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Case Report

A simplified approach to mandibular tooth-borne overlay denture: a case report

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ABSTRACT

Tooth supported overdentures are considered as a viable treatment option for patients with very few retained teeth. The presence of 2 to 4 remaining natural teeth bilaterally spread, are considered ideal option for a tooth supported overdenture. Tooth supported overdentures have varied advantages such as minimally invasive, cost effective and better proprioception compared to implant supported over-dentures. This case study elaborates the clinical steps in the fabrication of a tooth supported mandibular overlay denture for a 71-year-old patient with a completely edentulous upper arch and only the premolars remaining in the lower arch. In spite of the varied modes of retention such as mechanical and magnetic, a frictional mode of retention is chosen in this case.

Keywords: Tooth-supported overdenture, Primary copings, Bite force, Abutment teeth

INTRODUCTION

An overdenture can be defined as "a removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants".[1] Unlike conventional complete dentures, tooth-supported overdentures are significant in retaining the remaining alveolar bone and preserving the periodontal ligament, thereby orienting the direction and magnitude of biting forces.[2] An implant-supported overdenture demands satisfactory systemic health conditions, such as appropriate age and absence of systemic diseases, for the long-term success of the prosthesis.[3] Hence, for patients who cannot opt for an implant overdenture prosthesis, a tooth-supported overdenture is considered a first-line treatment plan, which requires only a few remaining natural teeth with adequate periodontal health. This case report details the functional rehabilitation of a 71-year-old patient who presented with the complaint of a completely edentulous maxillary arch and a partially edentulous mandibular arch with only the premolars present. The patient was treated with a complete denture in the upper arch and a tooth-supported overdenture in the lower arch. The remaining mandibular premolars were endodontically treated, prepared, and used as strategic abutments supporting the overlay denture.

CASE REPORT

A 71-year-old male patient reported to the Department of Prosthodontics at JKKN Dental College and Hospital with the chief complaint of difficulty in speaking and chewing due to missing teeth in the upper and lower arches (Figure1). There was no significant medical history affecting prosthodontic treatment. Past dental history revealed the extraction of multiple teeth in the lower arch six months prior due to mobility resulting from periodontitis. Intraoral examination revealed a completely edentulous maxillary arch and a partially edentulous mandibular arch, with only four mandibular premolars present. The teeth were stable but showed mild attrition with a Smith and Knight (1984) Tooth Wear Index (TWI) score of 2 and Miller's Class II Gingival Recession (1985).

The residual alveolar bone height in the mandible was 20 mm, with Atwood's Order IV residual ridge resorption.

Figure 1: Preoperative.

The treatment procedure was initiated with a primary impression using impression compound for the upper arch and a putty impression for the lower arch (Figure 2). A master cast was obtained for the upper arch from a secondary impression using zinc oxide eugenol impression paste (Figure 3). A tentative jaw relation was then recorded, and the prosthetic space was estimated from the articulated casts (Figure 4). The inter-arch distance was found to be 15–17 mm, calculated from the highest occlusal points on the premolar teeth. Following this, abutment preparation was performed on the endodontically treated premolars. The teeth were reduced to 4 mm in height to accommodate cast metal copings of 0.5–1 mm thickness (Figure 5). After cementation of the copings, a secondary impression was recorded using polyvinyl siloxane wash impression material with a custom tray (Figure 6). A face-bow transfer was performed, jaw relation was recorded, and the casts were mounted on a semi-adjustable articulator (Figure 7). Teeth arrangement was carried out following conventional complete denture principles to give a bilateral balanced occlusion. A wax try-in was performed for the maxillary complete denture and mandibular tooth-supported overdenture, followed by denture fabrication with a metal mesh reinforcement. Denture insertion was completed and evaluated for occlusal high points and rough surfaces (Figure 8).

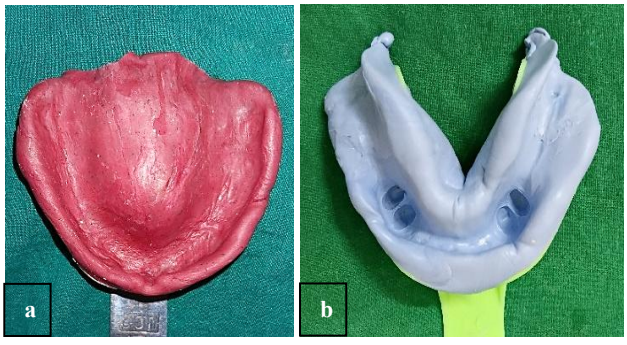

Figure 2 (a,b): Primary impression of maxillary and mandibular arch.

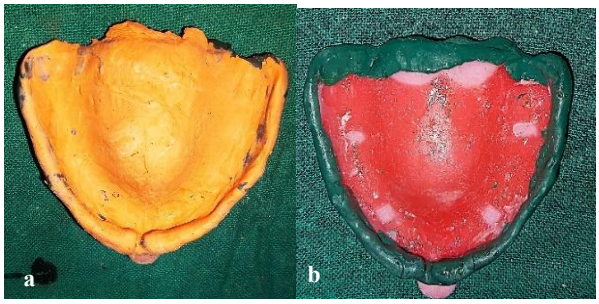

Figure 3 (a,b): Border moulding and secondary impression of maxillary arch.

