

Implant Supported Overdenture-A Better Treatment Modality for Edentulous Mandible : A Case Report

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Abstract

Implant supported overdenture is currently experiencing more popularity as a standard of care for the treatment of edentulous mandible. Clinical outcome of this treatment is significantly better and is also best suited for patients having severely resorbed ridges. The patients having financial limitations cannot afford adequate numbers of implant to ensure a fixed restoration, so the implant supported overdenture is a better treatment modality with high success rate and high degree of satisfaction. This case report describes a simple, economical method of placement of two implants in the mandibular interforaminal region and simplifies the chair side technique for incorporation of attachments with unsplinted ball abutments in conventional complete mandibular denture.

Key Words: Ball attachment, Conventional complete denture, Implant supported overdenture, Resorbed alveolar ridge.

Introduction

Conventional complete dentures were the only kind of treatment available for edentulous individuals since decades. Conventional dentures rely upon the condition of residual alveolar ridge and mucosa for the purpose of retention, stability and support. Due to continued bone resorption, the adaptation problems i.e. loosening of dentures are observed with a higher incidence for mandibular dentures than the maxillary dentures.¹ As resorption in completely edentulous cases of mandible occurs four times that is about 0.4mm vertical resorption per year than maxilla.^{2,3} Inability of chewing hard food, poor retention, and stability of lower denture is the main concern for the patients having resorbed residual alveolar ridges so rehabilitation of such types of edentulous condition in conventional manner could not solve their problems either functionally or psychologically. For improving the height and width of alveolar ridge, various pre-prosthetic surgical procedures were performed in the past. Even after such invasive procedures the level of satisfaction was not up to the mark so in regard to improve the mastication, function, comfort, phonetics and esthetics, nowadays implants became an important treatment modality with high success rate.

The ability to restore the atrophic mandible with endosteal implants has bring about radical changes in dentistry.⁴ Several treatment options with implant have been described for mandibular edentulous patients.⁵ For many years, osseointegrated

implant-supported overdentures have been used in the rehabilitation of the edentulous lower jaw with excellent results.⁶ Completely edentulous elderly patients can benefit from implant-supported overdentures when they lose their teeth at an advanced age and are not capable of wearing mandibular denture or when, after having dentures for many years, they begin to lose their motor skills and are no longer able to wear complete dentures. This could be accomplished by fabricating an implant supported overdenture, fixed prosthesis, or removable prosthesis.⁷ Misch proposed 5 prosthetic treatment options available in implant dentistry that are FP 1, FP 2, FP 3, RP 4, RP 5. FP 1 is a fixed prosthesis that replaces only the crown and looks like a natural tooth. FP 2 is a fixed prosthesis that replaces the crown and a portion of the root, crown contour appears normal in the occlusal half and elongated or hyper-contoured in the gingival half. FP 3 is a fixed prosthesis, replacing missing crowns and gingival colour and a portion of the edentulous site, prosthesis must often use denture teeth and acrylic gingiva, but may be porcelain to metal. RP 4 is the removable prosthesis that is supported completely by implants and this design requires about 5 to 6 implants in mandible and 6 to 8 implant in maxilla. RP 5 is a removable prosthesis that is supported by both implants and tissue. RP 4 design is for patients who have advanced ridge resorption, so a removable flanged prosthesis may be preferable to provide facial support and hygiene access. The implant supported overdenture requires placement of four to six implants in the anterior region and should be rigidly connected with a bar superstructure.⁸

Patients with knife-edged ridges, or sharp mylohyoid projections, or superficial placement of the mental nerve would benefit from this design.⁹ In RP-5 design the prosthesis is supported by implant and tissue both so fewer numbers of implants are needed. Economic factors may dictate the use of an overdenture supported by a few implants, notwithstanding possible additional maintenance costs associated with a removable design. A prosthesis that would require excessive cantilevers to obtain necessary occlusal contact would likely to be better designed as an overdenture that uses tissue support. This may be helpful with unfavourable arch relationships with moderate to advanced resorption. In case when mandible is opposed by a maxillary resorbed jaw, overdentures lend greater stability than a fixed detachable prosthesis.⁸

In contrast to maxillary overdentures, treatment outcomes with mandibular

overdentures appeared to be more successful and are better documented, particularly for elderly patients.¹⁰⁻¹⁶ Overdenture is supported by various types of attachments e.g. Bar, Locator, Ball/O-ring, Magnets etc.¹⁷ Ball attachment consist of post that is connected to the implant abutment, metal housing and doughnut shape O-ring which is a part of the denture. Locators are similar to ball attachment but their male component is the part of denture and female component is connected to the implants, due to smaller in size they may be superior in cases of reduced interarch space. Bar attachment consist of a metal bar that splint two or more abutments and a can be of two type single sleeve or multiple sleeve bar joints e.g. Dolder bar, Hader bar etc.

This case report described the placement of two endosteal implants between the interforaminal region with unsplinted Ball attachments and conversion of existing conventional complete mandibular denture to implant supported mandibular over denture by using a simplified chair side technique.

