Case Report

University J Dent Scie 2026; Vol. 12, Issue 2

Modified Hobkirk Technique with Glass Fiber Reinforcement for Management of Flabby Maxillary Ridge: A Case Report

Abstract:
Flabby ridges compromise retention and stability of complete dentures owing to their displaceable nature. Accurate impression-making is critical for successful prosthetic rehabilitation in such cases. This report describes the management of a completely edentulous maxillary arch with a flabby anterior ridge opposing a mandibular arch restored with fixed partial dentures. A modified Hobkirk impression technique was employed, allowing differential pressure distribution to minimize tissue distortion. Glass fiber mesh reinforcement was incorporated into the denture base to improve fracture resistance and reduce prosthesis weight. A silane coupling agent was applied to the fiber surface to enhance adhesion with the polymethyl methacrylate matrix. The combined approach yielded enhanced prosthesis stability, improved strength, and satisfactory patient outcomes. This protocol offers a practical and reproducible solution for prosthetic rehabilitation of patients with flabby ridges opposing fixed or natural dentition.

Key-words: Complete denture; fiber reinforcement; flabby ridge; Hobkirk technique; selective pressure impression

Introduction:

Flabby or fibrous ridges, resulting from the replacement of alveolar bone by hypermobile fibrous connective tissue, pose a significant challenge during complete denture fabrication due to their susceptibility to distortion under impression pressure.[1]

When tissues are recorded under compression, they recoil during function, compromising denture retention and stability.[1] The maxillary anterior region is most frequently affected, particularly when a complete maxillary denture opposes natural or fixed mandibular teeth, a pattern linked to Combination Syndrome.[2,3]

The modified Hobkirk technique offers a selective pressure approach, recording displaceable tissues in a near-mucostatic state while capturing stress-bearing areas under load. Maxillary dentures opposing fixed prostheses are prone to mid-palatal fracture.[4] Glass fiber reinforcement has been shown to significantly enhance the mechanical properties of denture bases without compromising aesthetics or increasing prosthesis weight.[5] This case report describes the combined use of a

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Received : 23 May 2026, **Published :** 30 June, 2026

Access this article online

Website:
www.ujds.in

DOI:
https://doi.org/10.21276/ujds.2026.12.2.18

How to cite this article: Chaturvedi, A., Agarwal, A., Lahori, M., & Sisodiya, S. (2026). Modified Hobkirk Technique with Glass Fiber Reinforcement for Management of Flabby Maxillary Ridge: A Case Report. UNIVERSITY JOURNAL OF DENTAL SCIENCES, 12(2).

modified Hobkirk technique and glass fiber mesh reinforcement for prosthetic rehabilitation of a patient with a flabby maxillary anterior ridge.

Case Report:

A female patient presented with the chief complaint of wearing an ill-fitting maxillary complete denture for six years, accompanied by difficulty with mastication. Clinical examination revealed a completely edentulous maxillary arch with a flabby, displaceable anterior ridge. The mandibular arch was restored with fixed partial dentures. The existing prosthesis exhibited generalized wear, loss of occlusal vertical dimension, and inadequate peripheral seal. Fabrication of a new maxillary complete denture employing a modified impression technique and a fiber-reinforced denture base was planned.

Preliminary Impression:

The extent of the flabby tissue in the anterior maxillary region was first identified and marked directly in the patient's mouth [Figure 1]. A primary impression of the maxillary arch was then made using irreversible hydrocolloid (alginate) in a stock tray under muco-compressive principles appropriate for diagnostic purposes. The impression was poured in dental plaster to obtain a diagnostic cast, and the delineated flabby tissue region was correspondingly marked on the cast surface using an indelible marker.

Custom Tray Fabrication:

A custom impression tray was fabricated on the diagnostic cast using autopolymerizing acrylic resin. To achieve selective pressure, a double-layer wax spacer was adapted over the flabby ridge region, while a single-layer spacer was maintained over the remaining areas. The tray was designed with a palatally positioned handle to minimize labial flange interference.