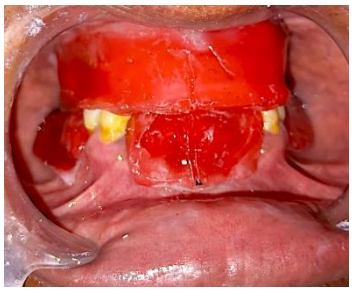

Figure 4: Tentative jaw relation.

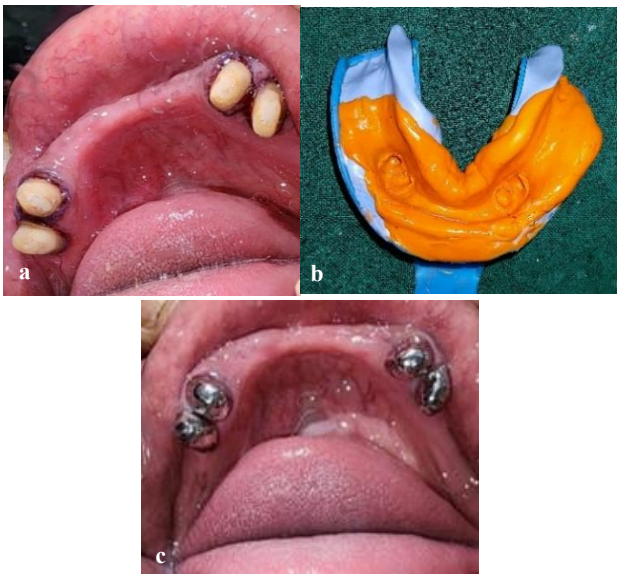

Figure 5: a) Tooth preparation. b) Final impression. c) Cementation of cast copings on the abutment teeth.

Figure 6: Secondary impression of mandibular arch post cementation of copings.

Figure 7: Face bow transfer.

Figure 8: a) Wax try-in. b) Tissue surface of mandibular tooth supported overdenture. c) Denture insertion.

DISCUSSION

The present case report describes an easy alternative to conventional complete dentures, incorporating a primary metal coping attached to the abutment teeth. As proven by electromyographic studies, an attachment-reinforced implant-supported overdenture provides increased bite force with enhanced retention and stability compared to a conventional complete denture.[4] Similarly, implant-supported overdentures exhibit higher masticatory efficiency compared with complete denture prostheses, which further increases with an increase in the number of implants, irrespective of the type of attachment used.[5] In general, natural dentition exhibits higher bite force compared to any implant-supported prosthesis due to the proprioceptive mechanism delivered by the periodontal fibres.[6] However, in the case of overdentures, implant-supported overdentures exhibit higher bite force compared to those supported by natural dentition, though the difference is insignificant.[7]

Tooth-supported overdentures can be fabricated using various attachment systems such as stud, bar, and magnetic attachments, which consist of matrix and patrix components attached to the abutment and denture, respectively.[2] Correspondingly, the success of an implant-supported overdenture relies on the specific attachment system used. Different types of attachment systems, viz. locators, ball and bar, magnets, Hader clips, O-rings, and OT Equator attachments, can be used based on the availability of inter-arch space, inter-implant distance, and number of implants used.[8]

Incorporation of an attachment system not only requires extensive preparation of the abutment tooth but also necessitates modifications in the denture to encompass the counterparts. A ball-and-socket attachment requires post space preparation, with the cast metal post serving as the patrix. The patrix projects from the root surface of the preparation and is attached to the matrix, which is in the form of an O-ring anchored to the intaglio surface of the denture.[9]

In the present case, no attachments were used, and retention was provided by the frictional force rendered by the metal copings fixed to the abutment teeth. Hence, the interradicular space has been preserved, as this does not require cast post fabrication. Moreover, this method overcomes the need for incorporating components and making extensive modifications to the tissue surface of the denture. Consequently, future loss of the abutment teeth may not necessitate new denture fabrication, as relining and rebasing of the existing denture would be sufficient. In contrast, dentures with attachments require new denture fabrication upon loss or damage to the abutment teeth or the attachments.

CONCLUSION

The technique discussed in the study is in accordance with DeVan's Principle, "Perpetual preservation of what remains is more important than the meticulous replacement of what is missing." Proposed by Dr. Milton M. DeVan in 1952. Though aesthetics and function may be the primary concern of a patient, biological considerations pertaining to the patient's health and long-term prognosis need to be considered by the clinician on formulating a valid treatment plan. This case report thus portrays the most feasible and compatible method compared to other methods encompassing attachments irrespective of the condition of the abutment tooth. Moreover, this method is economical requiring less appointments and laboratory charges with less chairside time ease for patients with all age groups.

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