



IMPLANT-SUPPORTED REHABILITATION OF AN EDENTULOUS MANDIBLE WITH IMMEDIATE FIXED PROVISIONALIZATION: A CASE REPORT

Dentistry

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ABSTRACT

Mandibular complete dentures often present challenges in achieving adequate retention and stability, particularly in patients with residual ridge resorption. Implant-supported fixed prostheses offer a predictable solution to improve prosthesis stability, masticatory efficiency, and patient satisfaction. This case report describes the staged rehabilitation of a 65-year-old male with persistent instability of a recently fabricated mandibular complete denture. Following prosthodontically driven treatment planning using a radiographic template and cone-beam computed tomography, six endosseous implants were placed in the mandible. The existing mandibular denture was converted into a screw-retained implant-supported provisional prosthesis and delivered within 48 hours of surgery. After a four-month healing period, a definitive CAD-CAM titanium framework-supported screw-retained metal-acrylic hybrid prosthesis was fabricated, together with a new conventional maxillary complete denture. The staged treatment approach restored function, stability, and comfort while simplifying the transition from conventional to fixed implant-supported rehabilitation. This case highlights that prosthodontically driven implant placement combined with immediate fixed provisionalization and definitive CAD-CAM hybrid prosthetic rehabilitation can provide a predictable and effective treatment option for edentulous patients with compromised mandibular denture retention.

KEYWORDS

Implant-supported Prosthesis, Edentulous Mandible, Immediate Loading, Hybrid Prosthesis.

INTRODUCTION

Edentulism remains a significant oral health condition that adversely affects mastication, speech, facial esthetics, and overall quality of life. Although conventional complete dentures remain a commonly used treatment modality for edentulous patients, achieving satisfactory retention and stability with mandibular dentures continues to be considerably more challenging than with maxillary dentures because of the smaller denture-bearing area, tongue activity, and progressive residual ridge remodeling. Consequently, many patients experience compromised function and frequent denture dislodgement despite acceptable maxillary denture performance. Consequently, many patients experience persistent functional limitations and dissatisfaction despite well-fabricated conventional prostheses.¹⁻³

Several treatment options have been proposed to overcome these limitations, ranging from implant-supported overdentures to fixed implant-supported prostheses. The choice of treatment should be individualized based on the patient's anatomical condition, systemic health, functional requirements, expectations, oral hygiene capability, and financial considerations.²⁻⁴ Fixed implant-supported prostheses have emerged as a predictable treatment option for selected patients by improving prosthesis stability, masticatory efficiency, and patient satisfaction while facilitating restoration of function and esthetics.^{3,5}

The present report describes the staged rehabilitation of an edentulous mandible in a medically controlled diabetic patient using a full-arch implant-supported hybrid prosthesis. The surgical and prosthodontic considerations influencing treatment planning, immediate provisionalization, and definitive rehabilitation are discussed.

Case Presentation

Patient Information

A 65-year-old male presented to the Department of Prosthodontics with the chief complaint of frequent dislodgement and poor stability of his mandibular complete denture, resulting in difficulty during mastication and speech. The patient had become completely edentulous four months earlier following extraction of the remaining

teeth because of advanced mobility and had subsequently received conventional complete dentures. His medical history was significant for well-controlled type II diabetes mellitus (HbA1c: 6.1%), with no other relevant systemic illnesses.

Clinical Findings

Clinical examination revealed a thin, knife-edge mandibular residual ridge associated with inadequate retention and stability of the mandibular complete denture despite satisfactory adaptation of the maxillary prosthesis. The patient reported frequent dislodgement of the mandibular denture during mastication and speech, resulting in functional discomfort and reduced confidence.

Diagnostic Assessment

Following clinical examination, various treatment options, including an implant-supported overdenture and a fixed implant-supported prosthesis, were discussed with the patient. After considering the advantages, limitations, maintenance requirements, and financial implications, the patient opted for a fixed implant-supported rehabilitation. Informed consent was obtained from the patient before commencement of the treatment. The existing mandibular denture was modified with radiographic markers and used as a radiographic template during CBCT to facilitate prosthodontically driven implant planning. (Figure 1) Routine hematological investigations confirmed fitness for implant surgery.

