Jallad WA, et al., J Dent Oral Health Cosmesis 2020, 5: 015
DOI: 10.24966/DOHC-6783/100015

HSOA Journal of Dentistry: Oral Health & Cosmesis

Review Article

Implant Overdenture - A Review to Highlight the Concept

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Abstract

Implant overdenture treatments cover one of the possible treatment solutions to the patients have some teeth/ roots retained, in patients completely edentulous or wearing conventional overdentures. Presenting this treatment plan using osseointegrated dental implants which will provide stability and retention for the prosthesis, prevent further bone resorption, and improvement of the aesthetic and functional requirement of the patients which is consequently affecting patients psychology and improve quality of life.

Clinical and research studies of this topic always explore that, overdenture treatment is an alternative to conventional complete denture in terms of retention and stability and an alternative to full arch fix prosthesis in terms of finance. Although there is remains a lack of consistency in techniques, prosthetics design, and attachment systems, this aspect has been proven less important to successful outcomes than we thought. In this review, we investigate implant overdenture in terms of advantage, disadvantage, indication and contraindication, attachment selection, and overdenture maintenance.

Keywords: Conventional complete denture; Implant-Retained Overdenture; Implant-supported Overdenture; Overdenture

Introduction

Teeth may be lost because of trauma, caries, and periodontal disease, congenital defects, and iatrogenic treatment. Tooth loss has a negative impact on masticatory function, aesthetics, and self-image. Fixed partial dentures, removable partial dentures, complete dentures, and implant-supported dentures can replace missing teeth comfortably and aesthetically, but it is not known whether they differ in their ability to reconstruct the masticatory force, phonetics, and aesthetics and preserve the residual bone ridge [1-3].

The edentulous patient has not disappeared. While the prevalence of edentulous is less than what it was before but still the overall percentage cannot be discarded. The classical treatment plan for the edentulous patient is the complete removable maxillary and mandibular denture. Although this treatment is relatively inexpensive in comparison with fixed implant-supported prostheses, Adaptation to conventional complete dentures is a complex learning process, when considered on a somatic and psychological basis [3]. Patients who are originally adaptive wearing complete denture may become maladaptive with time, due to ongoing residual ridge resorption, physiological intra-oral changes, and the development of altered muscular patterns [4-6].

An overdenture is a complete or removable partial denture that has one or more implants to provide support. Overdenture dentures are superior to conventional complete dentures in biting force, chewing efficiency, and force discrimination. The chewing efficiency of patients with natural dentition was measured at 90%, complete denture wearers at 59%, and patients with overdenture at 79% [7]. Disadvantages of the overdenture treatment include the need for inevitable treatment, which requires additional time and increases costs [1,8-10].

By definition an overdenture is any removable dental prosthesis that cover and rest on one or more remaining natural teeth, the roots of natural teeth and /or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, natural tooth roots, and / or dental implant - called also overlay denture, overlay prosthesis, superimposed prosthesis [11]. An Overdenture is a denture that uses precision dental attachments to hold the denture down. The overdenture attachment can be placed in tooth roots that have been saved or placed into dental implants that have been placed to receive them [12].

Discussion

Rehabilitation of the edentulous state with mild to severe ridge resorption has been improved greatly due to the introduction of implant overdenture procedures in the middle of the 1980s it has become a rapidly expanding and a successful treatment alternative in the rehabilitation of complete edentulism because of simple laboratory procedures and cost-effectiveness [13]. Many clinical and articles reported different advantages of implant overdenture and render it as a first-choice standard of care for the edentulous patient.

Implant overdenture is superior to conventional complete denture in terms of stability and retention, and it's improved the function, esthetics, and Phonetics of patients, it also reduces the residual ridge resorption. Patients with limited hygiene maintenance ability are good candidate because of fewer abutments and increased access, the overdenture works well for patients with limited hygiene maintenance ability [14-17].

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Citation: Jallad WA, Owda J (2020) Implant Overdenture - A Review to Highlight the Concept. J Dent Oral Health Cosmesis 5: 015.

Received: September 12, 2020; **Accepted:** September 18, 2020; **Published:** September 24, 2020

Other advantages we can count are improved the patient's psychological status and quality of life (McGill University have documented the improved nutrition, psychosocial status, and quality of life that have been gained through the use of overdenture treatment) [16].

Without exception this treatment has some disadvantage will rendering it as not ideal treatment for some patients. Surgical procedure risks which include postoperative bleeding, numbness if the mandibular nerve is disturbed infection, and lack of osseointegration. And it's a time-consuming procedure with technique sensitive required skill of practitioner and corporation of patients. Implant complications has been reported which include loosening of the overdenture retentive mechanism (33%), implant loss with maxillary overdenture (21%), overdenture needing to be relined (19%), and overdenture clip/attachment fracture (16%) [18].

Implant overdenture is indicated in patients who cannot tolerate the dentures because of emotional reasons or because of gag reflex or suffer of Palatine defect. Phonetic problems are caused by a difficult control of the saliva movements between the prosthesis and the maxillary gum. High aesthetic requirements, Limited financial budget. All these reasons call to use implant overdenture [19,20].

