

Implant Supported Overdenture: A Step Ahead From Edentulism - A Case Report

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Abstract: *Prosthetic rehabilitation of an edentulous patient with resorbed ridges involves various treatment approaches such as complete dentures, implant supported fixed prostheses and implant supported overdenture. Complete denture in resorbed cases provides limited retention and stability hence ultimate acceptance by patient is reduced. Implant supported fixed prostheses gives a feel of natural teeth and a sense of satisfaction. But it is very costly, time consuming treatment requiring careful maintenance and in patients with inadequate lip support, it does not restore esthetics whereas implant-supported over denture provides excellent retention, stability, esthetics with cost effective approach. It offers many practical advantages over conventional complete dentures and removable partial dentures. These include decreased bone resorption, reduced or eliminated prostheses movement, better esthetics, increased occlusal function and maintenance of the occlusal vertical dimension. In addition, implants supported over dentures also improve phonetics, the patient's psychological outlook and quality of life. This case report, intends to describe a patient with edentulous upper and lower arch. Because of resorbed lower arch the complete denture was not stable, so to meet the patient's demands, implant supported over denture was planned. Treatment approach was modified at some steps to improve quality and longevity of restoration. The final restoration was stable, well retained and esthetically pleasing.*

I. Introduction

Edentulous patients are a diverse group comprised of those who are anatomically deficient, medically compromised, economically depressed, geriatric, congenitally deformed, genetically affected as well as general population for a number of other reasons have been rendered edentulous.¹

Edentulous patients having severely resorbed mandible often experiences problems with their conventional dentures such as limited denture stability and retention leading to reduced masticatory efficiency and dissatisfaction. It has shown by several studies that several different strategies have been introduced to overcome the problem, such as use of dental implants, in the form of implant supported overdenture and implant supported fixed prostheses. Implant supported fixed prostheses feels like natural teeth with improved masticatory efficiency and sense of excellent satisfaction. It is very costly and time consuming treatment, requiring careful maintenance and it cannot be used in patients with poor lip support as fixed prostheses does not have flange to support lip as it is provided in complete denture and overdenture. Implant supported overdenture gives denture with excellent retention and stability. It is cost effective and time saving approach as compared to fixed prostheses. It also offers many practical advantages over conventional and removable partial dentures such as reduced rate of bone resorption, reduced or eliminated prosthesis movements, better esthetics, increased occlusal function and maintenance of the occlusal vertical dimension, improve phonetics, the patient's psychological outlook and quality of life.²

II. Case report

A 53 year old male patient reported to the Department of Prosthodontic, Government Dental College and Hospital, Aurangabad, with the complaint of loose fitting lower denture. Edentulous upper and lower U-shaped arches were present. Upper arch was sufficient in both height and width whereas lower arch was insufficient in height. He was using a set of complete denture since one year but not satisfied with its performance as the lower denture was not stable. Preoperative view shown in fig no.1



Fig no.1- Pre operative extra-oral and intra-oral view

Treatment approaches were explained to the patient. Implant supported fixed prostheses option was excluded as it will not improve patient's lip support and it is costly, requires high maintainance and time consuming. After obtaining informed consent from patient, upper complete denture and lower implant supported overdenture on four implants was planned.

Treatment was divided into three phases -1. Diagnostic denture fabrication 2. Implant placement 3. Definitive prosthesis fabrication.

Diagnostic denture was fabricated to use it as radiographic and surgical stent and also to evaluate the amount of available space for overdenture attachments. Using conventional technique, trial denture was fabricated which was duplicated in alginate impression material and by using clear auto-polymerizing acrylic resin, duplicate denture was made. Radiopaque markers were placed into it to use that as a radiographic stent and CBCT was recorded (fig no.2). Analysis of CBCT was done and two implants of 3.3× 10mm and two implants of 3.5 × 8 mm dimensions were planned to place in inter-foraminal region at A, B, D, E positions. From ridge crest to incisal edge of lower anterior teeth, 13mm of space was available for attachment placement. Hence lower denture with castable bar and clip attachment was planned. Radiographic stent was then converted into surgical stent. Implants were placed using two stage surgery. After 3 months of osseointegration, second stage surgery was carried out and healing abutments were placed. (Fig no 3)

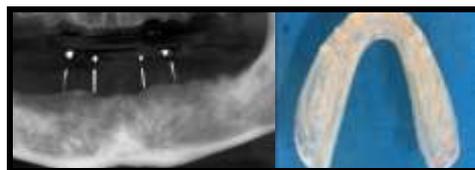


Fig no.2-CBCT image. Radiographic stent



Fig no 3-Placement of healing abutment

After two weeks of healing, definitive prosthesis fabrication was started. Primary impression in irreversible hydrocolloid was made. Upper final impression was made using conventional technique. For lower final impression, custom tray was fabricated and window was created for splinted open tray pick up/direct impression of implants. Border moulding was completed. Then open tray impression copings were placed over implants. Low viscosity polyvinyl siloxane was loaded in the tray and placed intraorally. Dental floss was entangled in between implants and reinforced with pattern resin. It will splint copings to each other rigidly so implant angulations will not change and position will be maintained. After complete polymerization, the copings were loosened and tray was removed.(fig no.4) Upper conventional and lower soft tissue cast was fabricated.



Fig no. 4-Window prepared and impression copings placed. Thread entangled in between copings for resin reinforcement. Pattern resin applied to splint the copings. Completed final impression.

Auto-polymerizing acrylic resin was used to fabricate denture bases. Lower denture base was relined with low viscosity polyvinyl siloxane impression material so that it will be stable during jaw relation recording. Using facebow record, upper cast was mounted and then centric relation was recorded.

