International Journal Dental and Medical Sciences Research
Volume 5, Issue 2, Mar - Apr 2023 pp 368-374 www.ijdmsrjournal.com ISSN: 2582-6018

Tooth Retained Maxillary Overdenture and Implant Supported Overdenture: A Notion Engaging Preventive Prosthodontics – A Case Report

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Date of Submission: 12-03-2023 Date of Acceptance: 22-03-2023

ABSTRACT
The most frequently encountered problems with conventional complete dentures are Retention and stability which in turn affects Phonetics and Mastication. To overcome these problems either Tooth supported over dentures or Implant supported over dentures are preferred. Good bone quality, Adequate Bone and teeth support and adequate tissue coverage must be present to distribute the amount of stress concentration thereby reducing the rate of resorption process.
The concept of over dentures may not be the elixir, but definitely helps in preservation of bone and through the sensory inputs from periodontal receptors, Teeth retained overdentures offers better proprioception and both Implant supported and Teeth retained overdentures provides better patient satisfaction by improving the functional ability.
This article is about a Case report including Maxillary Teeth retained over denture with opposing Implant supported overdenture on edentulous mandible its fabrication, objectives and limitations. Finally, it is concluded that to improve the success rate of any prosthetic treatment, careful evaluation of case is very important that influence the Prognosis and outcome of the treatment.

I. INTRODUCTION

Back in the day, dentures were made purely on the operator's judgement until gradually, in the 19th-century concepts of retention, stability, support, occlusion, the relationship between musculature and dentures was developed and understood. Later importance of maxillo-mandibular relations was emphasized. All these factors were developed and comprehend for better rehabilitation.
Conventional complete dentures most often cause inconvenience to patients due to their instability causing difficulty in speech and mastication thereby lacking comfort.
So, other treatment modalities apart from conventional complete dentures for edentulous patients are,
- Tooth Retained Overdentures
- Implant-Supported Overdentures (where both are removable prostheses)

Proper Diagnosis and discussing it with the patient is very important to formulate the treatment plan. It is done by scrutinizing diagnostic casts, and with appropriate radiographs, tentative maxilla-mandibular relation records, a clinician can make significant interpretations regarding treatment plan formulation.
In this article, a case report regarding maxillary Teeth retained Overdenture with opposing Implant Supported Overdenture is discussed.

The absence of periodontal ligament is associated with a variable but an inevitable time-dependent reduction in residual ridge dimensions. To avoid this atleast two or more coronally modified / endodontically treated teeth are used as abutments that give better retention, stability, and support to dentures and also provide proprioception which will not be present in conventional complete dentures.(3)
Pre-prosthetic and Prosthetic mouth preparations regarding existing oral condition also implicate the success of final treatment which include periodontal treatment, endodontic treatment, post space preparation,etc.,(15,16)
According to Prieskel, abutment preparation for overdentures can be done in 3 ways;
-Bare root face
-Dome-shaped metal copings (use of attachments)
-Thimble-shaped copings.(6,14)

Most of the clinicians avoid providing attachments in case of teeth-supported overdentures due to cost, reluctance to grasp the intricacies of their indications and applications.(3) But, the use of attachments provides better esthetics and aids in function.
Based on the number of abutment teeth present and their alignment and the amount of inter arch space present the Attachments are selected.(8)
In the case of Edentulous mandible, **2** Implant-based Overdenture is considered due to the primary stability achievement based on the inert nature of bone and with a fewer number of implants when

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compared to other fixed implant-supported restorations makes it simpler, cost-effective and by reducing the need for bone grafting thus making it as the better choice of treatment.[9]
It is called Implant overdenture because denture fits over the top of the implants.
The concept of Overdentures is mainly to distribute stress concentration among abutments and denture supporting soft tissues.[3]
The Implant Supported Overdentures have better psychosocial, functional, and anatomic/biologic benefits compared to other conventional ones.[1]
In Implant-Supported Overdentures also a variety of Abutment based Attachments can be used such as Bar and clip attachments, Ball attachments, Magnets, resilient Stud attachments such as locators, etc., based on the discrete clinical condition of an individual patient.[16]

II. CASE REPORT

A 55-year-old female patient presented to the Department of Prosthodontics, at C.K.S Theja instituteof dental sciences and research, Tirupati,India with the chief complaint of difficulty in chewing food due to missing teeth on upper and lower arches. There was no relevant medical history affecting prosthodontic treatment. On Extraoral examination, no gross abnormality was found. (Fig 1) Intraoral examination revealeda partially edentulous maxillary arch with only 14 & 24 teeth intact with opposing completely edentulous mandibular arch with less amount of optimal foundation present for denture bearing. (Fig 2) The maxillary and mandibular ridges were in class I ridge relationship.