Border Molding:

Peripheral border molding was performed using low-fusing impression compound. Functional movements of the lips, cheeks, and soft palate were guided to accurately capture the functional depth and width of the vestibular sulcus, establishing an effective peripheral seal.

Final Impression — Modified Hobkirk Technique:

A selective pressure impression philosophy was adopted for the final impression.[6] In the first phase, a wash impression was made using medium-body polyvinyl siloxane (PVS) elastomeric material to record the primary stress-bearing areas under controlled pressure [Figure 2]. The impression material overlying the flabby ridge region was then carefully relieved and escape holes were created in the corresponding tray areas. Light-body PVS was subsequently injected into the relieved area and the tray gently reseated, recording the flabby tissue in a near-mucostatic state while maintaining functional pressure over the remaining denture-bearing areas [Figure 3].

Master Cast and Jaw Relations:

The final impression was inspected for accuracy, beaded and boxed to preserve sulcus depth, and poured in Type III dental stone. Jaw relations were established using record bases and occlusal rims, including determination of vertical dimension of occlusion, recording of centric relation, and assessment of facial support and phonetics. Records were transferred to a semi-adjustable articulator for tooth arrangement.

Try-In Procedure:

A clinical try-in evaluated aesthetics, phonetics, and occlusion. Necessary modifications were completed prior to final processing.

Glass Fiber Reinforcement and Denture Processing:

Glass fiber mesh reinforcement was incorporated using a sandwich technique.[4] The glass fiber mesh was adapted onto the maxillary master cast over the region of maximum stress distribution [Figure 4]. A silane coupling agent was applied to the fiber surface prior to packing to promote chemical adhesion with the polymethyl methacrylate (PMMA) resin matrix.[7] The fiber mesh was positioned between sequential layers of heat-cure acrylic resin, ensuring optimal integration without compromising tissue adaptation or aesthetics. The denture was processed by conventional compression molding.[Figure 5] [Figure 6]

Denture Insertion:

The processed denture was inserted and evaluated intraorally for retention and stability, adequacy of border extensions, pressure areas (assessed using pressure-indicating paste), and occlusal harmony. Necessary adjustments were carried out and the patient was provided with comprehensive post-insertion instructions [Figure 7].

Discussion:

The prosthodontic management of flabby ridges remains a recognized clinical challenge owing to the presence of hypermobile, displaceable soft tissue replacing underlying alveolar bone.[1,2] When recorded under compression, these tissues recoil during function, resulting in compromised denture retention and stability.[1] In the present case, the flabby ridge was located in the anterior maxilla opposing a mandibular arch restored with fixed prostheses—a scenario associated with Combination Syndrome. Kelly (1972) described this as a characteristic group of changes including anterior maxillary bone resorption, formation of hyperplastic fibrous tissue, and tuberosity enlargement.[3]

Conventional impression techniques for flabby ridges—including mucocompressive (pressure) impressions, mucostatic (non-pressure) impressions, conventional single-window (closed-mouth or open-mouth) impressions, two-step impressions, liquid-supported impressions, and conventional record-base techniques—are limited because they compress, displace, or fail to adequately position the mobile tissue, leading to elastic recoil, loss of peripheral seal, and denture instability.[1,2,6] Surgical removal or augmentation approaches, while an option, are invasive and carry operative risks.[2]

The modified Hobkirk technique with multiple relief holes is superior to these conventional methods because it records the mobile, fibrous tissue in an undisplaced, passive state, avoiding compression, distortion, and elastic recoil.[2,6,10] Unlike mucocompressive techniques that displace flabby tissue or mucostatic techniques that fail to maintain stable denture base positioning, the multiple-hole window design provides uniform, controlled application of low-viscosity impression material through multiple entry points, reducing voids and ensuring even passive recording of the flabby zone.[6,12] This approach is non-surgical, simple to implement, and adheres to preventive prosthodontics principles while improving denture stability, retention, and support with documented patient satisfaction. The principal advantage of this modified technique is its ability to minimize distortion of flabby tissue while preserving the functional contour of the remaining supporting structures. Multiple small holes allow more even distribution of low-viscosity impression material, reduce localized compression, and prevent voids or uneven displacement. At the same time, the tray retains better structural integrity than a large window tray, making the technique easier to manage clinically. This balance of tissue preservation and functional

support makes the modified Hobkirk technique a practical alternative to conventional impression methods, especially when surgical correction is not indicated or preferred.[1,10] (Table 1)

