

TOOTH SUPPORTED OVERDENTURE: AN INNOVATIVE APPROACH TO MANAGE THE OVERCONTOURING AND ENCROACHMENT OF INTER-OCCLUSAL DISTANCE IN A CONVENTIONAL TOOTH SUPPORTED OVER DENTURE PROSTHESIS.

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Abstract

The prosthetic rehabilitation of partially edentulous arch by an artificial substitute is always a challenge for the Prosthodontists. There is always a problem of retention, stability and support of the artificial prosthesis. It is most difficult to satisfy the patients who have high retentive demands especially in the Mandibular removal partial denture prosthesis. This paper presents a case where in few remaining natural teeth of the patient was used to enhance the retention, stability and support of the mandibular tooth supported overdenture prosthesis. The over-denture tends to be bulkier and overcontoured encroachment of inter-occlusal distance is another disadvantage. The concept of overdentures works by means for delaying the process of complete edentulism and helps in the preservation of bone. And above all, it gives the patient the satisfaction of having prosthesis with his natural teeth still present.

In this article, case reports with an innovative approach to manage the overcontouring and encroaching of inter-occlusal distance which is generally encountered in a conventional tooth supported over denture.

Keywords: Over Denture, Natural teeth, Residual Alveolar Ridge, Primary coping, Secondary coping, Dental Ceramics.

Introduction

M.M. DeVan's Dictum states that "Perpetual preservation of what remains is more important than the meticulous replacement of what is lost". As per his statement it is said that one should try to preserve the remaining limiting and supporting anatomical structures of the denture to a great extent rather than just destroy it for the sake of replacement of tooth or teeth by an artificial substitute. M.M.Devan's concept is employed in tooth supported overdenture to a great extent wherein a complete denture overlies on retained teeth, tooth roots. This treatment is not a new concept and dental practitioners have successfully used existing tooth structures or retained roots to retain, stabilise and support the complete denture for more than a century. But in this prosthetic rehabilitation there has always been a problem of bulkier and overcontoured encroachment in the inter arch space.

This case report presents with an innovative approach to manage overcontouring of prosthesis both bucco-lingually

or cervico-incisally in a tooth supported overdenture prosthesis.

Case Report:

A 55-year-old patient visited the Department of Prosthodontics and Crown & Bridge, A.B.Shetty Memorial Institute of Dental Sciences, Mangalore, with the chief complain of inability to chew food properly due to many missing teeth in the mouth. He had a completely edentulous maxillary arch [Fig 1a]. Mandibular arch was partially edentulous with Kennedy class II modification 3. The tooth that was present in the mandibular partially edentulous arch were 33 and 35, 43 and 47. The period of edentulism for the patient was 3 years and it was because of multiple caries and periodontal problems. He had been wearing conventional complete denture and removable partial dentures in the maxillary and mandibular edentulous arches since then. The patient was not happy with the present prosthesis and wanted prosthesis with good retention, stability and support as compared to his existing dentures. No mobility and periapical pathology

was noticed with respect to the existing teeth in the mandibular arch when they were clinically examined and radiographically diagnosed. Clinical and Radiographic examination of the maxillary and mandibular edentulous arches revealed well healed round alveolar bone with well adherent alveolar mucosa which could provide good bony and mucosal support to the denture. The existing teeth were periodontally strong with long roots which could provide additional retention, stability and support to the denture. The different treatment options available for this patient's mandibular arch were implant supported overdenture and tooth supported overdenture. The patient rejected the option of an implant retained prosthesis because of the need for additional surgery, the longer duration of treatment phase and cost factor which was expensive.

Taking care of De Van's statement, it was planned to retain the existing teeth in the mandibular arch and tooth supported overdenture was planned for the patient.

Retained tooth abutments can give better retention, stability, and support to an overdenture and would also provide proprioception which would otherwise be lost with conventional denture treatment.

Treatment Plan:

The diagnostic or primary impression of the maxillary and mandibular edentulous arches was made with impression compound and alginate respectively. The diagnostic casts were poured with dental plaster and dental stone respectively. Wax occlusal rims were fabricated taking care of the reference points employed for its fabrication. It was tried in the patients mouth to determine the approximate vertical dimension of rest and occlusion. Vertical dimension recordings were determined by taking care of phonetics and esthetics. The diagnostic casts with the occlusal rims were mounted on to the articulator which helped in assessing the available inter-arch space. It was found to be adequate in the saddle areas but was not adequate in the tooth bearing areas.