The different treatment options available for this patient includes:

1. Extraction of remaining teeth followed by conventional Complete dentures on both maxillary and mandibular arches.
2. Extraction of remaining teeth followed by Implant-supported overdenture in both the arches.
3. Tooth-supported overdenture in the maxillary arch opposing conventional denture in the mandibular arch.
4. Tooth-supported overdenture in the maxillary arch opposing Implant-supported overdenture in the mandibular arch.

The treatment plan was formulated and it was decided to retain the remaining teeth and use them as abutments and fabricate an overdenture over the maxillary arch and planned an Implant-supported overdenture on the mandibular arch. Radiographic examination of the patient showed adequate bone support in relation to 14, 24, and dense compact bone in the mandibular anterior region without any signs of pathology. The blood reports of the patient were checked to rule out any pathology.
The treatment plan was explained to the patient and informed consent was obtained from the patient.

Procedure

Pre prosthetic mouth preparations

Oral prophylaxis was advised and then the remaining teeth 14, 24 were endodontically treated.

Prosthesis fabrication

After endodontic treatment has been completed the remaining teethwere reduced in vertical height to 2mm above the crest of the ridge. The tooth preparation was done to receive copings.(Fig 3) The preparation was rounded to minimize the horizontal torque on the roots. Primary impressions made with alginate and custom tray were fabricated. Border moulding was done with a green stick compound.(DPI PINNACLE)Metal copings were fabricated and tried on the patient. (Fig 4,5) Secondary impressions were made with silicone light body impression material. (FLEXCEED) (Fig 6,7) Master casts were fabricated. (Fig 8)Jaw relations were recorded and teeth arrangement was done and trial dentures were checked in the patient.(Fig9,10) The dentures were thenflasked and dewaxed for processing. After acrylization&deflasking, selective grinding was done. Finally, the dentures were finished and polished.

Incorporation of Nylon caps in denture

Rubber bands were placed to cover the height of contour of the stud attachment of the implant.(Fig 12) Female caps (nylon housings) were placed over the rubber band. The denture was seated and marking of housings was transferred onto the denture tissue surface.(Fig 13) Now the denture was reduced in order to provide space for housing. It was ensured that the patient had the same vertical dimension of occlusion as earlier. The self cure was sprinkled on the intaglio surface of the denture and denture was inserted back and the nylon cap was picked up in the denture. Now the rubber bands were removed and flash was trimmed off. The denture was adjusted and equilibrated and the patient was instructed to wear the denture.(Fig 15) Post insertion instructions were given. And the patient has beengiven a recall appointment. The following day, the mouth was observed for any sore spots and final occlusal

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adjustments were made. Thisdesigned prosthesis served as bothesthetic as well as a functional solution for this patient.

Implant Surgery

The mandibular complete denture was duplicated with clear acrylic to form the radiographic stent. Gutta-percha markers were placed in stent at the proposed implantation site. With the help of a surgical stent, the implant sites were marked in the patient mouth. Two implants of size 3.75 × 13 mm (ADIN Implant system) were placed in mandible, (Fig 11) between mental foramen, sequential drilling was done to prepare implant site while maintaining sterile surgical protocol. The mandibular denture was relieved from the implant site area to create passive fit while seating and retrieving. After 3 months of implant placement, the stud attachments were placed on the implants. After which, nylon caps were incorporated into the denture. After finishing and polishing of denture containing the nylon caps, occlusal equilibration was done intraorally.(Fig 14)

Fig 1:Preoperative photograph

FIG 2: Pre operative intra oral view

Fig 3: Tooth preparation done to receive metal copings

Fig 4: Metal copings on the cast

Fig 5: Intra oral view after placement of copings and Stud attachments of implants

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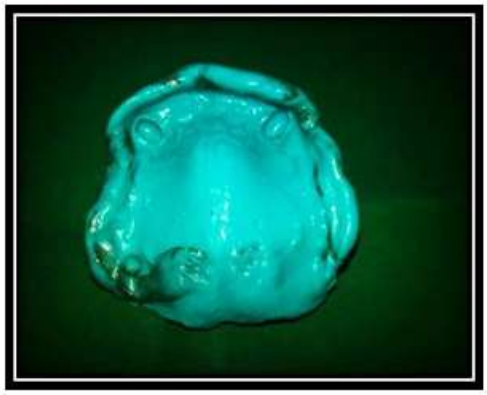

