

EFFECT OF COMPLETE MANDIBULAR OVERDENTURE ABUTMENT DESIGNS ON DENTURE SUPPORTING STRUCTURES

Thesis

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تأثير التصميمات المختلفة لدعامة الأطقم الفوقية السفلية على البنية الداعمة للاطقم

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CONTENTS

	Page
INTRODUCTION	١
REVIEW OF LITERATURE	٢
• Definition	٢
• Treatment Goals with Overdentures	٣
• Value of Preserving Teeth or Roots	٣
• Drawbacks of Overdentures	٥
• Classification of Overdentures	٦
<i>I .Implant supported Overdentures</i>	٦
<i>II. Tooth supported Overdentures.</i>	٨
A. <i>According to time of insertion</i>	٨
B. <i>According to stability</i>	٩
C. <i>According to number of remaining teeth</i>	٩
D. <i>According to Retention</i>	١٠
E. <i>According to Abutment preparations</i>	١١
• Patient and Abutments Selection	٢٠
Overdenture abutment tooth loss and preventive measures.	٢٥
• Methods of Evaluation of Overdenture Abutments	٢٩
١. <i>Clinical Evaluation</i>	٢٩
٢. <i>Radiographic Evaluation</i>	٣٣
AIM OF THE STUDY	٤٩
MATERIALS AND METHOD	٥٠
RESULTS	٧٦
DISCUSSIONS	١٠٦
SUMMARY	١٢٤
CONCLUSIONS	١٢٦
REFERENCES	١٢٧
ARABIC SUMMARY	

List of Tables

	Page
Fig. (١): <i>Effects of group on gingival crevicular fluid</i>	٧٨
Fig. (٢): <i>Effect of time on gingival crevicular fluid</i>	٨٠
Fig. (٣): <i>Effects of group on pocket depth measurements</i>	٨١
Fig. (٤): <i>Effects of time on pocket depth in group I and II</i>	٨٢
Fig. (٥): <i>Effects of group and time interval on bone height of the ٨٤ three groups during the follow-up period.</i>	٨٤
Fig. (٦): <i>Effect of time on bone height in group I</i>	٨٨
Fig. (٧): <i>Effect of time on bone height in group II</i>	٨٩
Fig. (٨): <i>Effect of time on bone height in group III</i>	٩٠
Fig. (٩): <i>Effect of site on bone height in group I</i>	٩٢
Fig. (١٠): <i>Effect of site on bone height in group II</i>	٩٣
Fig. (١١): <i>Effect of site on bone height in group III</i>	٩٤
Fig. (١٢): <i>Effects of group and time interval on bone density (gray level) for the three studied groups during the follow-up period,</i>	٩٥
Fig. (١٣) <i>Effect of time on bone density in group I</i>	٩٩
Fig. (١٤) <i>Effect of time on bone density in group II</i>	١٠٠
Fig. (١٥) <i>Effect of time on bone density in group III</i>	١٠٢
Fig. (١٦) <i>Effect of site on bone density in group I</i>	١٠٣
Fig. (١٧) <i>Effect of site on bone density in group II</i>	١٠٤
Fig. (١٨) <i>Effect of site on bone density in group III</i>	١٠٥

List of Figures

	Page
Fig. (١): <i>Mandibular canines</i>	٥٤
Fig. (٢): <i>Medium short dome shaped preparation</i>	٥٤
Fig. (٣): <i>Unicast Plastic impression post set</i>	٥٥
Fig. (٤): (a) <i>preparatory drill</i> (b) <i>calibrating drill</i>	٥٧
Fig. (٥): <i>Plastic impression post</i>	٥٧
Fig. (٦): <i>Impression and picking up of plastic post</i>	٥٩
Fig. (٧): <i>Cast metal coping assembly</i>	٥٩
Fig. (٨): <i>Acrylic at the gingival margins</i>	
Fig. (٩): <i>Short dome shaped preparation</i>	٥٩
Fig. (١٠): <i>Plastic impression post</i>	٦٠
Fig. (١١): <i>Cast metal coping assembly</i>	٦٠
Fig. (١٢): <i>Occlusal film showing adequate buccal cortical plate of bone .</i>	٦٢
Fig. (١٣) <i>A beveled crevicular incision</i>	٦٢
Fig. (١٤) <i>Surgical flap</i>	٦٢
Fig. (١٥) a- <i>Amputation of the crown</i> b- <i>Amputated crown</i>	٦٣
Fig. (١٦) <i>Crown reduced ٢mm below the crestal bone</i>	٦٣
Fig. (١٧) a) <i>surgicalflap</i> b) <i>Sutured mucosa</i> c) <i>Sutured mucosa</i>	٦٤
Fig. (١٨) <i>Measurement of gingival crevicular fluid using filter paper</i>	٦٧