Proposed abutment teeth 33 and 35, 43 and 47 were prepared on the diagnostic cast, and the ability to accommodate primary and secondary copings along with artificial teeth on the abutment tooth was assessed. It was found that the prosthesis was over contoured in the tooth supported areas as an abutment tooth along with copings which encroached the interarch space both cervico-incisally and bucco-lingually.

Planning was done so as to incorporate the ceramic crown in the secondary coping of the mandibular metal reinforced denture base. Metal Casting for the metallic denture base will be fabricated with the help of "Wirobond C" material which has the capacity to bond ceramic to

itself. Ceramic build up will be done on the secondary coping which is attached to the metallic denture base. Here the space of the secondary coping will be utilised for the ceramic crown which would be contoured on secondary coping itself.

After intentional root canal of 33 and 35, 43 and 47, the teeth was prepared with flat end tapered diamond point bur. [Fig.1b] The primary copings were dome shaped with parallel walls and was achieved by wax milling and carving. These were then sprued and finally casted with Base metal alloy (Hera P, Heraenium at cobalt chromium alloys, Heraeus Kulzer). The copings obtained were checked for fit in the patients' mouth and finally cemented with glass ionomer cement [Figure 2a]. The thickness of the copings should not be more than 0.5 mm. Primary impression for the maxillary arch was made with Impression compound (Kerr Impression compound) and with alginate (Vignette) for the mandibular arch. The impressions were poured and special trays were fabricated with self-cure acrylic resin. Border molding was done for both the arches with low fusing compound. Final impression for the maxillary and mandibular arch was made with light body elastomeric impression material (Reprosil, Dentsply Caulk [Figure 2b]). Master casts were prepared by pouring the impressions in Type IV gypsum (Ultrarock, Kalabhai Karson Pvt. Ltd.). Duplication of master cast was done with Phosphate bonded investment material. Secondary. Secondary copings and the pattern wax was adapted and attached to each other on the duplicated mandibular master cast [Fig 3 a]. This design of wax pattern was casted with "Wirobond c" metal pallets. The metal cast was deinvested, trimmed and polished [Fig 4a & b] and tried in the patients mouth and confirmed its fitness [Fig 5]. Ceramic build up was done on the secondary coping which was finally fired in the ceramic furnace at its suitable firing temperature [Fig 6]. Corner of the mouth was the reference for the canine tip to be contoured with the ceramic under the resting condition of the mouth. Then the self cure acrylic resin material was adapted to the maxillary and mandibular metallic denture base. Self cure acrylic resin material was adapted on to the metallic denture base over respective master cast after applying separating media. Maxillary and mandibular occlusal rims were fabricated. Maxillomandibular relations was recorded and transferred onto the semi-adjustable articulator with the help of face-bow [Fig 7&8]. Teeth setting and teeth arrangement was done [Fig 9], evaluated in the patient's mouth for vertical and centric relation, phonetics and finally esthetics. Vertical dimension was verified and centric and eccentric contacts checked [Fig 10a & 10b]. Patient's approval was taken, and the curing of the final denture was done in heat-cure acrylic resin. (Lucitone199 denture base material, Dentsply, Germany) [Figure 11]. Finally maxillary

metallic denture and mandibular tooth supported metallic overdenture was delivered [Fig 12].

Discussion:

The prospect of losing all the teeth can be very disturbing for the patient. It also brings down patient's morale as it is an indirect reminder for being dependent on others and losing senescence. In such conditions, overdenture option as preventive prosthodontic treatment modality should be regularly imbibed in our dental practices because of its innumerable advantages Crum and Rooney [12] graphically demonstrated in a 5 years study an average loss of 0.6 mm of vertical bone in the anterior part of the mandible of overdenture patients through cephalometric radiographs as opposed to 5.2 mm loss in complete denture patients. Miller[13] in his study concluded that alveolar bone resorption depends upon the variables like the character of the bone, the health of the individual, and the amount of trauma to which the structures are subjected.

