



CONSERVATIVE REHABILITATION OF SEVERELY ATROPHIC MANDIBULAR RIDGES USING LIQUID SUPPORTED DENTURES: A CASE SERIES

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Abstract

Managing edentulous patients with severely resorbed ridges continues to be a clinical challenge, especially when traditional dentures fail to offer lasting comfort, retention, or stability. In such cases, surgical or implant-supported solutions may not always be practical—either due to systemic conditions like diabetes or patient-related factors such as cost or preference. Liquid-supported dentures present a promising conservative alternative that adapts to the dynamic oral environment. This case series describes two patients with atrophic mandibular ridges who were successfully rehabilitated using liquid-supported dentures. After conventional fabrication steps, a flexible polyethylene sheet was incorporated into the mandibular denture to create space for glycerin,a

biocompatible liquid that cushions the tissues during function. The denture is adapted to soft tissue movements while evenly distributing masticatory forces.

Over a 6-month follow-up, both patients reported noticeable improvements in chewing, comfort, and overall satisfaction. There were no complications such as leakage or mucosal irritation. The flexible base helped reduce trauma to the tissues and may play a role in slowing further ridge resorption.

Liquid-supported dentures combine the best of flexibility and function, offering an effective solution for patients with compromised ridges especially when more invasive approaches are not an option.

Key Words: Glycerin; Liquid-supported dentures; Polyethylene sheet

Introduction

Fabricating complete dentures for patients with severely resorbed edentulous ridges is a common yet complex challenge in prosthodontics. After tooth loss, the alveolar bone undergoes continuous, irreversible resorption influenced by mechanical forces, time, and systemic health. This progressive loss in ridge height and width—especially in the mandible—leads to poor denture retention, support, and stability ^[1].

As the ridge resorbs further and soft tissues become more mobile or flabby, conventional dentures often fail to provide sufficient adaptation, resulting in discomfort, reduced chewing efficiency, and compromised function ^[2,3]. While surgical ridge augmentation or implant-retained prostheses can address these limitations, they may be impractical for some patients due to systemic health concerns, financial limitations, or personal preference ^[4].

In such cases, conservative approaches are crucial. Liquid-supported dentures represent one such alternative. These prostheses incorporate a rigid acrylic base combined with a flexible, liquid-filled layer. This design helps adapt to mucosal changes, distributes occlusal forces evenly, and minimizes soft tissue trauma, potentially reducing further bone resorption ^[5].

This case series presents the clinical application of liquid-supported mandibular dentures in two patients with severely resorbed ridges, highlighting their benefits and short-term outcomes.

Case Series

Case 1

A 38-year-old female presented with complaints of a prematurely aged appearance, difficulty speaking, and impaired chewing. She had been edentulous for four years after extractions due to periodontal disease. Her medical history included well-controlled diabetes. Clinical findings showed complete edentulism with significant mandibular ridge atrophy. A liquid-supported denture was chosen due to her systemic health status and economic constraints.

Case 2

A 39-year-old male reported being edentulous for over four years and experiencing difficulty in mastication. He also had a history of diabetes. Intraoral examination showed significant mandibular ridge resorption. Given the compromised ridge and systemic considerations, a liquid-supported mandibular denture was selected, while a conventional denture was fabricated for the maxilla.

Clinical and Laboratory Protocol

Clinical and radiographic evaluations were performed. For the maxillary arch, a primary impression was made using high-fusing impression compound (MDM Y Dents). Primary impression of mandibular arch was made with admixed technique to record the atrophic mandibular arch using impression compound and green stick in the ratio of 3:7 parts by weight in homogenous consistency. Custom trays were fabricated, followed by border molding with low-fusing impression compound (DPI pinnacle tracing sticks). Final impressions were then made using zinc oxide eugenol paste (DPI) for the maxillary arch, and McCord-Tyson's all-green technique was employed for the mandibular arch. Master casts were poured using Type III dental stone (Goldstone).

A 3 mm thick mandibular denture base was fabricated. Then the facebow record and jaw relation was recorded and mounted on Hanau articulator. After teeth arrangement and occlusal adjustments, a try-in was done. The maxillary denture was processed using conventional techniques.

Fabrication of Liquid-Supported Denture

A 1.5 mm vacuum heat-pressed polyethylene sheet (Dentmark) was adapted to the master cast, stopping 2 mm short of the sulcus, acting as a spacer. After dewaxing, this sheet was seated over the cast with petroleum jelly, and the denture was processed using heat-cured acrylic resin (SR Triplex, Ivoclar, Germany).