Case Report

A 53-year-old male patient reported to the Department of Prosthodontics at the Seema Dental College and Hospital with a chief complaint of difficulty in chewing and loosening of the mandibular dentures. Dental history revealed that patient had undergone uneventful full mouth extractions 5 years back due to periodontal involvement and had made two pairs of conventional dentures, but was not satisfied functionally and psychologically. There was no history of systemic illness.

Intraoral examination revealed Misch Type 2 division of edentulous arch with U-shaped hard palate and deficient ridge height posteriorly. Mandibular ridge was irregular with sufficient ridge height and width anteriorly between the mental foramen and also with normal labial, buccal mucosa and floor of the mouth. No hyperplastic or flabby tissue was found. Class I ridge relationship with inter-ridge space of 13mm was observed. (Fig 1) All vital signs and blood investigations were within the normal range.

For radiographic investigations Orthopantomogram (OPG) was done and to calculate the magnification error a template was fabricated with incorporated metal sphere of diameter 5mm and thus effectively evaluated the distortion of image by using simple equation ($A \text{ real} / A\text{-PR} = D\text{-real} / D\text{-PR}$). (Fig 2, 3)

Procedure

1. After completion of examination and investigations. Complete denture for



- maxillary and mandibular arch was fabricated in conventional manner. Post insertion issues were addressed favourably and patient was recalled after 15 days for implant surgery. (Fig. 4)
- Soft and hard tissue height was re-evaluated clinically and compared with radiographic diagnostic image to visualize a possible anterior loop of mandibular neurovascular canal. The goal was to place implant at least 2mm in front of mandibular nerve. (Fig. 5)
 - Bilateral mandibular block was administered to the patient (Lidocaine 2% with 1:200,000 Adrenaline).
 - OPG and Bone gauge were used to standardize length and width of Adin Dental Implant System that was 13.5mm and 3.35mm respectively.
 - Crestal incision was made with B.P handle with blade no. 15 and flap was reflected with Periosteal elevator. At required sites, Rongeur forceps was used to remove sharp edges, irregularities and no. #6 round bur was used to create dimple in the recipient site so as to allow easy initiation of twist drill hole. (Fig. 6)
 - Twist drill of diameter 0.2mm was used as a starter drill with a speed set at 2500rpm with copious irrigation of normal saline (15ml per minute). Then force direction indicator (parallel pin) of 0.2mm diameter was placed in prepared hole and angulation was checked to aid in parallel implant site preparation. (Fig. 7)
 - After checking parallelism, the depth drills of diameter Ø 2.8mm, Ø 3.2mm and Ø 3.65mm were used.
 - Two implants were placed in the mandible between the anterior interforaminal regions i.e. one each predetermined site. Flap was closed after placing healing abutment with interrupted sutures. (Fig. 8, 9)
 - Suture was removed after 14 days.
 - Patient was recalled after 3 months, and radiograph OPG was taken to evaluate the osseointegration status with implants. (Fig. 10)
 - Healing abutments were replaced by the ball abutment into the implant with Torque Wrench or Ratchet Wrench (recommended torque is 25 N/cm). Metal housing with nylon ring was placed over the ball abutment and block-out was done using sticky wax and rubber sheet. (Fig. 11, 12)
 - Pressure-indicating paste was used to transfer the marking from the metal housing to the tissue surface of the mandibular denture prosthesis and marked area was relief in denture to accommodate passive fit when seated over the attachments.
 - Self cure acrylic resin was mixed in conventional manner and injected in to the relief area and denture was seated into place.
 - Processed implant supported overdenture (RP-5) was removed, finished and

polished once self cure acrylic has set. (Fig. 13).

- Implant supported mandibular overdenture opposing the maxillary conventional denture was inserted in patient mouth. (Fig. 14). Oral hygiene and maintenance instruction were given. There was increased patient acceptance. Patient was recalled and necessary postinsertion adjustments were done for a regular period of time. There was improvement in retention, stability, function, and also high degree of satisfaction was observed with of mandibular implant supported overdenture in place. Esthetics was restored and there was rebuilding of self confidence in patient.

Discussion

Implant supported mandibular overdenture with a few interforaminal implants are regarded as a boon for treatment of edentulism due to the limitation of anatomical conditions of ridge, additional surgical procedures and also the cost of the implant therapy. In addition implant supported mandibular overdenture is advantageous for older patients who had complete dentures for many years, but lose their motor skills and no longer able to wear a complete denture. When overdenture prostheses are supported by both implants and mucosa, fewer implants may be needed,¹⁸ as number has been shown to be of minor importance for the treatment outcome of the patients.¹⁹

Batenburg et al¹⁴ evaluated 60 mandibular overdenture patients divided into two groups: first group was treated with 2 implants and other with 4 implants and found that no significance difference in peri implant health. Even with increasing the number of implants from 2 to 4 there is only a slight improvement in retention, stability and function as reported in retrospective study done by Mericske-stern's¹⁰ In 1987, Van Steenberghe et al proposed placement of two implants in edentulous mandible with success rate of 98%.²⁰ Implant supported mandibular overdentures using two isolated abutments are successful treatment options but they can be demanding in periodic continuing care.^{21,22}

