Effect of Overdenture Abutment Length on the Supporting Structures of Soft Lined Mandibular Tooth Supported Overdenture

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Mona Sabry AbdelAal Abdullah

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Introduction

Residual ridge resorption is a major factor of failure of traditional oral rehabilitation of patient. The volume of alveolar process is thought to be the key for retention & stability of denture. Bone loss leads to decrease in size of denture bearing areas thereby reducing stability and retention of the lower denture, difficulties in speech and altered facial appearance.

The resorption of bone began a vicious circle of ill fitting denture especially the lower denture, causing inflammation which in turn increases resorptive process, creating an unstable base, repeating the entire process again. The resorption of basal bone accompanied by decline in neuromascular control due to loss of propioception caused by teeth loss leads to denture failure.

Over dentures are designed to distribute the masticatory load between the edentulous ridge & the abutments. The overdenture transferes occlusal forces to alveolar bone through PDL ligaments of retained tooth roots. Proprioceptive feedback, from PDL to muscles of mastication may act to prevent occlusal over load and thereby prevent bone resorption because of excessive forces. The mandibular overdenture could improve masticatory function compared to complete denture. The short term and long term preservation of alveolar bone has been documented not only adjacent to overdenture abutments but also adjacent to the edentulous ridge.

Resilient liners for denture are used with hope of minimizing pressure & reducing trauma to supporting tissues, They act as a shock absorber that decreases stresses on the ridge and abutment teeth. The rationale behind success of bases lined by soft liners is that they enable some energy from masticatory impact to be absorbed, thereby reducing the load on supporting

structures and the load is distributed over the whole denture bearing area preventing localized areas of stress concentration.

The abutment length plays a major role in success of the overdenture treatment, Although the increased abutment length may improve retention and stability of the overdenture, it may act as a potential for increased stresses on the abutment teeth.

So the question is, does the length of the abutment teeth supporting soft lined complete mandibular tissue-tooth supported overdenture have an effect on the marginal bone height changes around these abutments?

Review of Literature

I- Consequences of edentulism

Teeth may be lost as a result of trauma, caries, periodontal disease, congenital defects, or iatrogenic treatment, which have a negative impact on masticatory function, esthetics, and self-image. After dental extractions, the residual alveolar bone undergoes a period of accelerated resorption for about 10 weeks, followed by a slower, but progressive resorptive phase thereafter. [1, 2]

Residual ridge resorption is a multi-factorial disease related to sex, hormones and type of bone. [3,4] Loss of alveolar bone from an edentulous ridge is more pronounced in the mandible than maxilla, the differential residual ridge resorption seen between the maxilla and the mandible has been attributed to the mandible providing a smaller surface area of support for the denture. [5]

a)Bony consequences

Teeth transmit compressive and tensile forces to surrounding bone. When teeth are lost the lack of stimulation to residual bone causes decrease in trabeculea and bone density with loss in width and height of bone. Bone resorption causes decreased bone width first followed by bone height leaving a narrow residual ridge which causes discomfort when the thin overlying tissues are loaded under the denture. [6]

The continued atrophy of posterior mandible may result in a prominent mylohyoid ridge covered by thin movable mucosa. Resorption of anterior mandible may result in prominent superior genial tubercles. Severe bone loss may lead to mental foramen dihesence resulting in acute pain,

parasthesia of the lower lip and increased risk of mandibular fracture. [7]

b) Esthetics consequences

Loss of alveolar bone results in reduction in facial height due to loss of vertical dimension resulting in pseudo class III malocclusion. Deepening of nasolabial groove and thinning of vermillion border are accelerated with bone loss. [8]

c) Soft tissue consequences

As alveolar bone resorbs, the attached gingiva gradually decreases resulting in very thin attached gingiva overlying atrophied mandible resulting in uncomfortable prosthesis. Most denture wearers have clinical evidence of denture induced stomatitis, denture related hyperplasia, angular chellites and inflammation of denture supporting mucosa. [9-11]

d) Consequence on masticatiory efficiency

The aging process results in reduced masticatory force, alveolar bone decomposition and reduction in the number of functional motor units, leading to decreased muscular activity. The reduction in dental function causes poor swallowing, mastication and digestion. [10]

e) Psychological consequences

The pschycological effects of edentulism are complex and range from minimal to state of neuroticism. Dissatisfaction with appearance and low self estimation will result in avoidance of social contact. [12]

II-Overdenture treatment modality

-Definition:

Over denture is defined as a removable partial or complete denture that covers and rests on one or more remaining natural teeth, roots and/or dental implants. It is also called overlay-denture, overlay prosthesis, superimposed prosthesis telescopic, hybrid, inlay and onlay denture. (13) Overdenture is a denture that replaces natural teeth and associated structures and supported both by mucosa and the teeth and the denture fits over them. (14)

- Classification of overdentures

1-Implant-Supported Overdentures

Advantages

Extraction of teeth leads to reduction of alveolar ridge, loss of occlusal contact and reduced vertical dimension.(15) Implant-Supported Overdentures can provide enhancement of the prosthesis function, fit, stability, and retention, maintenance of the vertical dimension and occlusion of the patient, improvement of facial and lip support, improved phonetics, speech and mastication, decreased trauma to the underlying tissues resulting in decreased bone resorption ,so that the denture may be well tolerated by the patient. (16, 17)

Implant supported overdentures are indicated in situations that are difficult to manage by conventional prosthesis, such as atrophied ridge. (18)

2-Tooth supported overdenture

i- Advantages

Overdenture therapy is a preventive prosthodontic concept since it attempts to conserve the few remaining natural teeth, it allows favorable distribution of forces for the preservation of remaining alveolar bone. [4]

The goals of maintenance of roots are to prevent alveolar bone resorption, provide better load transmission, and achieve better stability of denture with emphasis on psychological aspect of not being completely edentulous.[11]Moreover sensory feedback of periodontal ligaments of retained teeth is maintained and masticatory performance is enhanced.[19]

Overdentures provide better function than conventional complete dentures through a variety of factors, such as improved biting force, chewing efficiency, and increased speed of controlled mandibular movement, In addition, they minimize the downward and forward settling of a denture, which otherwise occurs with alveolar bone resorption. [20, 21]

Abutment teeth are prepared, to create adequate space for the overlying denture. The shortened crown improves the crown-root ratio, thereby decreasing the mobility of the abutment teeth under an overdenture. A 4-year-study showed that 50% of roots, used as overdenture abutments remained immobile. In addition, 25% of roots that were initially mobile became less mobile. Hence, it was suggested that teeth that are generally compromised can be used as abutments for overdenture after root canal therapy and reduction. [22, 23]

Overdentures help to partly overcome several problems posed by conventional complete dentures like progressive bone loss, poor stability and retention, loss of periodontal proprioception , low masticatory efficiency. [24, 25]