Fig 6: Secondary impression of maxillary arch

Fig 7: Secondary impression of mandibular arch

Fig 8: Master casts

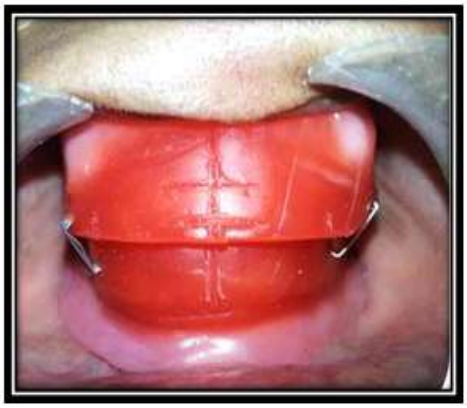

Fig9 : Jaw relations

Fig10 : Try in

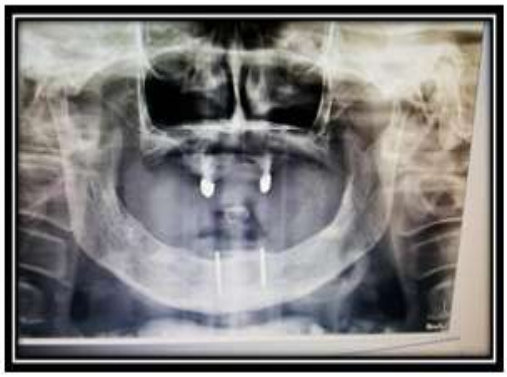

Fig 11: Radiograph showing abutment teeth with metal copings in maxillary arch and two implants in the mandibular arch

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Fig12 : Nylon caps over the stud attachments

Fig 13: Nylon caps incorporated into denture

Fig 14: Final dentures after finishing and polishing

Fig 15: Post-operative photograph

III. DISCUSSION

After tooth extraction, the alveolar process is reduced due to the bone resorption process in greateramounts in most individuals which is difficult topredictat the time of extraction. This loss leads to compromised retention while fabrication of the dentures. (11)

The possible way to prevent the bone loss of residual ridges is by avoiding extraction of all the teeth and retaining few teeth thereby preventing the resorption at a faster rate. (7)

The retained teeth are used as support to increase the stability and retention of the denture. (4) In cases where the natural tooth cannot be retained, an implant-supported overdenture can be planned if there is sufficient bone height and width. Jaws with implant-supported prostheses show less bone loss than jaws with conventional dentures because of more adequate functional stimulus to the bone via implants. (7)

An over denture is any removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants. (2)

A mandibular implant overdenture relying on two implants is thus a well-established and effective option in the long term perspective. Tooth/ implant-supported overdenture provides patients with better psychosocial,functional, and biological benefitssuch as patient satisfaction, better chewing ability and thereby improvingoral health-related quality of life.(7,13)

In this case report, toothretained overdenture is planned in the maxilla, and Implant-

supported overdenture is planned for edentulous mandible as it is simpler, cost-effective, and provides a better mechanical advantage compared to conventional dentures and also is mostly accepted by the patients. [9]

In the maxillary arch,premolarswere used as abutments for the overdenture. Root canal therapy is a necessary phase of preparation for the selected teeth; single-rooted or multiple rooted teeth with readily accessible canals are preferred. The short coping design showed the least amount of stress than other designs like tapered coping design & tapered coping with occlusal bearing design. This design minimizes horizontal torque on the roots and provides ease of maintenance and improves oral hygiene. Once the endodontic treatment is completed post space preparation was done and metal copings were cemented onto the prepared teeth.In this present case, stud attachments are preferred over other attachments as the stud attachment procedure is simpler, more retentive than others and the leverage forces acting are directed in a single plane.[10]

The dentures were fabricated in a conventional manner and insertion has been done and instructions were given to the patient regarding maintenance of dentures.

There are certain disadvantages along with advantages. Over course of time, nylon caps that are used become less resilient and need to be replaced[12] and more often require relining of dentures, and sometimes they might cause discomfort while seating and removing the dentures.

Maintenance of meticulous oral hygiene is necessary for the longevity of any prosthesis.[5]

IV. CONCLUSION

Overdentures have been favoured often because of mechanical advantages. Even though the retained teeth may be periodontally compromised, they still may provide sufficient support for the transmission of masticatory pressure and periodontal ligament receptors to initiate a jaw opening reflex. The abutments enhance support and stability of the denture and slow the rate of alveolar resorption. Implant dentures can be a simple, reliable, and cost-effective treatment for edentulous patients.

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