PMMA, while the material of choice for denture base fabrication, exhibits well-recognized limitations including low flexural strength, poor impact resistance, and fatigue susceptibility.[4,5]

Glass fiber mesh reinforcement significantly improves these properties by distributing stresses uniformly across the denture base, thereby impeding crack initiation and propagation.[8,9] Compared to metal reinforcement, glass fiber is translucent, lighter, corrosion-resistant, and biologically inert (Table 2).[4,8,9] Application of a silane coupling agent ensured effective stress transfer at the fiber–resin interface, enhancing long-term mechanical durability.[7] Full palatal coverage was selected to prevent stress concentration at the mid-palatal fracture site.

The success of this case results from accurate tissue recording with minimal distortion achieved through the modified Hobkirk technique, enhanced denture strength through glass fiber mesh reinforcement, and improved patient comfort compared to metal-reinforced alternatives.[10] The combined approach represents a practical and reproducible protocol with favorable functional outcomes and high patient satisfaction.[1,10]

Clinical follow-up was conducted over a 3-month period at scheduled intervals (24 hours, 1 week, 1 month, and 3 months post-insertion). The patient reported high satisfaction with denture retention, stability, and esthetics. No ulcerations or structural failures were observed during the 3-month observation period. Glass fiber reinforcement remained intact and denture durability was excellent. The patient expressed willingness to recommend the denture to others, indicating high overall satisfaction with treatment outcomes.

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List of Abbreviations:

Abbreviation	Definition
PMMA	Polymethyl methacrylate
PVS	Polyvinyl siloxane
ICMJE	International Committee of Medical Journal Editors
COPE	Committee on Publication Ethics
PE	Physical examination

ACKNOWLEDGEMENTS

The authors would like to thank the patient for providing informed consent for the publication of this case report and accompanying clinical photographs.

Source of Support: None.

Conflict of Interest: None declared.

TABLES AND LEGENDS:

Table 1: Comparison of modified hobkirk technique vs. Conventional flabby ridge techniques

Parameter	Conventional Techniques (Osborne/Window, Devlin, New Tunnel, Selective Pressure)	Modified Hobkirk Technique (Multiple Holes)	Advantage
Tray Design	Single large window (2-3 cm) or tunnel opening	**Double spacer and multiple small holes** (3-5+) over flabby area	Preserves tray strength better than large window
Pressure Distribution	Uniform through single opening	**Most uniform** via multiple discrete holes	Prevents localized tissue compression
Tissue Displacement	Good control	**Excellent** - minimal, uniform displacement	Superior mucostatic recording of flabby tissue
Materials Used	Variable (single or dual materials)	**Strategic dual-material**: medium body + light-body PVS	Optimal material selection for each tissue type
Steps	Two-step (most)	**Two-step**: medium body removal → light body PVS syringing	Better control over flabby tissue recording
Retention & Stability	Good	**Superior** - multiple contact points	Enhanced denture stability and patient satisfaction

Parameter	Conventional Techniques (Osborne/Window, Devlin, New Tunnel, Selective Pressure)	Modified Hobkirk Technique (Multiple Holes)	Advantage
Tray Integrity	Large window compromises strength	**Maintained** - small holes preserve rigidity	Better clinical handling
Customizability	Fixed window/tunnel size	**Highly customizable** - hole number/size adjustable	Adapts to various flabby ridge extents
Accuracy	Good	**Best** - undisplaced tissue recording	Highest number of advocates in literature

Table 2: Comparison of glass fiber mesh versus metal mesh reinforcement for complete denture bases

