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# Non Surgical Prosthodontic Rehabilitation of a Prominent Anterior Maxillary Ridge with Labial Undercuts Using a Flangeless Complete Denture: A Case Report

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## ABSTRACT:

*Prominent anterior maxillary ridges associated with pronounced labial undercuts pose a significant prosthodontic challenge during complete denture fabrication, frequently resulting in over-contoured labial flanges that adversely affect facial aesthetics, lip support, phonetics, and patient comfort. This case report describes the prosthodontic management of such anatomical limitations using a conventional flangeless maxillary complete denture as a conservative, non-surgical alternative. Elimination of the anterior labial flange permitted improved adaptation of the denture base to the underlying ridge anatomy while minimizing soft-tissue impingement and excessive labial fullness. The clinical workflow, design rationale, and processing modifications are presented to highlight the functional and aesthetic advantages of this approach. This treatment approach demonstrated improved comfort, satisfactory retention, and enhanced facial aesthetics during post-insertion follow-up, supporting the clinical applicability of flangeless denture designs in cases with unfavorable ridge morphology.*

## KEYWORDS:

*Flangeless denture; Labial undercut; Maxillary ridge; Denture aesthetics; Complete denture*

## 1. Introduction

Residual alveolar ridge morphology is a primary determinant of complete denture success, as it directly influences retention, stability, and support, while also affecting phonetics, aesthetics, and overall patient comfort. Following tooth loss, the edentulous ridge undergoes continuous and often unpredictable remodeling, leading to marked anatomical variability ranging from broad, well-formed ridges to severely resorbed or anatomically compromised configurations. [1]. These morphological differences significantly modify the denture-bearing area, border seal effectiveness, stress distribution, and resistance to functional and parafunctional loads. Consequently, ridge form plays a decisive role in denture prognosis, necessitating thorough clinical assessment and individualized prosthodontic planning to achieve predictable functional outcomes and long-term patient satisfaction [1]. Among the various ridge configurations, a prominent anterior maxillary ridge with associated labial undercuts is a commonly encountered clinical condition that complicates maxillary complete denture construction [2]. The labial flange of a maxillary denture is critical for providing lip support, maintaining facial harmony, and facilitating proper phonetics. However, in the presence of a prominent ridge, conventional flange extension often results in over-contouring of the labial surface, leading to excessive lip fullness, altered facial profile, compromised speech, and patient dissatisfaction. Achieving an optimal balance between functional requirements and aesthetic demands in such cases remains a significant prosthodontic challenge [3].

Pre-prosthetic surgical procedures, such as alveoloplasty and ridge recontouring, have traditionally been recommended to correct unfavorable ridge anatomy and facilitate

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conventional denture fabrication. Despite their effectiveness, these surgical interventions may be contraindicated due to systemic health considerations, advanced patient age, or patient reluctance to undergo invasive treatment [4]. As a result, there is an increasing need for conservative, non-surgical prosthodontic alternatives that can accommodate existing ridge morphology while preserving function and aesthetics.

The flangeless complete denture represents a conservative prosthodontic approach for managing prominent maxillary ridges with labial undercuts. By eliminating or reducing the anterior labial flange, this design allows improved adaptation of the denture base to the underlying ridge anatomy while minimizing excessive acrylic bulk and soft tissue impingement. This modification contributes to enhanced facial aesthetics while maintaining clinically acceptable retention and stability [5]. The present case report highlights the clinical application of a conventional flangeless maxillary denture as an effective alternative to surgical intervention in patients with challenging ridge morphology.

