Implant-retained mucous supported overdentures

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ABSTRACT
The increase of life expectancy occurred along the demand of a denture that provides high masticatory efficiency to promotes high quality of life among the elders. Implant supported overdentures has been an attractive procedure because of its simplicity and minimal invasive, in which both the attachment part and mucous provide support, retention and stability. The purpose of this article is to show how to implement an implant and mucous supported overdenture with CBCT guidance to improve parallelized implant placement. A 55-years-old female came referred to Unpad Dental Hospital with complete loss of teeth. First phase of treatment was to make complete denture, following by duplicating the denture and used it as guidance in CBCT. Second phase was the implant stage which is two stage surgery. First stage surgery aimed to put two paralleled implant and followed by second stage surgery after three months. It is concluded that implant overdentures have many advantages to elder patient, which is less invasive, simple reconstruction, provides facial support, retention, stability and easily removed for hygiene.
Keywords: implant overdentures, overdentures, complete dentures

INTRODUCTION

Complete loss of teeth may present with lack of support therefore will affect retention and stabilization of the denture. This condition may reduce patient's comfort, less of mastication efficiency and have an impact to psychosocial.

There are two ways to use implant in complete denture, removable and fixed. Fixed implant supported denture cannot be removed by patient therefore more stable than the removable. This type is more complex in manufacturing process and inquire more implants so they are more expensive.[1,2] In the other side, removable implant supported overdenture (ISO) give a better outcome, easy cleaning hygiene, less expensive, and require less number of implant used rather than the fixed type. This type also restores better phonetic function and lost soft tissue due the support from the denture.[2]

The use of implants in complete edentulism improves outcome therefore the demand is increasing.[3] Based on support type, implant overdenture classified into two: a) implant-retained and mucous-supported overdenture, in which the denture is supported by soft tissue and retained by implant, also known as implant retained protheses (IRP), and b) implant retained and supported overdenture, in which the all the support and retention obtained from implant, so that it acts as fixed denture but can be removed for cleaning hygiene, commonly known as implant supported prostheses (ISP).[1]

Implant supported prostheses use more implant and rigidly attached to each other with bar, bar combination or other attachment. Since the support in implant-mucous overdenture (implant retained prostheses) obtained from implant and soft tissue, they use less number of implant. The denture is connected to the implant through a non-rigid attachment in the form of a bar, locator, magnet, or telescopic which will limit the movement of the denture during function and allow the mucosa to function as support.[2]

This case report presents the clinical steps of implant retained overdenture in lower jaw.

CASE

A 50-years-old female came referred by general dentist to Prosthodontic Department Unpad Dental Hospital with chief complaint to replace the complete loss of teeth. The patient never had dentures before and didn't have bad experience with extraction. Clinical examination shows complete loss of teeth with ridge resorption in lower jaw. Advantages dan disadvantages of different treatment option was discussed and patient was convinced for an implant and mucous supported overdentures.

The clinical steps were divided into two phase, first phase was to make the complete denture with sublingual impression and suction denture technique. Second phase was the surgery phase, which is 1) duplicate the denture as surgery template 2) CBCT were taken as imaging guide to place paralleled implants, 3) implant placement surgery, 4)

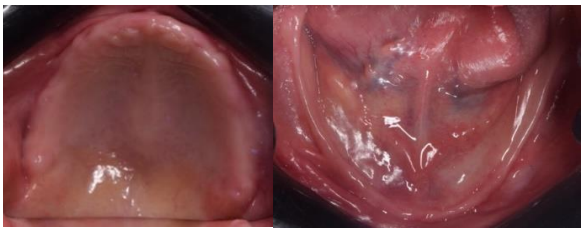

Figure 1 Intra oral view; **A** upper jaw, **B** lower jaw

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Figure 2 Working cast resulted from beading and boxing followed by bite rims

Figure 3A Initial facial profile photo, **B** aesthetic try in, **C** facial profile with final denture.

putting locator as retentive part.

Impression with irreversible hydrocolloid was made in the first appointment for diagnostic model. Private trays were made with light-cured acrylic for both jaw and muscle trimmed was done with green stick compound. Light-body polyvinyl siloxane was used for final impression. In the third appointment, vertical dimension (VD) and centric relation is established using bite rims that were fabricated on master casts. Color shade is taken and in the fourth appointment, aesthetic try-ins for anterior tooth is done (Fig.2,3).

Home care instruction was given in the fifth appointment as the denture placed and patient got recalled for one week. After one week patient show no difficulties to use her denture and was ready to the second phase.

Lower jaw denture was duplicated with the following steps: first, denture was pressed into a denture cup filled with heavy-body polyvinyl siloxane, and a thin layer of vaseline was placed on the surface following with final layer of heavy body PVS pressed and the denture cup was closed. After the impression was set, denture was removed, clear self-cure acrylic was mixed and poured into the mold.