Property	Glass Fiber Mesh	Metal Mesh
Aesthetics	Translucent; does not affect denture color	Opaque; may show through thin acrylic
Weight	Lightweight	Heavier; may reduce patient comfort
Fracture resistance	High flexural and impact strength	High, but may concentrate stresses at edges
Corrosion resistance	Fully corrosion-resistant	May corrode over time
Biocompatibility	Biologically inert	Generally biocompatible
Processing	Simple sandwich technique	Requires precise adaptation and processing

Figure Legends

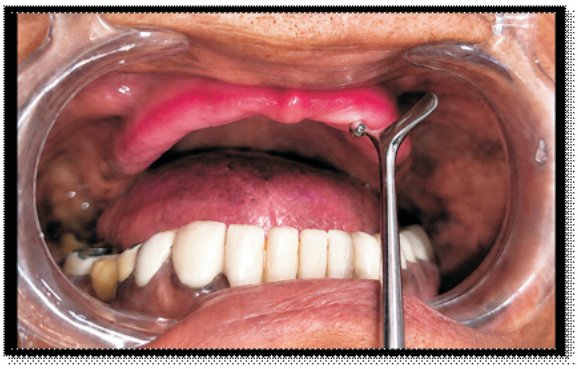

Figure 1: Preoperative intraoral view showing flabby anterior maxillary ridge.

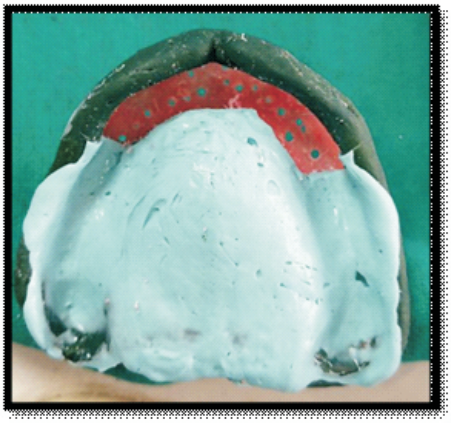

Figure 2: First-phase medium-body PVS impression recording stress-bearing areas and medium body PVS impression material was removed from the anterior region

Figure 3: Second-phase light-body PVS recording of flabby tissue in near-mucostatic state.

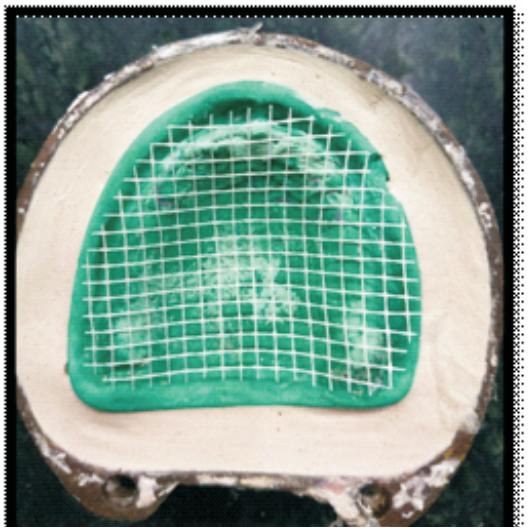

Figure 4: Glass fiber mesh adapted on master cast prior to denture processing.

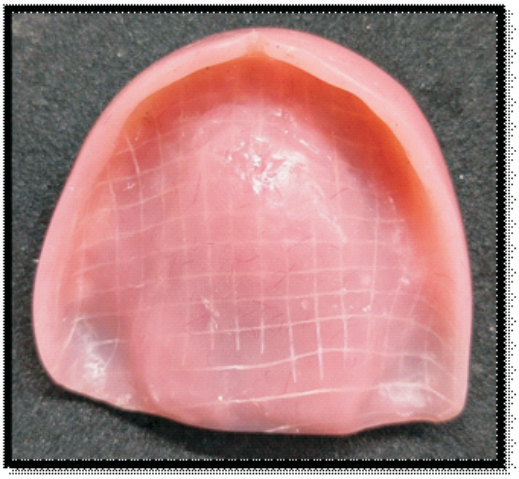

Figure 5: Glass fiber reinforced maxillary denture

Figure 6:Final processed and polished complete denture at insertion.

Figure 7: Satisfied patient with final prosthesis