The Photoanalysis done by Kenney and Richards indicated that ball/O ring transfers less stress to the implants and also minimized the denture movement.^{23,24} It is mostly used as it is economic, less technique sensitive and easy to clean when compared to bar attachment.^{6,13,25} A study done by Krennmair and Ulm evaluated that when Bar-clip attachment was retained by two implant mandibular dentures at initial evaluation and 10 years of function showed no marked increase in satisfaction level. Moreover, there is less potential for mucosal hyperplasia when using a mandibular implant denture with ball attachment opposing the conventional complete maxillary denture.²⁶ Generally a minimum of 5 to 6mm of vertical space is needed to accommodate the implant

attachment. When the amount of inter arch space is not adequate the locators abutments can be a better option than ball attachments.² Magnets can be used as a attachment system in the cases having less interarch space. It is cost effective and there is ease of placement (automatic seating) but they are less retentive when compare to other attachment systems even have poor corrosive resistance within oral fluid which makes it less demanding then other systems used.

A variety of techniques have been reported in the literature for the incorporation of attachments in implant supported overdenture with unsplinted or individual abutments. Bulent and volkan described a 2-stage impression technique that records mucosa in functional state and placement of implant components accurately but disadvantage of this technique is that it is time consuming.²⁷ A chair side technique was discussed in this case report when implants are in relatively parallel position and minimal alveoloplasty was performed and technique is less expensive, require single step procedure, and the seating of attachments can be confirmed instantly²⁸ without compromising esthetic state and function.²⁹

Conclusion

Management of severely resorbed ridges always poses a great challenge to the prosthodontist in rehabilitation with conventional complete denture therefore implant supported overdenture has gained considerable acceptance by the professionals/patients. Here a technique for the fabrication of implant supported mandibular overdenture was described which was easy to use, versatile, economical, acceptable, less traumatic, and less time consuming. Even the patient with implant supported mandibular overdenture opposing the conventional complete maxillary denture was highly satisfied and showed increased masticatory performance, improved esthetics appearance, nutritional intake, and marked increase in retention, stability and support when compared to conventional complete denture.

References

References are available on request at editor@healtalkt.com

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 Fig. 14 Post operative view





Fig. 1

Fig. 2



Fig. 3

Fig. 4

Fig. 5



Fig. 6

Fig. 7

Fig. 8

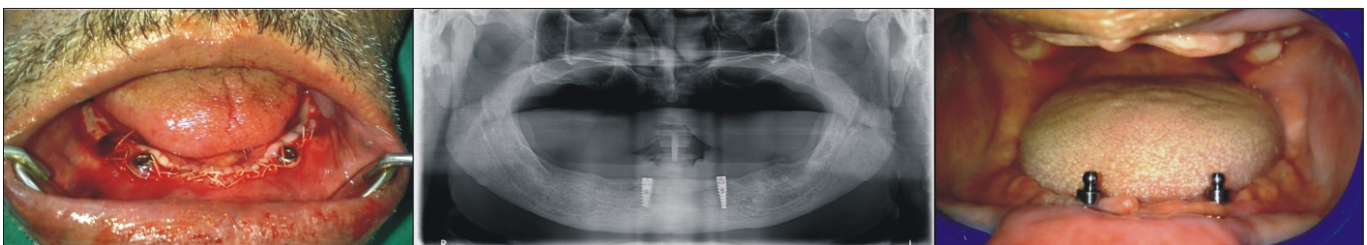


Fig. 9

Fig. 10

Fig. 11

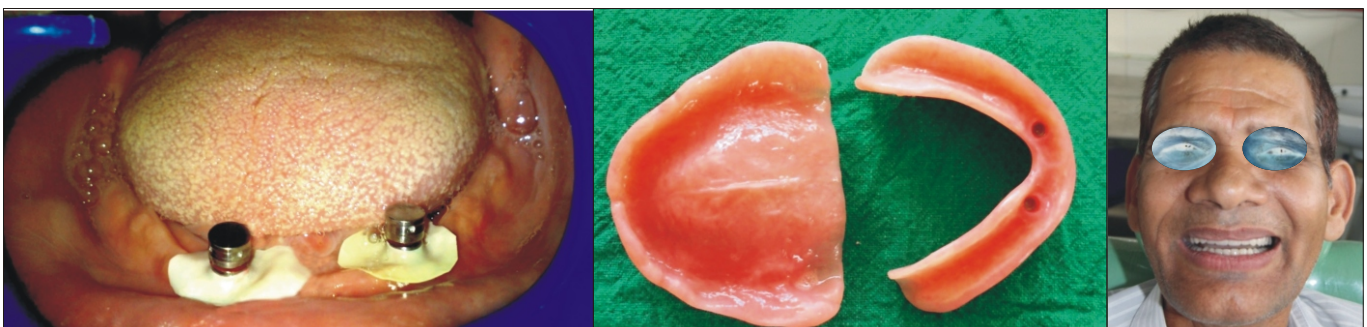


Fig. 12

Fig. 13

Fig. 14

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