Attachment selection

They are different attachment used in implant-supported overdenture treatment and each attachment system will have its clinical consideration and laboratory procedure. They are different methods that are used in attachment classification. According to support it could be classifying. First: Soft tissue-borne and implant borne: supported by the implants and soft tissue and retained by implants (must be in position that allows the construction of straight bar). Can place over one to five implants, most often two or four implants. Second purely implant borne usually required five implants. Other classifications depend on the connection methods of the overdenture to underling implants, splinted supported and none splinted supported [20-23].

Based on attachment resiliency, the attachment system could be rigid: which allows no movement between the abutment and the implant. When utilizing a rigid non-resilient attachment assembly, the implant receives 100 percent of the chewing forces, providing no relief to the supporting implants. On the other hand, resilient attachment allows varying amounts of rotation and angulations correction. Furthermore, the resilient attachment will have many types include restricted Vertical Resilient Attachments which provide 5-10 percent load relief to the supporting implants, and the prosthesis can move up and down with no lateral, tipping, or rotary movement. Hinge Resilient Attachments: This type of attachment resists any lateral tipping, rotational, and skidding forces. Hinge resilient attachments provide almost 30–35 percent load relief to the supporting implant. A Hader bar or any other kind of round bar can provide hinge resiliency. Combination Resilient Attachments: Attachments of this type allow unrestricted vertical and hinge movements. Anytime we utilize this type of attachment, we increase the tissue support of the prosthesis during mastication. This type of attachment offers 45–55 percent load relief to the supporting implants. The Dolder bar joint (egg-shaped) is a combination of resilient attachment. Rotary Resilient Attachments: This type of attachment provides vertical hinge and rotation movements. Rotary resilient attachments transfer both the vertical and horizontal components of masticatory forces to the residual ridge. Usually, this type of attachment provides 75–85 percent load relief to the supporting implants. Some of the stud attachments (prefabricated individual attachments) provide rotary resiliency.

Universal Resilient Attachments These attachments provide vertical, hinge, translation, and rotation movements. This type of attachment offers 95% load relief to the supporting implants. Magnetic attachments are the best example of the universal resilient attachments [24-28]. Depending on mechanical attachment different attachment systems fall in to. Retentive ball anchors with O-rings, metallic or plastic cap attachments, magnets, resilient attachment systems (Zest Locator and Sterngold ERA attachments), custom-fabricated components, and bars:

Compassion between different attachment mechanisms

Regarding retention bar attachment provide superior retention compared to ball/O-ring and magnetic attachment, on the other hand, the load in bar attachment transfer to implant fixture while in ball/O-ring and magnetic attachment Provide more favorable load transfer to bone [29-31].

Bar attachment permit splinting of implants and can mask excessive residual ridge atrophy, and implant loss with bar-retained overdentures (20.6%). While implant loss with ball retained overdenture 38.8% [32]. Bar attachment required more space within the denture base than do ball /o-ring attachment. In masticatory performance bar attachment is better than ball/o-ring attachment while magnetic attachment is the least masticatory performance of all.

Attachment selection criteria

Selecting of different attachment system depending in many factors which could be divided in patient's factors; including available bone in each jaw, patient's prosthetic expectations, and financial ability of the patient to cover treatment costs [33,34]. Dentist factors depending on personal choice and clinical expertise. Other factors will include, Experience and technical knowledge of the lab technicians, the height of the attachment to minimize space required inside the denture (to decrease potential fracture caused by inadequate acrylic thickness) and housings with replaceable matrices, and implant location, number of implants placed, their length, the percentage of surface area surrounded by bone (osseointegration).

Prosthodontic Maintenance for Implant Overdentures

Available clinical studies showing that overdenture treatment has a good prognosis [no]. The types and degree of maintenance are unpredictable multiple clinical studies have focus on this issue. David M. Davis [35], investigate different studies and reported most areas need maintenance including the plastic retainers used to maintain retention and an overdenture retained by metal clips on the bar, the reactivation of the clip followed by fracture of the clip and relining of the prosthesis.

According to Cehreli MC, [36] matrix replacements after 5 years in the maxilla and mandible. Among the attachment systems, a dislodged, worn, or loose matrix or its respective housing was more common in the ball-attachment group after the first year. Long-term study of an unsplinted implant overdentures were evaluated for more than 15 years. Prosthodontic maintenance including replacement of

attachment systems as a result of wear was required every 3 years. Implant overdentures need relining every four years. Replacement of splinted implant overdentures on average every 12 years as a result of resin teeth wear. While O- rings need subsequent replacement over the five years [37-40].

Conclusions

Overdentures in one of the treatment modalities which are indicated to those group of patients have few teeth/ roots retained, or to those patients which presented completely edentulous with or without conventional complete denture. The literature and clinical experience indicate implant-supported overdenture provides predictable results with improved stability and function and a high degree of satisfaction as compared with conventional removable dentures.

In the area of maintenance implant, overdentures need some form of maintenance over periods but the degree or frequency of this maintenance is unpredictable, and need to be discussed thoroughly with patients during treatment planning. Long term prognosis we find that the implant overdenture concept being more successful than alternative treatment. Fact that patients with implant overdenture generally exhibit a high standard of oral hygiene, the problem of caries and periodontal diseases are absent and the accumulation of plaque has been postulated to have an insignificant effect on implant success.

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