

CASE REPORT

MANAGEMENT OF SEVERELY RESORBED MANDIBULAR RIDGE WITH MINI DENTAL IMPLANT SYSTEM

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ABSTRACT:

Complete dentures play an important role in oral rehabilitation. Patients usually get easily adapted to the maxillary denture, but the mandibular denture has its own share of problems to deal with. Often elderly patients have a chief complaint of a loose lower denture resulting from an inadequate mandibular ridge. In an attempt to a well fitting dentures Implant retained over-dentures have evolved as a potential solution to the problem of stability and retention of the complete dentures. Narrow diameter implants can be used in patients with extremely thin residual ridge which do not allow the placement of standard implants (3.75-4.1mm). Mini dental implants (MDIs) are ultra small diameter, biocompatible titanium alloy implant screws ranging from 1.8-2.5mm in diameter. Lengths range from 10mm –18mm. The main advantage of MDIs is the minimally invasive and single stage placement procedure. Bleeding and post operative discomfort are usually reduced and healing time is shortened. Generally, MDIs are loaded immediately as soon as primary stability is achieved. In this article, a case report of 58-year-old female patient is presented, with a severely atrophic mandibular ridge that was managed by the MDI system with an over denture.

Keywords: Immediate loading implants, mini dental implants, over denture

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INTRODUCTION

According to World Health Organization, edentulism has an important adverse impact on the individual and, in some cultures, on the community, as well (World Health Organization 2000). Complete dentures have been playing the important role of oral rehabilitation of these compromised groups of patients but they have their own limitations. Patients usually get easily adapted to the maxillary denture, but the mandibular denture has its own share of problems to cope up with. Some of these could be attributed to resorption of the bone, as well as the movement of the tongue, cheek, and lips leading to instability of the denture.¹

Traditional implants can serve as a viable solution for patients presenting with denture instability and retention concerns; however, overall expense, fear of surgery, and expected healing time associated with this option may make the procedure unpalatable for many older patients. Small diameter implants also called mini-dental implants, however, are a reasonably simple, easily learned, predictable, and less expensive alternative to stabilize dentures and provide the comfort, functionality, and confidence patients are seeking.² Implant retained over-dentures have evolved as a potential solution to the problem of stability and retention of the complete dentures.³ The major requirement for implant supported over-dentures will be available bone at the edentulous site

which is often limited due to bone loss during extraction or resorption overtime. Some residual ridges are very thin and will not accept a standard diameter (3.75-4.1mm) implant without site development. Often, grafting procedures can be accomplished if the patient desires this form of treatment. In such compromised patients, narrow diameter implants can be used instead of regular diameter implants and additional cost and surgical intervention can be avoided. There is small diameter implants available in a range from 3.0-3.3mm. Furthermore, available are very small or “mini” 1.8-2.5mm diameter implants. The advantage of immediate loading of the mini implants, reduced cost factor, reduced overall treatment time; avoidance of repeated surgical procedures and associated complications also makes it a treatment of choice for the elderly edentulous patients.¹ Notably, a recent literature review by Sohrabiet al² demonstrates that the survival rates for small diameter implants versus traditional, standard width implants are similar.

Usually ball attachments are being used when we are using mini implants to retain over-dentures, because the bone to implant contact area is smaller in case of mini implants and also they are mechanically weak due to smaller surface area, so to further increase the clinical longevity of the prosthesis, they should preferably be splinted using bar type attachment. The lateral forces exerted over the mini implants can be significantly reduced if we are choosing

the splinted bar design to retain the overdentures.⁴ Furthermore, there is reduced marginal bone loss in splinted mini-implants in comparison to the nonsplinted ball attachments.⁵

This case report describes rehabilitation of patient's mandibular arch with mini implant retained Overdenture to reduce the problem of reduced retention and stability. The mini implants were used only for the lower arch because retention is usually not that big a problem for maxillary arch as it is for the mandibular arch.

CASE REPORT

A 58-year-old edentulous woman, wearing complete dentures for last 8 years, presented with a complaint of the looseness of a lower denture. On examination, mandibular residual ridge was found to be highly resorbed. The residual ridge had adequate height, but the width was less than 5mm (figure1) Standard diameter implants would not fit in the space available without ridge augmentation procedure. After panoramic X-ray and dental CT scan evaluation with oral surgeon's consultation, the treatment plan with maxillary conventional complete denture and mandibular two-implant retained Overdenture was suggested and accepted by the patient. Mini-implants supported Over denture with unsplinted implants having individual ball attachments was planned to augment the retention retention of a lower denture. Ball attachment was selected instead of bar and clip attachment due to the limitation of vertical space. The placement of 2.5mm diameter implants in B and D positions were planned.