In case of overdenture prosthesis, proprioception is maintained, [10] there is the presence of directional sensitivity; dimensional discrimination; canine response and tactile sensitivity.[14] The average threshold of sensitivity to a load was found to be 10 times as great in denture wearers as in dentulous patients.[15,16] Rissin *et al.* in 1978 compared masticatory performance in patients with natural dentition, complete denture and overdenture. They found that the over-denture patients had a chewing efficiency one-third higher than the complete denture patients.[17]

In this case report, Overdenture with primary and secondary copings having parallel walls is attained by metal milling, which enhances the retention of the prosthesis by friction fit (Mechanical retention). This case of Tooth supported overdentures with limited interarch space buccolingually and cervicoincisally, the space for the secondary coping was utilised as a ceramic crown. The strength of the denture was also enhanced by metal reinforced mandibular denture which was attached to the secondary coping, on to which later ceramic build up was done. Thus stress was reduced in the midline of the overdenture and around the copings, functional rigidity was improved. Occlusal stress to the underlying denture-bearing areas was distributed evenly thereby minimising the chance of denture fracture. The metal reinforced maxillary denture was fabricated as the maxillary denture base was subjected to more occlusal load because of tooth supported mandibular overdenture as stated by Rissin *et al.* in 1978.[17]

Conclusion:

Careful selection of the periodontally healthy abutment is important. The decision must first be made to retain the

teeth as overdenture abutments and then the interarch space availability should be evaluated. If inadequate space availability is present then space for secondary coping can be utilised for ceramic contouring of crown on it to avoid overcontouring and encroaching the interarch space. A tooth supported Overdenture is one of the treatment modality incorporating Preventive Prosthodontics concepts to the core.



Figure 1(a), (b): Preoperative intraoral Maxillary and Mandibular edentulous arch with prepared tooth with respect to 33,37,43, 47.



Figure 2(a) (b): Primary coping cemented on to the prepared tooth of Mandible and secondary impression made with elastomeric impression material.

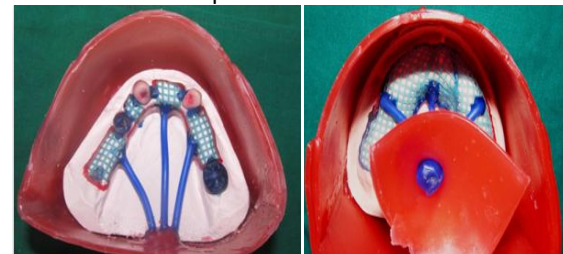


Figure 3(a) (b): Wax patterns adapted on to the duplicated cast made of PO₄ bonded investment material for metal casting.

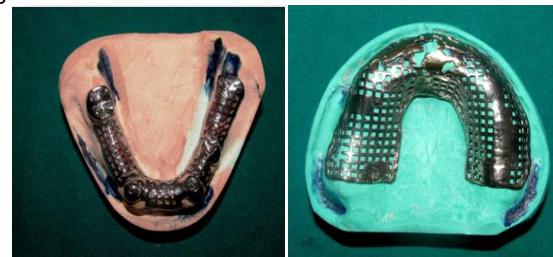


Figure 4(a) (b): Trimming and Polishing of the Maxillary and Mandibular metallic denture base.



Figure 5: Try in of Mandibular metallic denture base to which secondary copings are attached with respect to 33,35,43,47.

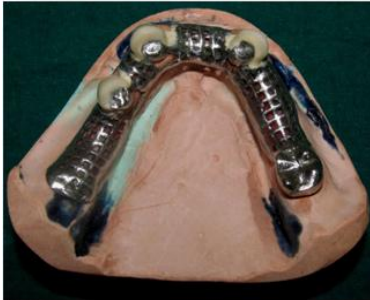


Figure 6: Mandibular metallic denture base after ceramic build up in the secondary copings of 33, 35, 43, and 47 is of full metal crown in tooth supported overdenture.



Figure 7: Face bow transfer after occlusal rim fabrication.



Figure 8: After Jaw Relation record and face bow transfer, mounting on to the Semi-adjustable articulator.



Figure 9: Teeth selection and arrangement.



Fig 10 (a): Try in of the Denture (Intra oral view)



Figure 10(b): Try in of the Denture (Frontal view)

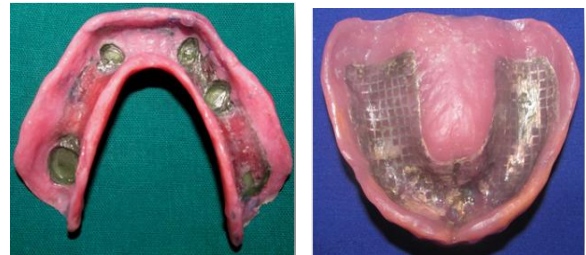


Figure 11: Processed Mandibular and Maxillary metallic denture with incorporation of secondary coping in Mandibular denture.



Figure 12: Preoperative and Post operative frontal view of the patient.

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