After polishing, the denture was inserted for a two-week adaptation period. Then, the temporary sheet was removed, and a putty impression of the tissue surface was used to make a new cast. A 0.5 mm thick final polyethylene sheet was vacuum-formed on this cast to create a 1 mm space for the glycerin layer. This sheet was trimmed, seated, and sealed using autopolymerizing acrylic resin.

Two holes were drilled into the lingual flange for injecting glycerin. One hole was sealed before try-in, and the other after confirming occlusal vertical dimension. Patients were instructed on hygiene and advised to report any leakage. Follow-ups were scheduled at 2 weeks, 1 month, 3 months, and 6 months.

The clinical workflow, laboratory procedures, and final outcomes for both cases are illustrated in Figures 1–4.

Outcome Evaluation

Patient satisfaction was assessed using the Visual Analog Scale (VAS), based on Grandmont et al. [6]. Both patients reported noticeable improvements in comfort, chewing, and speech. No complications, such as soreness, leakage, or mucosal irritation, were observed over the six-month follow-up.

Discussion

Severely atrophic ridges often result in poor denture performance. In such cases, especially in patients with systemic conditions like diabetes, conventional dentures can exacerbate discomfort and tissue trauma [6,7]. Liquid-supported dentures address these concerns by dynamically adapting to soft tissue movement.

The design allows the polyethylene membrane to act as a soft liner at rest. Under functional load, the glycerin redistributes occlusal forces, reducing pressure points and enhancing tissue support [2,5,8]. This approach is particularly beneficial for flabby ridges, parafunctional habits like bruxism, and superficial nerve involvement.

Glycerin is biocompatible, non-toxic, cost-effective, and provides a smooth viscous response. The polyethylene sheet conforms well to tissue contours, resists microbial colonization, and improves patient tolerance [5].

To ensure effectiveness and durability:

- A 3 mm minimum denture base thickness was maintained.
- All seals were checked for leakage.
- Patients were given clear maintenance instructions.
- A preserved master cast allowed for easy replacement if rupture occurred.

Liquid-supported dentures provide:

- Better stress distribution.
- Enhanced retention and mucosal comfort.
- Improved function in resorbed ridges with minimal invasive intervention [9].

Though chairside relining is not feasible, the denture can be modified using the original master cast without needing a complete remake.

Conclusion

Liquid-supported dentures offer a conservative, adaptable, and clinically effective solution for patients with severely resorbed ridges, particularly when surgical or implant-based approaches are not feasible. Their combination of flexibility and structural support enhances comfort, function, and soft tissue health. Continued clinical evaluation is encouraged to validate their long-term effectiveness and refine fabrication protocols.

Conflict of Interest:

The authors declare no conflict of interest related to this case series.

Patient Consent:

Written informed consent was obtained from both the patients for participation in this case series and for the publication of clinical images and related information. Patient identity has been anonymized to protect confidentiality.

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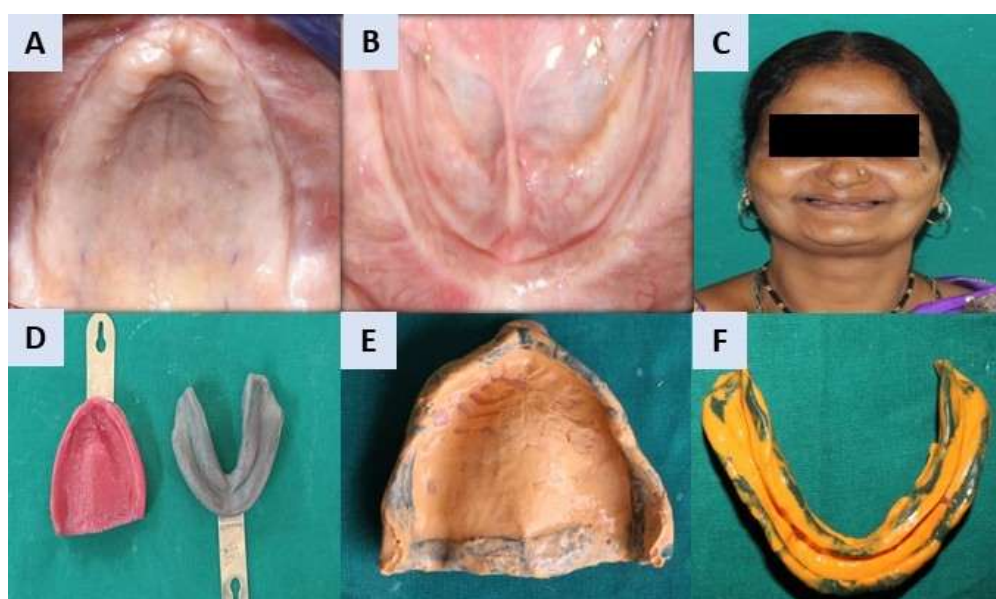