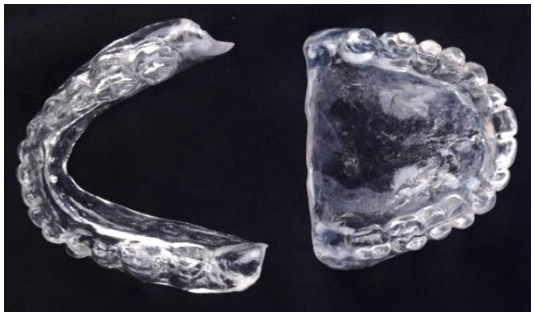

Figure 4 Surgical template made from clear acrylic. This template is made by duplicating denture.

The template denture was polished and holes were made on the incisal surface from teeth 33 to 43 teeth. With long needle bur the holes was drilled down parallel to the long axis of teeth and touched the base of acrylic. These holes were filled radiopaque gutta percha as guide in CBCT imaging. Patient used this denture while CBCT was taken.

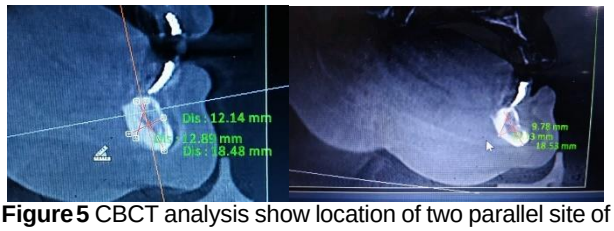

Figure 5 CBCT analysis show location of two parallel site of the mandible between both of mental foramen.

Two step surgery was taken and two implants (Osstem Implant 8 cm length, 3.8 cm diameter) were placed parallel to each other with denture template guide. One week later the suture was taken and the denture base around the implant site area were reduced. Patient was recalled after two months for second step surgery.

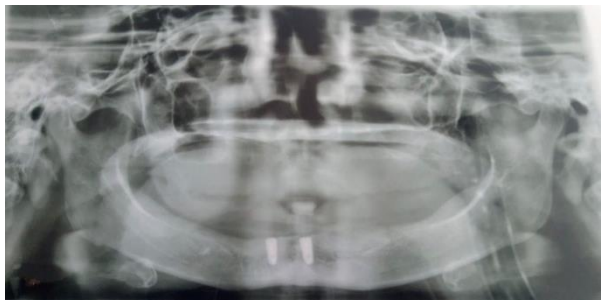

Figure 6 Panoramic radiograph showing implant parallelism.

Healing cap was placed in both implants to create soft tissue profile and after two weeks, the locator was placed. The anterior area of denture base was reduced, escaped holes were made in the lingual wall and with the locator was placed with self-cure acrylic. Home care instructions were discussed and patient recalled for two weeks. Patient showed satisfaction and better comfort in overdenture with implants.

DISCUSSION

Removable implant supported in complete denture (implant overdenture) is superior to conventional complete denture in terms of stability and re-

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tention and it improves the function, aesthetics, and phonetics of patients it also reduces the residual ridge resorption. This superiority was reflected in the McGill consensus and the York consensus which stated that the treatment of choice for an edentulous mandible should be a two-implant retained overdenture.[2]

Fixed rehabilitations for mandibular edentulous patients seem to be a well-accepted treatment from the patients' oral health perspective. However, mandibular overdentures are no less efficient than fixed prostheses in terms of clinical outcomes.[4]

Patients with limited hygiene maintenance ability are good candidate because of the abutments and increased access, the overdenture works well for patients with limited hygiene maintenance ability.[5]

Implant overdenture might be considered a better treatment option to fix in patients with excessive ridge resorption which has led to the loss of facial support of the lips and soft tissues of the face and has high aesthetic requirement; inadequate access/ability to maintain good oral hygiene around the implants/prosthesis; where the number, positioning or angulation of the implant fixtures are inadequate for a fixed reconstruction; when multiple surgical procedures such as bone grafting is contraindicated; and when the financial expense and time are restricted.[2]

Implant overdenture is indicated in patient who cannot tolerate the denture because of emotional reasons or because of gag reflex. Phonetic problems are caused by a difficult control of the saliva movements between the prosthesis and the maxillary gum.[5]

The IRP achieves support from both implants and tissue whereas the ISP achieves support only from implants. According to Misch, as ISP is stabilized on multiple bars between implants, the attachment clips located on each bar are frequently not parallel to one another or perpendicular to the posterior ridges. Therefore, the clips can bind in function, limiting prosthesis movement. This can produce a reduced range of motion between the prosthesis and bar attachment, increased prosthesis support from implant and increase applied torsional forces to the implants.[6]

In clinical situations involving poor posterior ridge form, reducing posterior support mucosal support in this manner may be advantageous as it prevents rotational movements of the prosthesis. Similar to a fixed prosthesis it creates a stable occlusal plain and prosthesis position reducing possible jaw resorption in posterior mandibular and anterior maxillary regions.[1]

The anterior posterior (AP) spread should also be contemplated during the planning stages. This is the distance measured from the most anterior implant in the arch to the most posterior implants. With regards to implant retained overdentures the AP spread has a bearing on the overall stability of the denture.[13] In general, the greater the AP spread of the implants the less AP movement that occurs with the prosthesis.