## 2. Case Report

A 70-year-old male patient presented to the Department of Prosthodontics with complaints of difficulty in mastication, impaired speech, and compromised facial aesthetics due to complete edentulism of both arches for the past 12 years. Clinical examination revealed completely edentulous maxillary and mandibular arches, with a prominent anterior maxillary ridge exhibiting a pronounced labial undercut from canine to canine (Figure 1a-c). In contrast, the mandibular ridge was U-shaped with adequate height and width (Figure 1d). The ridge anatomy was considered unfavorable for conventional maxillary denture fabrication because it predisposed to excessive labial flange bulk, thereby adversely affecting aesthetic outcomes. After discussing treatment options, including pre-prosthetic surgery and implant-supported prostheses, the patient declined surgical intervention, and a conservative treatment plan involving a conventional flangeless maxillary complete denture opposing a conventional mandibular complete denture was planned. Written informed consent was obtained from the patient for treatment, following a thorough explanation of the procedure, alternative treatment options, and consent for the use of clinical data and photographs for publication.

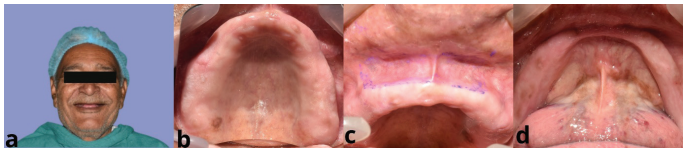


**Figure 1: 1a. Extraoral view 1b. Maxillary arch 1c. Maxillary labial undercut 1d. Mandibular arch**

## 3. Clinical procedure

Primary impressions of both the maxillary and mandibular arches were made using an irreversible hydrocolloid impression material (Orikam Neoalign Alginate; Orikam Healthcare, India) (Figure 2a, b), and the primary casts were poured using Type II dental plaster (Kalabhai Karson Pvt. Ltd., Kalrock, India) (Figure 2c). Wax spacers were adapted to the primary casts, and custom impression trays were fabricated for both arches using autopolymerizing acrylic resin. Border molding was performed using a low-fusing green stick impression compound (DPI Pinnacle Tracing Sticks; Dental Products of India Ltd., Mumbai, India) to achieve functional border extension. A definitive wash impression was recorded using a light-body elastomeric impression material (Aquasil Ultra LV; Dentsply Sirona, Konstanz, Germany) to accurately capture fine anatomical details and soft-tissue morphology (Figure 2d). The posterior palatal seal was recorded functionally at the vibrating line during border molding and was incorporated directly into the definitive impression. The definitive master casts were poured using Type III dental stone (Kalabhai Karson Pvt. Ltd., Kalrock, India) (Figure 2e). Subsequently, record bases and occlusal rims were fabricated, and the maxillomandibular relationship was recorded following conventional clinical procedure (Figure 2f). The vertical dimension of occlusion (VDO) was established using assessment of facial proportions, phonetics, and physiologic rest position, with verification of an adequate 2–4 mm freeway space. Trial evaluation confirmed balanced lower facial height and absence of muscular strain. Despite the proclined anterior ridge, sufficient interarch space was available, and no alteration of VDO was required.

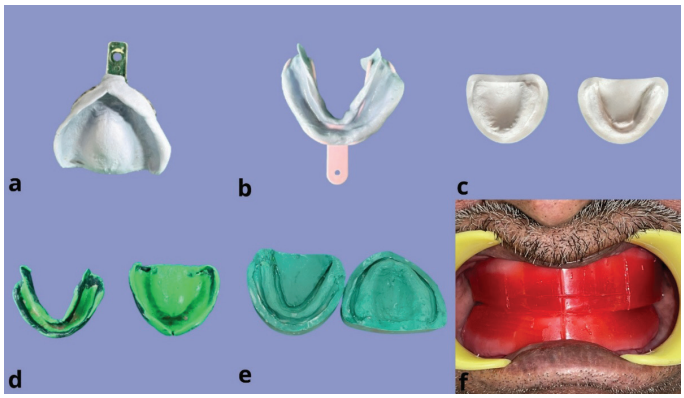


**Figure 2: 2a, b. Maxillary and Mandibular Primary impression 2c. Primary casts 2d. Definitive Impressions 2e. Definitive cast 2f. Maxillomandibular relation record**