Therapeutic Intervention

A full-thickness mucoperiosteal flap was reflected, and six regular-platform endosseous implants (BioLine Dental Implant Systems Ltd., Israel) were strategically placed extending from the canine-lateral incisor region to the first molar region bilaterally. Three implants measured 4.2×10 mm, two measured 3.75×11.5 mm, and one measured 3.75×10 mm. All implants achieved insertion torque values exceeding 35 Ncm. Multi-unit abutments were connected immediately to establish a common path of insertion. Multi-unit healing abutments were then placed, and the flap was approximated with interrupted

sutures. Routine postoperative medications and oral hygiene instructions were prescribed.

The existing mandibular denture was converted into a screw-retained implant-supported provisional prosthesis by intraoral pickup of titanium cylinders using autopolymerizing acrylic resin and delivered within 48 hours of surgery. (Figure 2) The patient's existing maxillary complete denture was retained throughout the four-month healing period.

Following successful osseointegration, definitive prosthetic rehabilitation was initiated. (Figure 3) Splinted open-tray impressions and a verification jig were used to ensure accuracy of the master cast. Simultaneously, a new maxillary complete denture was fabricated using conventional techniques. A CAD-CAM milled titanium framework was evaluated clinically and radiographically for passive fit before processing the definitive screw-retained metal-acrylic hybrid prosthesis using ProBase Hot heat-polymerized acrylic resin and SR Phonares II acrylic teeth (Ivoclar). (Figure 4) Prosthetic screws were tightened to 15–20 Ncm, the screw access openings were sealed with composite resin, and a lingualized occlusal scheme was established. (Figure 5)

Follow-up and Outcomes

The patient was enrolled in a periodic maintenance program. At the six-month follow-up, fracture of one mandibular lateral incisor acrylic tooth and minimal occlusal wear were noted. The fractured tooth was repaired chairside without compromising the framework or implant components. At the one-year follow-up, the peri-implant soft tissues remained healthy, the prostheses were functioning satisfactorily, and the patient reported significant improvement in comfort, masticatory efficiency, and overall satisfaction.

DISCUSSION

Rehabilitation of the edentulous mandible continues to present significant prosthodontic challenges because mandibular complete dentures frequently demonstrate inferior retention and stability compared with maxillary dentures. Anatomical limitations, reduced denture-bearing surface area, tongue movements, and progressive residual ridge remodeling collectively contribute to compromised prosthesis performance and reduced patient satisfaction.¹⁻³ Although mandibular implant-supported overdentures are widely accepted as the minimum standard of care for edentulous patients,¹⁻² treatment should ultimately be individualized according to the patient's anatomical condition, functional demands, expectations, oral hygiene capability, and financial considerations. In the present case, the patient's preference for a fixed restoration, together with adequate bone availability for placement of six implants, supported the decision to provide a full-arch implant-supported hybrid prosthesis.

Successful full-arch rehabilitation requires careful integration of surgical and prosthetic principles. The patient's existing mandibular denture was modified into a radiographic template for CBCT evaluation, facilitating restoration-driven implant planning while allowing optimal implant positioning for the intended prosthesis. Adequate primary implant stability (insertion torque ≥ 35 Ncm) enabled immediate conversion of the existing denture into a screw-retained implant-supported provisional prosthesis. Immediate loading protocols have demonstrated predictable implant survival and favorable patient-reported outcomes when adequate primary stability and controlled occlusal loading are achieved, making them a reliable treatment option in appropriately selected patients.^{4,6}