The surgery was carried out under infiltration anesthesia, and a full thickness flap was raised using a mid-crestal incision. Placement of two mini implants of dimension 2.5mm × 11mm at B and D positions were done. These implants had one-piece titanium screw with a ball shaped head for denture stabilization, instead of classic abutment (figure 2). After 3 months of healing time for Osseointegration, patient was recalled to clinic for prosthetic procedure (figure 3). Alginate preliminary impression for both arches were obtained and followed by fabrication of

individual trays, which refined borders with molding compound. Final impressions were made with zinc oxide eugenol impression materials, with ball abutment impression copings for mandibular arch (figure 4). The master casts were poured to fabricate record bases and occlusal rims with metal housing in the mandibular record base. Vertical dimension, occlusal plane and lip support were evaluated and duplicated with record bases and occlusal rims. Face bow transfer with the interocclusal record were obtained by using vinyl polysiloxane bite registration material. The master casts were then mounted on a semi-adjustable articulator. Vertical dimension, lip support, and phonetics were re-evaluated with wax dentures after denture teeth were arranged. Before packing, ball abutment metal housing was removed from mandibular wax denture. Dentures were then delivered and tissue adaptation was first assessed in the oral cavity. Finally, maxillary and mandibular dentures were delivered to patient without metal housing and O-ring female part (figure 5). The metal housings with O-rings were picked up with auto polymerizing resin after two appointments of denture adjustment to get rid of sore spots and occlusal interference. The relief area was provided inside the mandibular denture to create space for new acrylic resin to encase the attachment. The relief holes were drilled on the relief space to ensure passive seating over abutments and attachments. Simultaneously, the white block-out spacers were used to prevent acrylic resin from being locked into undercut areas. Manual stabilization of the mandibular denture preceded patient's closure into centric occlusion during polymerization of acrylic resin. After resin polymerization, the denture was removed from oral cavity and was confirmed that stability and adequate encasement of the attachment housing in the acrylic resin (figure 6). The patient was instructed with the insertion and maintenance of the dentures after occlusal adjustment and the verification of soft tissue adaptation. The patient was well trained to use the new dentures, and was satisfied with the good stability and better retention of the mandibular denture (figure 7)



Figure 1: Pre-operative pictures



Figure 2: 2 IMPLANTS (2.5 × 11 mm) in place



Figure 3: Post Operative OPG of patient



Figure 4: Lower final impression with implant analogues in place



Figure 5: Complete Denture Fabricated



Figure 6: Lower denture with nylon caps in place after pick up with self cure acrylic resin



Figure 7: Complete denture in place intraorally extraoral view of patient after denture insertion

DISCUSSION

Though dentistry has evolved a lot in last few decades, but the problem of retention associated with the conventional complete denture given in compromised residual ridges still persists. Dental implant retained over dentures have proven to be satisfactory treatment option to enhance the retention of dentures, but there are obvious limitations associated with this therapy. Conventionally used regular diameter implants cannot be used if the bone volume is not sufficient, or bone augmentation can either not be

performed or has failed. In such cases very small diameter mini implants can be used to retain overdentures.¹ There may be certain physiologic advantages of mini implants over wider implants. Due to very small osteotomy prepared, the blood supply at the osseous crest is not remarkably compromised.^{6,7} Also mini implant supported over dentures are naturally subjected to immediate gradual bone loading due to one-piece nature of the implant and abutment. According to Wolff's law, gradual bone loading is associated with superior bone healing.⁸

Also because of the smaller surface area of the implant body, metal fatigue leading to implant fracture can happen if insertion torque is too high.⁶ To avoid complications related to implant overloading, fatigue and fracture, multiple mini implants should be used and they should be splinted if possible.⁴ Hence, they are ideally not suited for patients with bruxism and parafunctional activity due to high uncontrolled forces seen in them.

The discussed case has been rehabilitated with two mini implants for retaining the mandibular complete denture. Though splinting of mini implants is recommended but due to limitation of the available prosthetic space, non splinted ball abutment retained over denture was given in this case. The patient response was very satisfactory.

CONCLUSION

In selected edentulous complete denture wearers having poor bone volume, multiple very small diameter, or mini implants may be used to retain the dentures. This therapy increases the comfort and satisfaction of the patients with minimal investment in terms of time as well as money.

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