The definitive casts were mounted on a mean-value articulator, and the arrangement of artificial teeth was performed. A bilateral balanced occlusal scheme was established to counteract potential rotational forces arising from the elimination of the anterior labial flange. Incisal guidance was deliberately reduced by increasing horizontal overlap and maintaining minimal vertical overlap, thereby decreasing anterior tipping forces during protrusive movements. Eccentric movements were adjusted to achieve simultaneous bilateral posterior contacts, verified intraorally using articulating paper, to maintain stability and prevent rotation around a potential fulcrum line in the premolar region. Protrusive movements were refined to ensure light anterior contact accompanied by posterior balancing contacts, thereby preserving the posterior palatal seal during functional excursions. Cuspal inclinations were selectively adjusted to minimize horizontal destabilizing forces. A clinical evaluation of the trial denture was subsequently performed to evaluate aesthetic parameters, phonetic accuracy, and occlusal relationships, ensuring harmonious maxillomandibular articulation before final processing (Figure 3a). Following the clinical evaluation, a labial window was created in the maxillary trial denture extending from canine to canine, thereby eliminating the anterior labial flange (Figure 3b). This modification permitted direct contact of the upper lip with the underlying residual ridge, reducing labial fullness and enhancing facial aesthetics. The remaining denture borders were maintained with adequate thickness to preserve strength and durability. A 19-gauge (≈1.0 mm) stainless steel orthodontic wire was temporarily adapted during the trial stage to evaluate the required anterior acrylic bulk and spatial clearance following flange reduction. The wire served solely as a dimensional reference during wax modification and was not incorporated into the definitive prosthesis (Figure 3c)

Following insertion of the trial denture, a clinical evaluation was performed to assess denture retention and stability following labial flange modification (Figure 3d). During processing, the addition silicone putty spacer was isolated from the acrylic resin using a separating medium to prevent chemical interaction and polymerization inhibition. The intaglio surface of the flangeless anterior region was carefully finished and highly polished to achieve a smooth, non-porous tissue-contacting surface, thereby minimizing plaque accumulation and mucosal irritation. Dewaxing was subsequently performed using conventional laboratory procedures.


**Figure 3: 3a. Clinical evaluation of trial denture with conventional labial flange 3b. Labial flange removed and adaptation of support wire 3c. Modified wax-up of maxillary trial denture post flange reduction 3d. Clinical evaluation of trial denture with modified labial flange 3e. Flashing of the flangeless denture 3f. Putty indexing for denture processing.**

The denture was processed using a conventional heat-polymerized polymethyl methacrylate (DPI Heat Cure; Dental Products of India Ltd., Mumbai, India) by the conventional compression molding technique. The definitive flangeless maxillary denture was subsequently finished, polished, and inserted for clinical evaluation (Figure 4a). Chairside occlusal adjustments were carried out to achieve optimal occlusal harmony, functional efficiency, and patient comfort (Figure 4b, c). The patient was instructed to avoid incising hard food items with the anterior teeth to reduce functional tipping stresses.


**Figure 4: 4a. Definitive prosthesis 4b. Intraoral lateral view of the final prosthesis 4c. Intraoral frontal view of the final prosthesis.**

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Post-insertion follow-up visits were scheduled at 24 hours, one week, and one month. At each review appointment, the patient reported satisfactory comfort, improved facial esthetics, and adequate functional performance of the prosthesis, with no evidence of soft-tissue irritation or postoperative complications (Figure 5a, 5b).


**Figure 5: 5a. Pre-Operative Extra-Oral View, 5b. Postoperative Extra-Oral View**

## 4. Discussion

The management of edentulous patients with unfavorable residual ridge morphology continues to present a biomechanical and aesthetic challenge in complete denture therapy [6]. Prominent or proclined anterior maxillary ridges with associated labial undercuts significantly alter the neutral zone and complicate denture base extension, often predisposing the prosthesis to compromised retention, instability, phonetic distortion, and compromised facial aesthetics. Conventional denture designs in such scenarios frequently rely on excessive labial flange extension to engage the undercut area, which may result in over-contoured denture bases, altered lip posture, soft-tissue impingement, and reduced patient acceptance.

