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CASE REPORT OPEN ACCESS

Mandibular Tooth-Supported Overdenture with O-Ring Attachments: A Conservative Approach to Prosthetic Rehabilitation

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ABSTRACT

Tooth-supported overdentures remain a valuable yet often underutilized treatment option for the rehabilitation of partially edentulous patients. Preserving natural teeth as overdenture abutments helps maintain alveolar bone, improves proprioception, and enhances retention and stability compared with conventional complete dentures. The present case report describes the prosthetic management of a patient requiring mandibular rehabilitation in whom remaining teeth were strategically retained and restored with a tooth-supported overdenture using O-ring attachments, while a conventional complete denture was fabricated for the maxilla. Careful diagnosis, evaluation of inter-arch space, and patient preference guided the treatment plan, with elective endodontics performed on the selected abutments followed by precise preparation and chairside incorporation of the attachment components. The O-ring system provided satisfactory retention, stability, and patient comfort, with successful function maintained during a one-year follow-up. This report reinforces the clinical relevance of tooth-supported overdentures as a minimally invasive and cost-effective alternative when anatomical, functional, or financial factors limit the use of implant-based or bar-retained designs, and highlights the importance of meticulous planning and periodic maintenance to ensure long-term success.

Keywords: tooth-supported overdenture; O-ring attachment; mandibular prosthesis; alveolar bone preservation; prosthodontic rehabilitation

Introduction

Tooth-supported overdentures represent a conservative and biologically sound treatment modality for the rehabilitation of partially edentulous patients.[1] The preservation of strategic abutment teeth helps maintain proprioception, minimizes residual ridge resorption, and enhances the stability and retention of the prosthesis compared with conventional complete dentures.[1,2] Natural teeth or their roots act as stress breakers and improve tactile sensitivity, which contributes to better masticatory efficiency and patient satisfaction.[3]

In the mandible, where ridge resorption is typically more severe and rapid, retaining teeth as overdenture abutments can provide critical long-term advantages by maintaining alveolar bone height and supporting facial esthetics.[4,5] The incorporation of precision attachments such as O-rings further improves functional outcomes by offering additional retention and comfort, while allowing for easier hygiene maintenance.[6]

Despite these benefits, tooth-supported overdentures are often overlooked in favor of implant-based solutions or conventional complete dentures. [5,7] This case report highlights the clinical relevance of tooth-supported overdentures as a cost-effective, minimally invasive, and biomechanically favorable option for mandibular prosthetic rehabilitation, emphasizing their value in modern prosthodontic practice.

CASE REPORT

A 64-year-old female reported to the Department of Prosthodontics with the chief complaint of difficulty in eating due to multiple missing teeth and associated esthetic concerns. The patient's medical history was non-contributory. Extraoral examination revealed no abnormality. Intraoral examination (Figure 1) showed a completely edentulous maxillary arch

and a partially edentulous mandibular arch with only two remaining teeth (35 and 44). Both teeth exhibitedlocalized gingival recession, although they were periodontally sound and free of mobility.

Figure 1: Pre-operative photographs of A) extraoral view, B) Maxillary arch; and Mandibular arch from C) Front and D) Occlusal view

General Considerations during Diagnosis and Treatment Planning

Retention of natural teeth in the mandible plays a pivotal role in preserving residual alveolar bone, maintaining proprioception, and enhancing masticatory efficiency. For a partially edentulous mandibular arch, treatment planning must balance the patient's esthetic, functional, and financial expectations with biological feasibility. During diagnosis, factors such as periodontal status of remaining teeth, inter-arch space, ridge morphology, occlusal relationships, and patient motivation are critically evaluated. In the present case, different treatment alternatives were discussed, includingthe extraction of the remaining teeth followed by a conventional complete denture, an implant-supported overdenture, and a tooth-supported overdenture.

