

Addressing Anatomical Challenges in Complete Denture Rehabilitation: Flabby Maxillary and Knife-Edge Mandibular Ridges - A Clinical Case Study

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Abstract

Case Report

Managing edentulous patients with compromised ridges, such as a flabby anterior maxilla and knife-edge mandibular ridges, presents significant clinical challenges. This case report details the successful prosthodontic rehabilitation of a 62-year-old female patient showing both conditions. A modified impression technique was employed: a custom tray with partial window design was used for the maxilla to minimize tissue distortion, while a pressure-relief approach was applied in the mandible to accommodate the knife-edge ridge. The patient was rehabilitated with complete dentures utilizing a lingualized occlusal scheme, resulting in satisfactory esthetics, function, and comfort. This report accentuates the importance of individualized treatment planning and meticulous execution at each stage of complete denture fabrication in managing complex anatomical variations.

Keywords: flabby ridge, knife-edge ridge, modified window technique, lingualized occlusion.

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INTRODUCTION

Flabby maxillary ridges and severely resorbed knife-edge mandibular ridges present significant challenges during complete denture rehabilitation because tissue displacement and concentrated occlusal stresses compromise retention, stability, and patient comfort. Flabby tissues are readily displaced during impression making, producing distortion of the denture-bearing area, while knife-edge ridges possess thin mucosal coverage over sharp residual bone and are highly susceptible to pain and tissue trauma under functional loading. [1,2] Successful management therefore requires careful modification of impression procedures and occlusal design.

Various techniques have been described for recording flabby tissues and managing compromised ridges. [3,4] Massad and Lobel classified flabby tissues according to mobility into low, average, and high displaceability types, aiding selection of impression

techniques. [5] Conservative prosthodontic management is often preferred over surgery because further tissue reduction may compromise denture support.[6-8] Lingualized occlusion has also been advocated for compromised ridges because it centralizes occlusal forces while maintaining esthetics and masticatory efficiency.[9,10] This report describes the rehabilitation of a patient with a flabby maxillary ridge and knife-edge mandibular ridge using modified impression techniques and balanced lingualized occlusion.

CASE PRESENTATION

A 62-year-old female presented with difficulty in chewing due to looseness of her mandibular removable partial denture and attrition of teeth on her maxillary complete denture (Figure:1). She had been wearing the same prostheses for approximately ten years. Clinical examination of the maxillary arch revealed a flabby anterior ridge and palatal inflammation associated with a suction-cup denture. Examination of the

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mandibular arch revealed a severely resorbed knife-edge ridge and altered vertical dimension resulting from worn denture teeth (Figure:2). Orthopantomographic evaluation revealed no pathology except a retained root stump [33], which was subsequently extracted (Figure:3).

The anterior maxillary flabby tissue was surgically excised and histologically diagnosed as fibroepithelial hyperplasia. However, recurrence occurred within one month, indicating persistent tissue displaceability. Implant-supported treatment was discussed but declined due to surgical apprehension and financial limitations. Consequently, conservative prosthodontic rehabilitation was planned. Written informed consent was obtained.

CLINICAL PROCEDURE

Primary impressions were made with irreversible hydrocolloid and custom trays fabricated (Figure:4). For the maxillary arch, a clear acrylic modified partial-window tray was designed with 1.5 mm spacer relief and an additional 1.5 mm relief over the flabby anterior region to minimize tissue displacement (Figure:5). Border molding was completed with low-fusing compound. [11,12] A two-step impression technique was performed in which posterior maxillary tissues were first recorded using light-body polyvinyl

siloxane (PVS), followed by controlled injection of light-body PVS through the window to record the anterior flabby tissue (Figure: 6). [13-15]

For the mandibular arch, a 3 mm spacer was adapted over the knife-edge ridge region and a custom tray with multiple relief holes was fabricated. [16,17] (Figure: 7) Final impressions were made using medium-body polyvinyl siloxane (PVS), and the master cast was obtained. The knife-edge ridge area was identified and marked on the master cast, following which a thin layer of pumice was adapted over the region. Heat-cured clear acrylic denture bases were then fabricated.[18]

Vertical dimension was established using the Niswonger method. [18] A Hanau spring face-bow transfer and split-cast mounting was performed on a Hanau Wide-View semi-adjustable articulator (Figure:8). Centric relation was recorded and transferred using the nick-and-notch method and verified with extraoral tracing, while protrusive and lateral records were used to program condylar guidance. Semi-anatomic maxillary teeth and non-anatomic mandibular teeth (Acryrock A1) were arranged in a balanced lingualized occlusal scheme (Figure:9). [19,20] Following trial verification, dentures were processed using compression molding technique and laboratory remounting was performed prior to insertion (Figure:10).

Summary Table: Traditional vs Modified Techniques in Prosthodontic Management

Aspect	Traditional Technique	Modified Technique (Used in This Case)
Maxillary Impression	Full-window tray with zinc oxide eugenol and plaster	Partial window tray with controlled injection of light-body elastomeric material
Mandibular Impression	Uniform spacer with standard tray	3 mm spacer with multiple relief holes in custom tray using medium-body elastomeric material
Tray Material	Conventional. Acrylic tray	Clear acrylic tray for visual control of material flow and tissue blanching
Tissue Management	Risk of tissue displacement and compression	Selective relief with visual monitoring to minimize distortion of flabby tissue
Occlusal Scheme	Anatomic or monoplane occlusion	Lingualized occlusion with semi-anatomic teeth in maxilla and non-anatomic teeth in mandible
Force Distribution	Greater lateral forces; uneven distribution	Vertical force centralization with minimized lateral stress on ridges
Post-Insertion Adjustments	Empirical and blind; higher risk of ulceration	Guided by visibility through clear base; allows precise and early intervention for tissue comfort
Prosthesis Outcome	Less predictable fit, especially in compromised ridges	Improved accuracy, retention, and patient satisfaction with long-term prosthetic comfort



Figure 1: Patient's Old dentures



Figure 2: intraoral images showing maxillary and mandibular arch.

