Effect of Different Types of Occlusion on the Supporting Structures of Mandibular Overdenture Retained by Two Splinted Mini-Implants

Thesis

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Dedication

To My Family

I could never have done this without you, You are my strength, God's greatest blessing to me. You have earned this more than I did.

To My Son

Ali, you are the reason I keep going, and the light that shines my way.

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List of Abbreviations

Abb.	Full term
2D	*Two-Dimensional*
3D	*Three-Dimensional*
CBCT	*Cone Beam Computed Tomography*
CBVT	*Cone Beam Volumetric Tomography*
CT	*Computed Tomography*
CT	*Computed Tomography*
MRI	*Magnetic Resonance Imaging*
PIBL	*Peri-Implant Marginal Bone Level*
PVS	*Poly-Viny Siloxan Material*
SD	*Standard Deviation*

Introduction

Edentulism is a multifactorial phenomenon, the prevalence levels of edentulism vary across countries. While the prevalence has decreased worldwide over time, it is more distinctly cumulating into older age groups.[1]

Residual ridge resorption in the mandible is associated with subjective complaints and clinically assessed poor lower complete denture stability, especially among women. Furthermore, poor lower denture stability is associated with poor satisfaction with the dentures. Preventing tooth loss is extremely important among the elderly. In the case of tooth loss, fabrications of overdentures or implant-retained dentures are recommended treatment strategies to create good denture stability and to avoid problems linked with denture wearing.[2]

With the advent of new technologies together with the increasing demand for implant treatment, root form implants are now available in many different lengths and diameters to suit more clinical situations. Narrow diameter and mini dental implants are now available as therapeutic options for cases with space limitations, or when it is difficult to esthetically restore a small-sized tooth and use a standard-diameter implant on a thin alveolar ridge without doing guided bone regeneration procedures.[3]

Rigid superstructure splinting mini-implants decrease the stresses on the bone compared to non splinted mini-implants. The effects of bone stress magnitude may explain the clinical outcome, in which splinted mini-implants supporting a mandibular overdenture showed less marginal bone compared with nonsplinted mini-implants.[4]

Occlusion is one of the critical factors for implant longevity because of the difference of nature of the attachment of the bone to the titanium-surfaced implant and the natural dentition. In the natural dentition, the periodontal ligament has the ability to absorb stresses or allow for teeth movement but the bone implant interface seemingly has no capacity to allow movement of the implant. If occlusal force is greater than the capacity of the interface to absorb stress, the implants will fail. [5]

Lingualized occlusal and Monoplane schemes were idealy designed to decrease occlusal forces falling on the supporting structures. The lingualized occlusal concept eliminates the buccal cusp contact in centric and eccentric excursions providing great occlusal freedom, decreasing lateral interferences and reducing timing of force contact and directions. In monoplane occlusal concept, Elimination of cuspal inclination of posterior teeth decreases the horizontal forces transferred to the supporting structures. [6, 7], Thus this thesis is prompted to evaluate which type of occlusion is favourable for two splinted mini-implants retaining overdenture.

Review of Literature

1- Mandibular flat ridge problems

Resorption of the alveolar ridge is a continuous process that results in reduction of the alveolar ridge leading to severe difficulties in complete denture construction. Preservation of the alveolar ridge and reducing rate of bone resorption is a key objective in dental prosthetic treatment.[8,9]

The effect of bone loss together with the aging process causes facial changes and esthetic consequences. Decreased facial height and rotation of the chin forward, loss of tone of facial muscles of expression and deep facial grooves and thinning of vermilion border of the lips and decreased horizontal labial angle are reported. These changes together give the patient an old prognathic appearance.[10,11,12]

Edentulous patients with severe residual ridge resorption frequently complain about poorly fitting, loose denture, even if these were manufactured according to the state of the art.[13]

In complete denture patients, a greater amount of mandibular resorption than maxillary resorption was detected in studies such as that of Atwood or Tallgren show that mandibular bone loss is four times greater than maxillary bone loss. These resorption differences are attributed to the fact that the support surface for the complete lower denture is smaller and as such, the pressure exercised on it is much greater.[14,15,16]

Masticatory Complaints are very often when the mandibular prosthesis is non-retentive and instable. To obtain the same degree of pulverization in dentate patients, complete denture wearers usually need an average of four, six or even eight times the number of chewing strokes.[17]

Patients with poorly retained mandibular dentures may suffer from nutritional deficienes because of their inability to chew food. With a decrease in nutrition, the patients general health is affected and their quality of life suffers. This can be overcomed by increasing denture retention, allowing patients to improve their diet. [18,19]

Severe residual ridge resorption increases gradually interarch distance, great horizontal discrepancy between edentulous ridges, presence of flabby displaceable tissues in the denture bearing area. Prosthetic rehabilitation in these patients can be challenging.[20]

Variety of treatment modalities including preprosthetic surgery or ridge augmentation therapy to enhance the ridge height and conventional implant treatments are available. But many patients are not prepared to undergo through such extensive surgical procedure or conventional two stage implant therapy owing to the chronic old age illness and cost factor. [21]

Oral implant placement may prevent the continued resorption of bone and has been associated with increased mandibular bone height distal to the implant location.[22]

The advent of osseointegrated dental implants and subsequently the implant-supported mandibular overdentures now means there is an alternative to the essentially palliative therapy offered by conventional dentures. The