The patient expressed a strong desire to retain the remaining teeth and declined extraction. Clinical and radiographic evaluation revealed that teeth 35 and 44 were periodontally sound and suitable for use as overdenture abutments. Diagnostic impressions and jaw-relation records were obtained to assess available inter-arch space. Analysis revealed sufficient vertical dimension to accommodate O-ring attachments but inadequate space for a bar-supported overdenture. Based on these findings and patient preference, a definitive plan was formulated to fabricate a maxillary conventional complete denture and a mandibular tooth-supported overdenture with O-ring attachments.

Clinical and Laboratory Procedures

Elective endodontic treatment was carried out for the selected abutments (35 and 44) to eliminate any potential endodontic complications and to provide a stable foundation for overdenture attachment. The abutment teeth were prepared to reduce lateral stress and minimize plaque accumulation. Preparation for the O-ring direct access post (AccessPost Overdenture, Essential Dental Systems) was performed using the primary reamer and countersink drill. After obtaining the required height, the access posts were trial-fitted and cemented, and protective rubber bands were placed over the O-rings.

Primary impressions were made using impression compound for the maxilla and irreversible hydrocolloid (alginate) for the mandible. Custom trays were fabricated in autopolymerizing resin, and border molding was performed to capture functional vestibular extensions. Final impressions were made with an elastomeric impression material, and casts were poured in Type III dental stone (Figure 2). A record base with relief block-out around the attachment areas was fabricated, and occlusal rims were constructed for jaw-relation recording. Face-bow transfer was completed, and the maxillomandibular relationship was articulated on a semi-adjustable articulator (Hanau Wide-Vue).

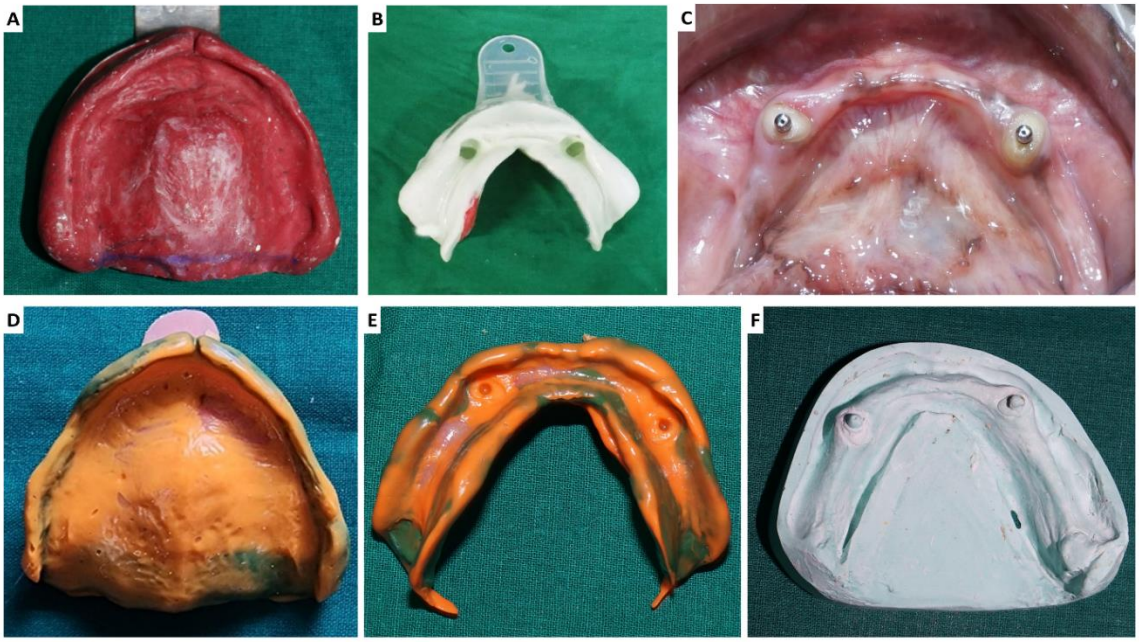

Figure 2: A) Maxillary primary impression; B) Mandibular primary impression; C) Mouth preparation; D) Maxillary final impression; E) Mandibular final impression; F) Mandibular Final cast

Teeth were arranged in wax and evaluated intraorally for esthetics, phonetics, vertical dimension, and centric/eccentric contacts. After obtaining patient approval at the trial stage (Figure 3), the dentures were processed using heat-cured acrylic resin and finished with meticulous polishing.