Figure 1(Case 1)

A- Intraoral maxillary view

B- Intraoral mandibular view

C-Preoperative Extraoral View

D- Primary impression using impression compound and admix technique

E- Final impression of maxillary arch using zinc oxide eugenol paste

F- Final impression of mandibular arch using McCord-Tyson's all-green technique

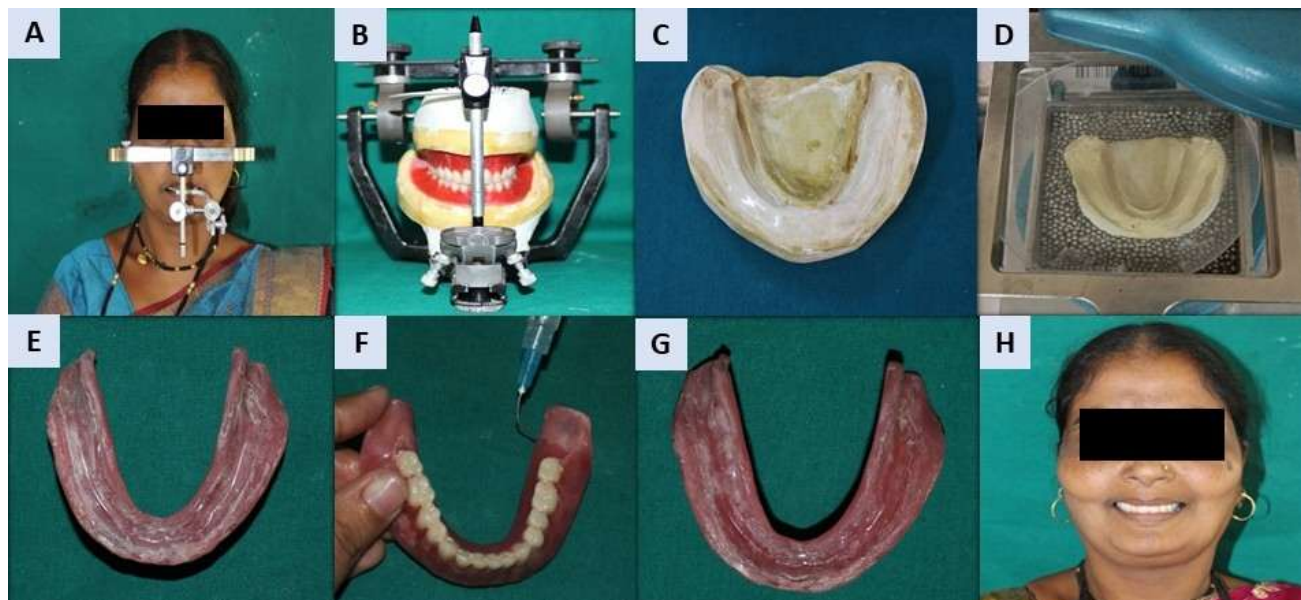


Figure 2(Case 1)

A- Face bow record

B- Teeth arrangement on Hanau articulator

C- 1.5 Mm Bioplast Sheet Adaptation On Mandibular Cast 2 Mm Short Of Sulcus Prior To Packing