Various treatment modalities have been advocated to manage pronounced labial undercuts. Pre-prosthetic surgical interventions such as alveoloplasty, ridge recontouring, and undercut reduction can improve the denture-bearing foundation; however, these procedures are invasive and associated with surgical morbidity, postoperative discomfort, and irreversible loss of alveolar bone. Their use is further limited in medically compromised or elderly patients, as well as in individuals unwilling to undergo surgical treatment [7]. Orthodontic correction and implant-supported prostheses have also been proposed, but these options are often constrained by cost, treatment duration, systemic health considerations, and anatomical limitations.

Several prosthodontic modifications have been described as conservative alternatives, including sectional dentures, flexible denture base materials, hollow labial flanges, window dentures, and modified flange contouring techniques. While flexible denture bases may aid insertion through undercuts, they frequently lack long-term dimensional stability and adequate support. Sectional dentures increase technical complexity and patient handling difficulty. Window dentures, although aesthetically acceptable, may compromise border seal and retention if not carefully executed [8].

In the present case, a flangeless maxillary complete denture design was selected as a conservative, non-surgical solution to accommodate the prominent anterior labial undercut while preserving facial aesthetics and functional efficiency [9]. Retention is primarily derived from a functionally recorded posterior palatal seal, maximal palatal coverage, interfacial surface tension, and controlled passive engagement of the favorable hard-tissue undercut. This design represents a conservative, non-surgical alternative when surgical ridge recontouring is contraindicated or declined. [10] A critical limitation of flangeless denture designs is the potential reduction in structural rigidity of the anterior denture base. A 19-gauge (≈1.0 mm) stainless steel orthodontic wire was temporarily adapted during the trial stage to simulate the anticipated anterior acrylic thickness and to assess spatial clearance following labial flange reduction. The wire functioned exclusively as a dimensional and contour guide during wax modification to prevent over- or under-contouring of the anterior region. It was removed before processing and was not incorporated into the definitive prosthesis. Additionally, the use of putty-consistency addition silicone over the labial undercut area before dewaxing served as an effective spacer, preventing acrylic resin overextension and ensuring accurate reproduction of ridge anatomy. This technique minimized polymerization shrinkage–related distortion, preserved soft-tissue contours, and contributed to improved comfort and phonetic performance. Compared with conventional wax relief or manual trimming methods, this approach offers greater precision and reproducibility during processing.

The combination of a flangeless design and

controlled acrylic contouring represents a biologically sound and mechanically stable approach tailored to the patient's anatomical constraints and treatment preferences. [11]. This integrated technique provides a distinct advantage over alternative conservative methods by simultaneously addressing aesthetics, strength, comfort, and functional performance without increasing clinical or laboratory complexity.

Overall, the favorable outcome observed in this case reinforces the clinical relevance of flangeless maxillary complete dentures as a predictable and patient-centered solution for managing prominent anterior maxillary ridges with labial undercuts. When appropriately indicated and reinforced, this technique offers an effective alternative to surgical intervention, aligning with contemporary principles of minimally invasive prosthodontic rehabilitation.

## 5. Conclusion

A flangeless maxillary complete denture represents a conservative and clinically effective treatment option for patients presenting with prominent anterior maxillary ridges and pronounced labial undercuts, particularly when surgical intervention is contraindicated or declined. Elimination of the anterior labial flange contributes to reduced lip prominence, enhanced facial aesthetics, and improved patient comfort while maintaining satisfactory denture retention and stability. This case report highlights the importance of individualized prosthodontic treatment planning and demonstrates the clinical versatility of conventional denture techniques in successfully managing complex ridge morphology to achieve favorable functional and aesthetic outcomes.

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