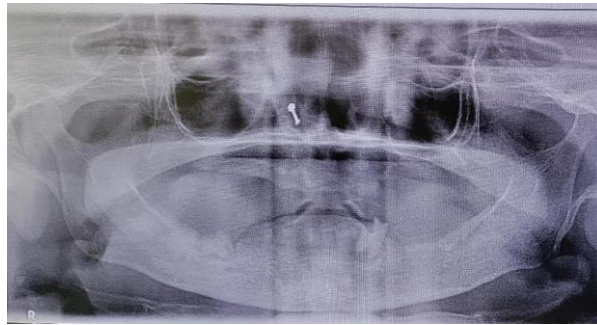


Figure 3: Orthopantamogram



Figure 4: Primary Casts

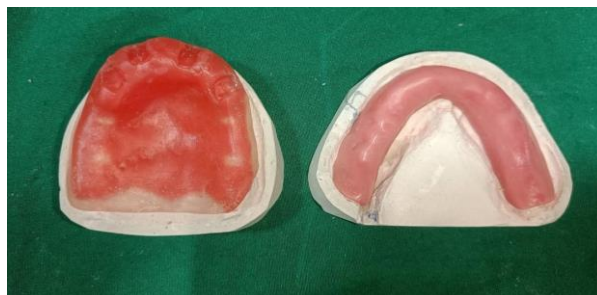


Figure 4: Primary Casts with Modified Custom Tray



Figure 5: Custom tray showing border molding



Figure 6: Maxillary two step impression technique



Figure 7: Mandibular custom tray with multiple relieves holes in the knife edge area



Figure 8: Facebow transfer done



Figure 9: Denture Try-in



Figure 10: Final insertion showing lingualized occlusion



Figure 11: Pre- and post-operative images

DISCUSSION

Simultaneous management of flabby maxillary and knife-edge mandibular ridges presents a unique prosthodontic challenge because both conditions demand contrasting biomechanical considerations during denture fabrication. Mobile maxillary tissues require minimal displacement during impression making, whereas severely resorbed mandibular ridges necessitate careful stress control to prevent discomfort and tissue trauma. Achieving satisfactory retention, stability, and patient comfort therefore depends on balancing tissue preservation with functional support. [11-14]

In the present case, the anterior maxillary tissue corresponded to a localized flabby ridge, likely associated with long-term denture wear and recurrence of hyperplastic tissue following excision. A modified partial-window impression technique facilitated recording of the flabby tissues with minimal displacement while maintaining accuracy in the stress-bearing posterior regions. Elastomeric impression material was selected instead of conventional impression plaster or zinc oxide eugenol because it simplified the procedure, improved patient comfort, and permitted controlled tissue recording with minimal distortion. [15,16] Recording the posterior and anterior tissues separately improved control and preserved the tissues in a relatively undistorted state. The use of two differently colored light-body polyvinyl siloxane materials aided visualization of material flow and delineation between the separately recorded regions, allowing controlled recording of the flabby tissue without disturbing the previously recorded posterior impression. The clear acrylic tray further facilitated assessment of material adaptation during impression making. [21]

Management of the mandibular arch required a selective pressure approach because the severely resorbed knife-edge ridge was highly susceptible to trauma during function. [22] Surgical correction was avoided as additional reduction of residual ridge

structure could compromise denture support. Spacer relief and perforations in the custom tray reduced pressure over the vulnerable crest during impression making, while pumice adaptation over the master cast created relief within the final prosthesis and minimized stress concentration over the sharp residual ridge.

Heat-cured clear acrylic denture bases facilitated visualization of tissue blanching and aided identification and adjustment of excessive pressure areas during jaw relation procedures, thereby enhancing denture base adaptation and stability. Accurate maxillomandibular records, together with split-cast mounting and laboratory remounting, contributed to occlusal refinement by compensating for processing-related discrepancies and enabling precise selective occlusal adjustments before denture delivery. [23]

Lingualized occlusion contributed significantly to denture stability by centralizing occlusal forces and reducing lateral stress transmission to the compromised mandibular ridge. The combination of semi-anatomic maxillary teeth and non-anatomic mandibular teeth provided favorable esthetic and functional outcomes while maintaining mechanical freedom during mandibular movements. Bilateral balanced articulation further enhanced prosthesis stability during functional movements. [24,25] The patient demonstrated satisfactory adaptation to the prosthesis with improved mastication, comfort, retention, and esthetics during follow-up, supporting the effectiveness of combining modified impression procedures with clear acrylic denture based and balanced lingualized occlusion in the management of compromised ridges.

CONCLUSION

The successful management of this case demonstrated that modified conventional techniques can yield satisfactory outcomes in patients with compromised ridges. A thorough understanding of ridge morphology, careful impression strategies, and

appropriate occlusal planning were crucial to restoring function and comfort.

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