	Page
Fig. (١٩): <i>Software program for measuring the area stained by ninhydrin</i>	٦٧
Fig. (٢٠): <i>Measuring the pocket depth</i>	٦٧
Fig. (٢١): <i>Radiographic stent</i>	٧٠
Fig. (٢٢): <i>Step wedge</i>	٧٠
Fig. (٢٣): <i>Periapical radiograph with step wedge on the film</i> a) <i>abutment with coping</i> b) <i>submerged root</i>	٧٠
Fig. (٢٤): <i>Bone height measurements using Digora software</i> c) <i>Proximal to the abutment</i> d) <i>١,٥ cm distal to the abutment</i>	٧٢
Fig. (٢٥): <i>Bone height measurements using Digora software</i> a. <i>Proximal to the submerged tooth</i> b. <i>١,٥ cm distal to the submerged tooth</i>	٧٢
Fig. (٢٦): <i>Optical bone density measurements using Digora software</i> a. <i>Proximal to the abutment</i> b. <i>١,٥ cm distal to the abutment</i>	٧٥
Fig. (٢٧): <i>Optical bone density measurements using Digora software</i> c. <i>Proximal to the submerged tooth</i> d. <i>١,٥ cm distal to the submerged tooth</i>	٧٥
Fig. (٢٨): <i>Changes in gingival crevicular fluid, Effect of group</i>	٧٩
Fig. (٢٩): <i>Effect of time on gingival crevicular fluid</i>	٨٠
Fig. (٣٠): <i>Changes in pocket depth measurements, Effect of group</i>	٨١
Fig. (٣١) <i>Changes in pocket depth measurements, Effect of time</i>	٨٣
Fig. (٣٢) <i>Changes in bone height during the follow up periods Effect of groups</i>	٨٥
Fig. (٣٣) <i>Changes in bone height during the follow up periods Proximal to abutments in the three groups</i>	٨٦

		Page
Fig. (٣٤)	<i>Changes in bone height during the follow up periods ١,٥ cm distal to abutments in the three groups.</i>	٨٧
Fig. (٣٥)	<i>Changes in bone height group I: Effect of time</i>	٨٨
Fig. (٣٦)	<i>Changes in bone height group H: Effect of time</i>	٨٩
Fig. (٣٧)	<i>Changes in bone height in group HI: Effect of time</i>	٩٢
Fig. (٣٨)	<i>Changes in bone height in group ١: Effect of site</i>	٩٢
Fig. (٣٩)	<i>Changes in bone height in group II: Effect of site</i>	٩٣
Fig. (٤٠)	<i>Changes in bone height in group III: effect of site</i>	٩٤
Fig. (٤١)	<i>Changes in optical bone density (Gray level) during the Follow up periods.</i>	٩٦
Fig. (٤٢)	<i>Changes in optical bone density during the follow up Periods in the three groups proximal to abutments (the average of the mesial and distal).</i>	٩٧
Fig. (٤٣)	<i>Changes in optical bone density during the follow up periods in the three groups at ٧,٥ cm distal</i>	٩٨
Fig. (٤٤)	<i>Changes in optical bone density in group I Effect of time</i>	٩٩
Fig. (٤٥)	<i>Changes in optical bone density in group II Effect of time</i>	١٠١
Fig. (٤٦)	<i>Changes in optical bone density in group III Effect of time</i>	١٠٢
Fig. (٤٧)	<i>Changes in optical bone density: Effect of site in Group</i>	١٠٣
Fig. (٤٨)	<i>Changes in optical bone density: Effect of site in Group II</i>	١٠٤
Fig. (٤٩)	<i>Changes in optical bone density: Effect of site in Group I</i>	١٠٥

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Introduction

Despite the recent development in dental implantology the conservative approach to root preservation is still valid, especially in complex occlusal situation (such as severe attrition and bruxism) or when implant retained or supported prosthesis is not feasible for economic or anatomic reasons.

Preservation of roots of teeth that are destroyed by caries or compromised by periodontal disease to support an overdenture is preferred alternative to extraction of these teeth and construction of complete denture.

Complete denture wearer suffer from functional problems because of dependence of the prosthesis on mucoperiosteal support only, whereas overdenture drives additional support and retention from the retained root. The retained roots were nominated as natural or physiological implant. These physiologic implants with their intact proprioceptive feed back mechanisms offer best solution to function, retention, support, stability and also training effect for complete dentures that may be necessary by preparing the neural path way for appropriate patterns.

However, the usefulness of overdentures has been limited by susceptibility of abutment teeth to caries and progressive periodontal disease.

In an attempt to control caries and periodontal disease various abutment designs have been suggested, hence it was imperative to study the effect of different overdenture abutments on denture supporting structures.

Review of Literature

Complete overdenture is a removable prosthesis that overlies the retained teeth, tooth root or dental implant. This treatment modality is not a new concept. Dentists have successfully used existing tooth structures or retained roots to support complete denture for more than a century (*Burns, 1994*).