Figure 3: A) Jaw relation in centric occlusion; B) Try-in; C) Final denture in position

Incorporation of Attachments and Denture Delivery

Following conventional denture insertion procedures, the mandibular denture base was adjusted to the supporting mucosa using pressure-indicator paste to ensure uniform tissue contact. Nylon caps were placed on the O-ring abutments, and a rubber band was used to cover the height of the contour of the attachments. The female housings were picked up chairside by luting them to the denture base with autopolymerizing denture-base resin. After polymerization, the denture was carefully removed, and the tissue surface was examined to confirm accurate transfer of the female components. Excess resin was trimmed and polished to prevent mucosal irritation. Final adjustments were made to achieve a passive fit with simultaneous, stable contact of the denture base on the mucosa and O-ring attachments, eliminating any rocking movement.

The maxillary conventional complete denture and mandibular tooth-supported overdenture were delivered, and post-insertion instructions were provided. The patient demonstrated satisfactory retention, stability, and comfort during function (Figure 4). A strict recall schedule was emphasized, and the patient was placed on a one-year maintenance program for periodic evaluation of the abutments, attachments, and denture base adaptation.

Figure 4: Comparison of A) pre-operative and B) post-operative frontal profile

Discussion:

The present case demonstrates that a mandibular tooth-supported overdenture using O-ring attachments can be an effective alternative when patient preference or anatomical constraints rule out full extraction or bar-supported prostheses. Literature on tooth-supported overdentures re-emphasizes their multiple advantages over conventional complete dentures including - better preservation of alveolar bone, enhanced proprioception, improved retention and stability, and greater psychological satisfaction.[1,8]

Comparative studies of attachment systems show that while bar-clip systems often provide greater initial retention than O-ring or ball attachments, O-rings have advantages in simplicity, cost, and ease of maintenance.[9] A systematic review by Araujo et al. (2024) found that in implant-supported overdentures, the bar-clip attachments had higher retention than O-ring systems; however, the choice of attachment often depends on functional, anatomical, and economic considerations. [10] The present case aligns with this trade-off, as the inter-arch space was insufficient for a bar, making the O-ring a logical choice.

Similarly, Guttal et al. (2011) reported favorable outcomes when using O-ring attachments alone over time, including high patient satisfaction for function and esthetics.[11] In vitro work by Shastry et al. (2016) confirmed that ball/O-ring and bar attachments yield higher retentive forces than some other systems, although O-rings tend to lose retention after repeated insertion–removal cycles. [12] These findings emphasize the importance of monitoring long-term retention, maintenance frequency, and wear of attachment components.[13]

Compared with earlier reports, the strengths of the present case include careful diagnosis of inter-arch space, elective endodontics for abutments, appropriate preparation of abutments, and chairside pickup of attachments, all of which likely enhanced fit and patient comfort. Limitations include the possibility of progressive loss of retention due to O-ring wear and the absence of long-term quantitative measurements of retention or patient-reported outcomes beyond the one-year recall. Overall, the case supports that when bar attachment is not feasible, O-ring overdentures remain a viable and cost-effective treatment option, provided meticulous planning, precise fabrication, and regular maintenance are ensured.

Conclusion:

The successful rehabilitation of this patient demonstrates that tooth-supported mandibular overdentures with O-ring attachments offer a conservative, cost-effective, and functionally satisfactory alternative to complete extractions or bar-supported designs. By preserving natural abutments, the approach maintains alveolar bone, enhances proprioception, and improves retention and patient comfort. With appropriate case selection and regular maintenance, O-ring overdentures can provide long-term clinical success and high patient satisfaction.

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