D-Adaptation of 0.5mm Bioplast Sheet on Cast

E-Adaptation Of 0.5 Mm Sheet on Intaglio Surface Of Denture

F-Liquid Insertion Into The Denture

G-After Liquid Insertion into Denture Base

H-Post operative extraoral view after insertion

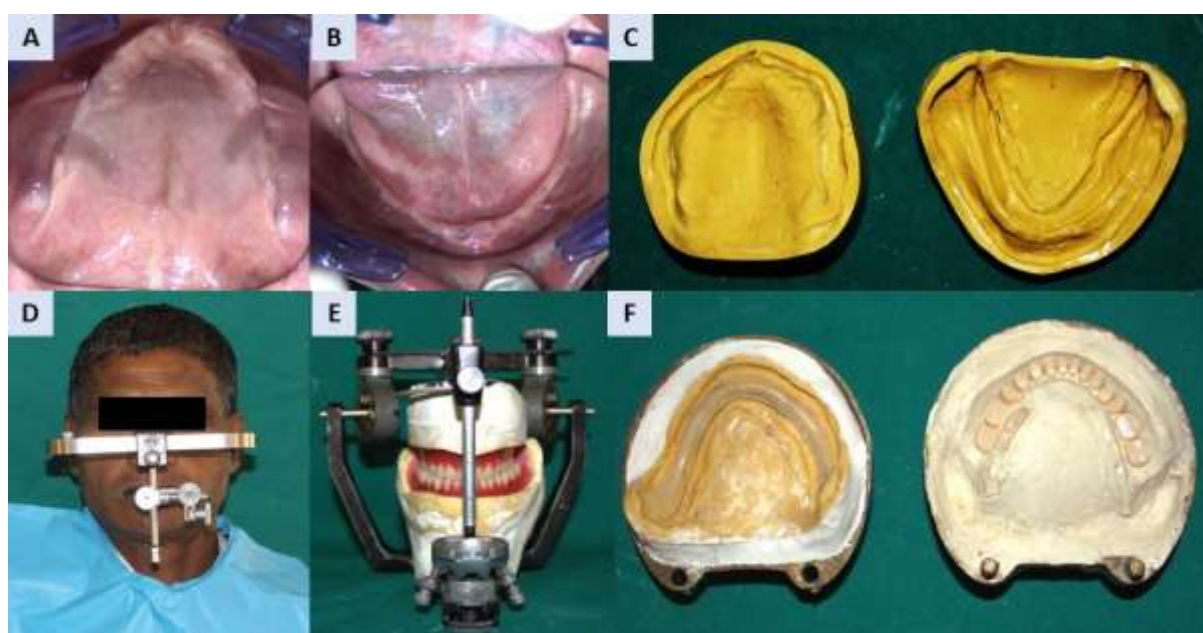


Figure 3(Case 2)

A-Edentulous maxillary arch

B-Edentulous mandibular arch

- C-Final maxillary and mandibular casts
- D-Facebow Transfer in the patient
- E-Teeth arrangement on a Hanau articulator
- F-Processing of Denture

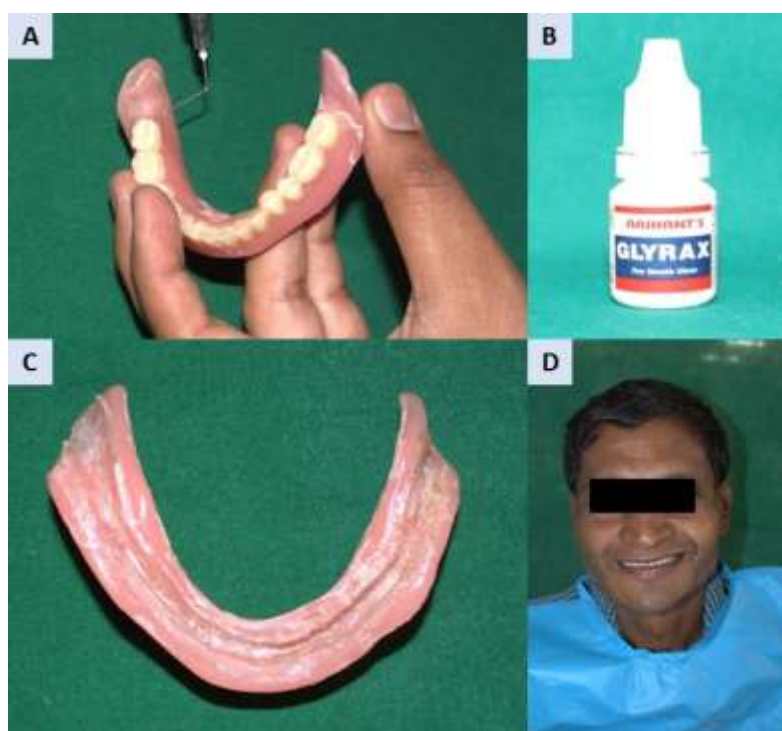


Figure 4(Case 2)

- A-Liquid Insertion of Glycerine
- B-Commercially available Glycerine for liquid supported dentures(Glyrax)
- C.After liquid insertion into denture base
- D. Post operative extraoral view after insertion