نقاط للتحميل فى القضيب بالمناطق التالية : أربعة فى منتصف كل جزء من القضيب واثنان فى نهاية الحد الوحشى للقضيب , وقد تم التحميل على كل من هذه النقاط بحمل قدرة ٦٠ نيوتن فى كلا المرحلتين و أخذت القراءات الناتجة من كل تصميم لتحليلها احصائيا لعمل مقارنة بين الحالتين.

و من نتائج هذه الدراسة تم استنتاج ما يلي:

وجد أن كمية الاجهادات المنقولة الى الغرسات المعدنية في حالة استخدام ثلاث غرسات تكون أقل من تلك في حالة استخدام غرستين فقط.

كما وجد أنه في كلا التصميمين تكون أكبر كمية للإجهادات منقولة إلى الغرسة القريبة للامتداد الوحشى للقضيب.

كذلك وجد أن أكبر كمية للإجهادات منقولة إلى الغرسة القريبة للتحميل تليها الغرسة التي بجانبها.

كذلك وجد أنه كلما نقص طول الامتداد الوحشى للقضيب كلما نقصت الإجهادات المنقولة إلى الغرسة الجانبية.

عند مقارنة الإجهادات الناتجة عند التحميل على حد الامتداد الوحشى للقضيب, فإن التحميل على الجانب الوحشى للغرسة الجانبية ينتج عنه إجهادات أكبر بالمقارنة بالغرسات المعدنية الأخرى.

INTRODUCTION

The prosthetic treatment of the edentulous patients has always been a challenge for the dentist.

Many edentulous patients wearing conventional complete dentures are dissatisfied with their dentures, this is particularly common with the mandibular one. The most probable cause for this is the smaller denture bearing area, unfavorable distribution of occlusal forces resulting in increased rate of bone resorption, loss of denture stability and retention, pain as well as patient discomfort.

Dental implants of various types have achieved very high success rates in completely edentulous patients. The implant-supported overdenture was especially attractive treatment because of its relative simplicity, minimal invasiveness and economy comparing to full arch fixed restoration.

Bar and stud attachments are the two main retainer system for implant-supported overdenture. The greatest advantage of bar retainer is that it acts as a relatively rigid connection between implants which leads to overcoming the divergence between them and resolves load into a more apical direction.

The implant-supported overdenture cantilever design can enhance denture retention, tissue protection, stabilize the prosthesis and provide a more conservative surgical and economic treatment.

The location, number and dimensions (length and diameter) of the implants and the arch form are important factors that can affect the

cantilever length. The relative stress transfer of splinted and unsplinted mandibular implant-supported overdenture has been studied.

However, the stress transfer to implant-supported overdenture with cantilever bar by either two or three implants are lacking. The strain gauge technique is the most common method used for dental stress analysis. The aim of this study was to compare stress distribution under mandibular overdenture retained by two and three implants designs with cantilever bar using strain gauge technique.

LITERATURE REVIEW

The implant-supported overdenture

Adell et al. in 1990 reported that edentulous patients with severely resorbed mandibles often experience problems with complete dentures, such as insufficient retention and stability during masticatory function ⁽¹⁾, the insufficient retention and stability causes altered muscular function that unstablizes the denture ⁽²⁾ which is a serious problem for both the prosthodontist and the completely edentulous patient. ⁽³⁾

Awad et al. in 2003 concluded that the greatest problems of complete denture are most frequently seen in the mandible. There are treatment alternatives that aid in increasing retention and stability when conventional denture therapy is inadequate such as implant-supported overdenture. ⁽⁴⁾

Overdenture treatment was considered a valuable and valid approach for preventive prothodontics. Overdenture helps to decrease the rate of alveolar bone resorption, improves prosthesis support, retention and stability. ⁽⁵⁾

Overdenture was defined as a removable partial or complete denture that covers and rests on one or more remaining natural roots and/or dental implants. ⁽⁶⁾