The implants act as a fulcrum with two potential level arms: 1) from the fulcrum to the posterior extension off the denture and 2) from the fulcrum anteriorly to the incisal edge. forces on either lever arm will produce rotation. However, the primary and secondary bearing areas of the overdenture will resist occlusal forces placed on the posterior lever arm, but forces on the anterior lever arm, such as incisive movements, may cause more noticeable rotation. By moving the implants from the canine to the lateral incisor position, the effective anterior lever arm is reduced, thus minimizing the tipping forces on the overdenture. [7]

It is generally accepted that in the mandible two inter-foraminal implants are the minimum number of implants required to provide a complete implant-retained overdenture. Unless the implants are very short (8 mm or less) or they are severely diverggent (more than 20°), they need not be splinted.[8]

Sadowsky[9] suggested multiple implants for mandibular overdenture when sensitive jaw anatomy, Increased occlusal forces, or high attention needs are present or when implant length <8 mm or implant width <3.5 mm are employed.

The final location of the implant in relation to the bone and the prosthetic teeth will help decide the type of attachment system used. This should be determined at the treatment planning phase before the placement of implants. Where a pre-existing satisfactory prosthesis is unavailable, fabrication of a conventional prosthesis with ideal tooth position we'll help determine appropriate implant position. In order for the individual attachment to provide adequate retention, all the implants need to be placed as parallel to each other as possible. [2]

The majority of complications and/or maintenance issues appeared to occur more frequently within the first year and one of the major factors relating to maintenance issues associated with the attachment system it's related to correct positioning of the implants,[10] and therefore implant positioning should be very carefully planned.

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The inter-implant distance also needs to be considered. Splinting of the implants with a bar shield not be carried out when the inter-implant distance is excessive, particularly as bars have been shown to transmit more forces to the implants.[11]

Implant length and inter implant distance in two-implant supported overdenture have no significant effect on marginal bone loss, but instead implant diameter found to be a critical factor.[12]

The selection of the attaching mechanism for an implant retained overdenture depend on implant number, implant position, inter-arch space, movement of the denture and stress distribution,[2] cost effectiveness, amount of retention needed, expected level of oral hygiene, amount of available bone, patient's social status, patient's expectation, maxilla mandibular relationship, inter implant distance, and status of the antagonist jaw.[11]

IRP with ball or bar and Clip attachment design allows a significant amount of rotation and vertical movement due to soft tissue resiliency and leads to residual ridge bone loss. Therefore, for the functional success of an IRP an optimal extension and fit of the denture is important. Rigid attachments have been shown to distribute increased forces to the implants in comparison to resilient attachment.[11]

Inadequate space for prosthetic components can result in an over-contoured prosthesis, excessive occlusal VD, fractured teeth adjacent to the attachment, attachments separating from the denture, fracture of the prosthesis and overall patient dissatisfaction.[1] A reported minimum space requirement in the vertical plane (interocclusal space) from the platform of the implant to the opposing of collusion for implant overdentures with locator attachments is 8.5 mm,[8] implant retained overdenture with a bar requires 13-14 mm and an implant-retained overdenture with other freestanding attachments Is 10-12 mm which can be assessed clinically.[14]

According to Martinez,[15] selecting an adequate retention system depend on a) It is a upper or lower jaw. In the mandible it will be easier to place parallel implants, thus, ball or locator attachments will be indicated; b) arch form: bar attachments will be indicated in wide arches. On the other hand, in narrow arches using bow or locator attachments would be indicated, c) bone resorption rates and implant length: If implant is at least 10 mm long, it can be used as unsplinted, but if it lasts than 10 mm long it will be indicated that the implants be splinted with more attachment; d) implant location: if implants are placed quite far from each other it will not be indicated to use bar attachment due to increase of bond stress.

Abutment parallelism is very critical for the solitary implants as abutment non parallelism leads to faster wear of the matrix. Therefore, with increase in number of implants splinting should be done as abutment parallelism becomes more difficult. In V-shape anterior mandibular ridge, if bar is placed at canine location, it encroaches on the tongue space and if placed anteriorly, length of the bar becomes inadequate. Therefore in such cases, ball attachments or 3-4 implants with a connecting bar supported overdenture is indicated.[7]

In edentulous mandible, implant retained overdentures provide excellent long-term success and survival, including patient satisfaction and improved oral functions. To further reduce the cost, a single midline implant overdenture can be a promising option.[16] Increase in number of implants did not significantly improve the patient satisfaction.[17]

Survival rate and the peri-implant tissue resppponse in a group of patients who received two unsplinted immediately loaded dental implants in the mandibular anterior to retain a complete overdendenture using locator attachments was studied by Al-Dharrab and found at 3 years, all implants had osseointegrated with a 100% survival rate.[18]

It is concluded that compared to conventional removable prosthesis, implant retained overdenture have improved retention and stability, and patient satisfaction levels are reported as high. Clinicians should discuss with the patient considering all the factors to achieve optimum results.

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