As we were giving implant supported overdenture, implant protected occlusion will improve longevity and masticatory efficiency of prostheses. Hence lingualised occlusion was given and try in was done (fig no.5).



Fig no 5- Lingualised occlusion

Putty index of lower trial denture was made (fig no.6). Bar was fabricated using this putty index as a guide for space assessment (fig no.6). Then bar was tried into the patient's mouth and fitting was checked radiographically (fig no.7)



Fig no. 6- Occlusal index of putty. Vertical height of bar wax pattern verified with guide



Fig no 7- Radiographic view of bar in position

.As we have done the teeth setting over the record base that was adapted over healing abutments, we have to modify the teeth setting according to the bar framework. Hence window was created in the record base all along the bar framework area (fig no.8) and teeth setting was modified accordingly and again try in was carried out.



Fig no. 8- Bar in place. Window prepared for teeth setting modification

Cast with bar framework was duplicated and a new cast was fabricated to carry out the denture processing and clips were incorporated using indirect method. Metal housing with nylon rings were placed over bar framework after dewaxing (fig no.9) and processing was carried out. Denture finishing and polishing was done in conventional manner. Finished lower denture with female component shown in (fig no.10). Patient with final prosthesis (fig no.10)



Fig no. 9- Clips in place for indirect method of clip incorporation



Fig no. 10- Final prostheses

III. Discussion

Complete dentures have been the standard treatment of edentulous patients from many years. Many complete denture wearers have significant problems in adapting to the mandibular prosthesis. Such complete dentures have many disadvantages such as continued ridge resorption with fibrous replacement, compromised retention and stability, displacement of complete dentures during mastication, phonetics. Treatment of edentulous mandible with an implant-supported mandibular overdenture has been advocated by Mericster Sten¹ in elderly patients who require stabilization of their mandibular complete denture. However, a panel of expertise the McGill consensus agreed due to overwhelming evidence that the implant over denture should be considered as a first choice standard of care for the edentulous mandible¹. They offer several advantages as reduces bone loss, improves esthetics, improves stability, improves occlusion, decrease in soft-tissue abrasions, improves chewing efficiency and force, increased occlusal efficiency, improves retention and support^{2,3}.

The use of implant-retained dentures has been an alternative for treating the edentulous mandible, since it allows fixation of the prosthesis to the edentulous ridge. This has encouraged dental professionals to display and perform prostheses, such as overdentures retained by implants, as an option to solve the problem of edentulous patients. Treating patients by implant placement is a popular option for restoring function and esthetics, and for improving oral function, masticatory efficiency and individual satisfaction.^{2,3} There is still some debate regarding the number of implants required to properly support dentures. Studies have shown good results for oral rehabilitation with implant-retained prostheses; however, over dentures with 4 implants has been proved to be more successful than 2 implants with respect to clinical characteristics, patient satisfaction and ease of care.⁴

Various attachment systems are available for overdenture as stud, bar, magnets, telescopic crowns etc. Numbers of authors have conducted study to evaluate the success of attachment system in regard with retention. Isabelle de SD concluded in his study that mandibular overdentures with 4 implants showed better results with respect to survival and success rates, especially those with a bar connection.^{4,5} Bar framework splints all implants together so the occlusal forces will get equally distributed. Hence in this case report, overdenture supported by four implants and bar framework was fabricated.

Modifications in prosthetic approaches were done so that it will help to improve the prosthesis longevity and improve masticatory efficiency. During open tray implant level impression making, dental floss was entangled in between impression copings so that it will reinforce the pattern resin.⁶ Pattern resin was applied over floss so that impression copings will be splinted together rigidly. Assunção,⁵ Heeje,⁶ Paolo Vigolo,⁷ Filho HG⁸ concluded in their study that splinted impression technique using dental floss and pattern resin, resulted in an accurate implant level impression.⁶⁻⁹ Auto-polymerizing acrylic resin record bases will not be stable over healing abutments so the lower denture base was relined with low viscosity poly vinylsiloxane.¹⁰ Modified occlusal scheme (lingualised occlusion) was used for teeth setting.^{5,11} In this, lower posterior teeth were placed in more medial position as compared to conventional so that more vertical forces will be generated over the maxillary bone, reducing tipping that ultimately improves upper denture stability. Lingual contact occlusion was given in that only one cusp i.e. upper lingual cusp occludes with lower central fossae and that will narrow the occlusal table, reducing forces required for crushing the food.⁵ Occlusal index of lower trial denture was fabricated to evaluate the amount of available space for overdenture attachments and to use as a guide during teeth setting modifications.¹² After fabrication of bar framework, teeth setting were modified accordingly so that it will improve tooth position, loading of occlusal forces and aesthetics. For processing, cast was duplicated so that it will minimize post-processing adjustments. Incorporation of clips into the denture was carried out by indirect method as heat processed acrylic resin was used to attach clips so that irritation due to residual monomer will not be there. It doesn't require blocking out of undercuts. It also improves strength of denture so chances of denture fracture will be reduced.¹³

Summary:

This article describes a case report of edentulous patient who was experiencing limited retention and stability with his existing lower denture. Hence to overcome the problems upper complete denture and lower

implant supported overdenture was planned. Modifications were done in prosthetic approaches so that the restoration's longevity and prognosis will be improved. Implant supported overdenture gives excellent retention, stability, improved masticatory efficiency, psychological relief, and increases patient's acceptance.

Hence this treatment modality should be practiced routinely .It will preserves hard tissues and soft tissues of the patient and gives psychological relief to the patient which he expects from the dental treatment.

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