An overdenture is defined as a dental prosthesis that covers and is partially supported by natural teeth, roots, and/or dental implant. It has been called also a biologic denture, overlay denture, overlay prosthesis or superimposed prosthesis (*Rhan & Heartwell, 1997 and the Academy of Prosthodontic terms, 1998*).

Miller (1984); re-introduced the concept of using teeth to stabilize complete dentures by using vital teeth with coping thimble arrangement without necessitating root canal therapy.

Morrow et al. (1977), suggested that teeth should be reduced to a few millimeters above the free gingival margin with elective root canal therapy and then they covered with gold thimbles.

Today with the stress on preventive measures in prosthodontics the use of overdentures has increased to the point where it is now a feasible alternative to most treatment plan outline in which the construction of a prosthesis for patients with few remaining teeth which were previously considered inadequate to support fixed or removable partial dentures (*Winkler, 1988 and Budtz-Jorgenson, 1999*).

The overdenture approach has also other applications beside the obvious replacement of complete or partial denture; it is used as an effective prosthodontic means for correcting disparities in dentition, between two dental arches, for treating occlusal disharmony and in patients with congenital and acquired defect (*MacEntee, 1979; Winkler 1988; Lunger & Langer, 199; Mericske-stern, 1994 and Zarb et al., 1999*).

Treatment Goals with Overdentures

The goals of overdenture therapy are to preserve alveolar bone, improve function and comfort by maintaining few roots or placing implants to prevent abuse of soft tissue of the residual ridge (*Mericske et al., 1992; Preiskel, 1997; Burns, 2004 and Misch, 2002*), providing better load transmission, better masticatory function and improving stability (*Mericske-Stern, 1994*). The retention of prosthesis can also be secured by using precision attachment. These advantages are reflected on psychological condition of the patient (*Preiskel, 199, and Burns, 2004*)

Value of Preserving Teeth or Roots

Extraction of the last remaining teeth and their replacement with complete dentures has many advert consequences. The patient has to adapt to new situations with respect to speech, chewing and swallowing. The patient also has to accept edentulousness, which may lead to psychological problem and social isolation (*Van Waas, 1990 a,b,c and Kalk et al., 1990*). Furthermore, extraction of the teeth leads to reduction of alveolar ridge (*Klemetti, 1997; Van Waas et al., 1997 and Atwood, 2001*) which causes changes in denture base adaptation, vertical

dimension of the occlusion and occlusal contact (*Tallgren, 1972; Van Waas, 1997 and Fenton, 1998*) and subsequent need for prosthodontic care (*Winkler, 1988 and Burns, 2004*).

On the other hand, retention of teeth or roots in the alveolar ridge aids to preserve bone around and in between these structures. Bone maintenance is the most significant advantages of overdentures because bone maintenance can improve retention and stability of the prosthesis (*Thayer& Caputo et al, 1979*). Moreover, sensory feed back of periodontal ligaments of retained teeth is maintained and masticatory performance is enhanced (*Rissin et al, 1978; Nagasawa, 1979; Fenton, 1998; and Budtz-Jorgensen 1999*).

Tooth supported overdentures also minimize down and forward settling of denture which otherwise occurs with alveolar bone resorption. The overdenture occlusion is maintained rather than shifting forward to simulate the appearance of an angle class III malocclusion (*Fenton, 1998*).

Tooth-borne overdenture the patients are not rendered completely edentulous so psychologically the patients may perceive the preservation of few teeth as an important factor in maintaining a more positive self-image (*Warren & caputo, 1978; Rissin et al, 1978 and Preiskel, 1979, 1997*).

Drawbacks of Overdentures:

There are few drawbacks provided that overdenture, are properly designed and constructed. These are:

- 1- Adequate inter-arch space is required to accommodate overdenture prosthesis and for the underlying teeth or tooth roots (*Robbins, 1981; Basker et al., 1987(a) and Winkler, 1988*).
- 2- Compared with conventional denture, overdenture may be bulkier, although the base is trimmed very thin around abutment teeth making overdenture base more susceptible to fractures (*Preiskel, 1997*).
- 3- Prominent osseous tissue undercuts in the area of abutment teeth, especially in anterior region of the mandible, may cause difficulties developing proper denture extensions. In this case the denture base is likely to be under extended, negatively influencing prosthesis retention and esthetic outcome (*Preiskel, 1999, 1997 and Burns, 2004*).
- 4- Contact between denture base and abutment either by design or because of tooth eruption, can produce a fulcrum in denture base where contact occur. Movement of the denture base around this fulcrum can interfere with denture retention and stability or contacts may create fatigue related maintenance problems that are generally unique to overdentures. For this reason denture base contact with abutment teeth should be avoided or should occur only under condition of heavy occlusal loading forces (*Burns, 2004*).