The definitive restoration incorporated a CAD-CAM milled titanium framework supporting a screw-retained metal-acrylic implant-supported hybrid prosthesis. Titanium was selected because of its high strength-to-weight ratio, excellent corrosion resistance, biocompatibility, and lower elastic modulus compared with cobalt-chromium alloys, which may contribute to more favorable stress distribution to the supporting implants and peri-implant bone. Furthermore, CAD-CAM milling enables fabrication of highly accurate frameworks with improved passive fit, thereby minimizing the risk of mechanical complications associated with framework misfit.⁷⁻⁸ The hybrid prosthesis was selected because it provides favorable shock absorption, simplified maintenance, lower treatment cost, and the ability to repair or replace fractured acrylic teeth without remanufacturing the entire prosthesis. Furthermore, when opposed by

a conventional maxillary complete denture, acrylic occlusal surfaces provide a more compatible occlusal interface than rigid ceramic restorations while facilitating future maintenance.^{3,5} Occlusal rehabilitation is equally important for the long-term success of implant-supported full-arch prostheses because implants lack the periodontal ligament and therefore possess limited capacity to dissipate occlusal forces.³ When a mandibular implant-supported fixed prosthesis opposes a conventional maxillary complete denture, a lingualized occlusal scheme helps enhance maxillary denture stability while directing functional forces more centrally over the mandibular prosthesis.^{5,9} During the one-year follow-up period, fracture of one mandibular lateral incisor acrylic tooth with minimal occlusal wear was observed. The fractured tooth was replaced chairside without disturbing the framework or implant components. Such prosthetic complications are well documented with metal-acrylic full-arch prostheses and are generally managed conservatively without compromising overall treatment success, highlighting the importance of regular maintenance and recall.^{10,11}

This case demonstrates that staged rehabilitation of an edentulous mandible using immediate fixed provisionalization followed by a definitive full-arch implant-supported hybrid prosthesis can successfully overcome the limitations of conventional mandibular complete dentures while restoring function, comfort, and patient satisfaction.

Figure Legends-

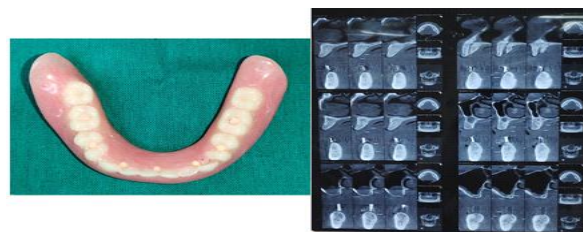


Figure 1. Existing mandibular complete denture modified with radiopaque markers and used as a radiographic template for prosthetically driven implant planning during CBCT evaluation.

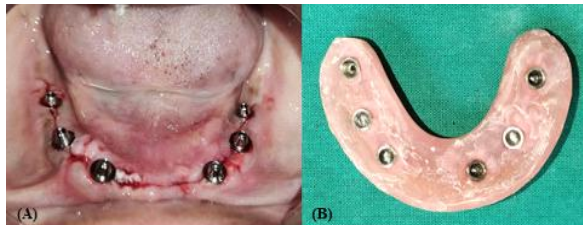


Figure 2. (A) Postoperative healing after 48 hours of surgery (B) Conversion of the existing mandibular complete denture into a screw-retained implant-supported provisional prosthesis.

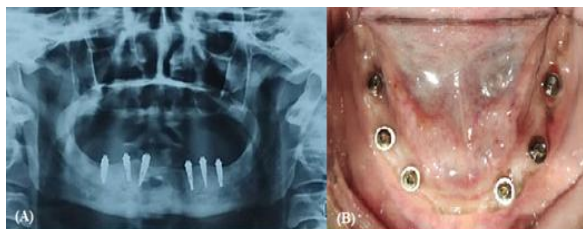


Figure 3. (A) Panoramic radiograph after 4 months showing successful osseointegration of the six mandibular implants (B) Healed peri-implant soft tissues at 4 months

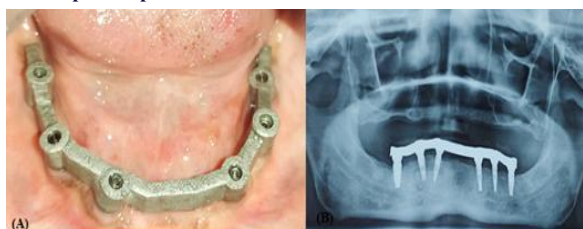


Figure 4. CAD-CAM milled titanium framework (A) Clinical evaluation (B) Radiographic verification.



Figure 5. Definitive mandibular implant-supported hybrid prosthesis opposing a conventional maxillary complete denture.

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