

CASE REPORT



A customized approach to palatal rugae replication using acrylic stamp for improved prosthetic phonetics

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ABSTRACT

Phonetic efficiency is a critical yet often overlooked aspect of complete denture fabrication. The absence of natural palatal landmarks, particularly rugae, can impair speech adaptation in certain patients. Reproducing palatal rugae on the denture surface can significantly improve tongue positioning and articulation. This article presents a simplified and effective technique for duplicating patient-specific palatal rugae using an acrylic palatal stamp, thereby enhancing phonetics and reducing the adaptation period.

KEY WORDS

Acrylic resin, Complete denture, Palatal rugae, Palatal stamp, Phonetics

ARTICLE HISTORY

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Introduction

Speech is a complex physiological function that relies on the precise coordination of various oral and perioral structures, including the tongue, lips, palate, and teeth. In individuals with natural dentition, these structures work harmoniously to facilitate clear articulation of sounds. However, in completely edentulous patients, the loss of teeth and associated anatomical landmarks significantly alters the oral environment, often leading to compromised speech [1]. One of the critical anatomical features involved in phonetics is the palatal rugae, which are irregular ridges located on the anterior part of the hard palate. These structures serve as essential tactile guides that help the tongue achieve proper positioning during speech production [2]. When conventional complete dentures are fabricated without replicating these natural contours, patients may experience difficulty in articulating certain sounds, particularly linguopalatal phonemes such as “t,” “d,” “n,” and “l” [3].

Therefore, recreating palatal rugae in complete dentures can play a significant role in restoring normal speech patterns. By re-establishing these anatomical landmarks, patients can regain better neuromuscular control and improve their overall phonetic performance, ultimately enhancing comfort and adaptation to the prosthesis [4].

Case Report

A 64-year-old male patient, a journalist by profession (where clear speech and articulation are essential), reported with complete edentulism and a chief complaint of unclear speech, particularly difficulty in pronouncing linguopalatal sounds. Clinical examination revealed well-formed maxillary and mandibular ridges with no significant pathological findings.

Conventional prosthodontic procedures were initiated with primary impressions, followed by border molding and final impressions to obtain accurate master casts. During the clinical evaluation, special emphasis was placed on the palatal anatomy to aid in phonetic rehabilitation. To record and reproduce the palatal rugae accurately, an acrylic palatal stamp was fabricated on the master cast after that intraoral markings were

first made along the midline of the palate using an indelible pencil (Figure 1 and Figure 2).



Figure 1. Acrylic palatal stamp is fabricated on master cast.



Figure 2. Intraoral view showing midline marking on palate.

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These markings served as a reference for orientation and ensured proper alignment of the rugae pattern. The same midline reference marking was transferred onto the acrylic palatal stamp, facilitating precise positioning during the recording procedure (Figure 3).

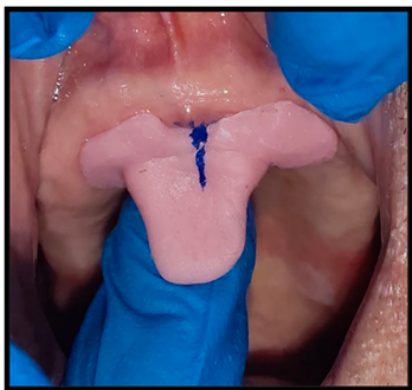


Figure 3. Transfer of marking on the acrylic palatal stamp.

An elastomeric impression material was applied over it to capture the detailed rugae pattern. The presence of midline markings ensured accurate repositioning and orientation during this step (Figure 4). The impression thus obtained recorded both the palatal contours and the customized rugae morphology (Figure 5).

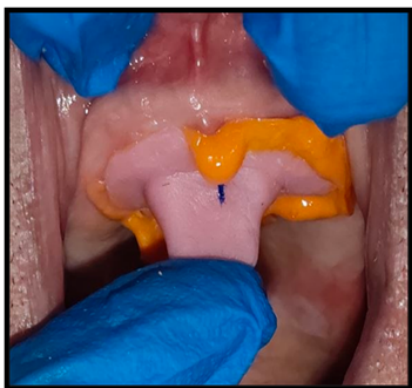


Figure 4. Recording of rugae pattern using elastomeric material.



Figure 5. Final impression of recorded rugae on acrylic palatal stamp.

This recorded pattern was transferred onto the trial denture base over the wax template in palatal region, preserving the anatomical details (Figure 6). During the wax-up stage, care was taken to maintain the integrity of the rugae pattern without distortion (Figure 7). The denture was then processed using conventional heat-cure acrylic resin techniques, ensuring that the reproduced rugae were retained in the final prosthesis (Figure 8).

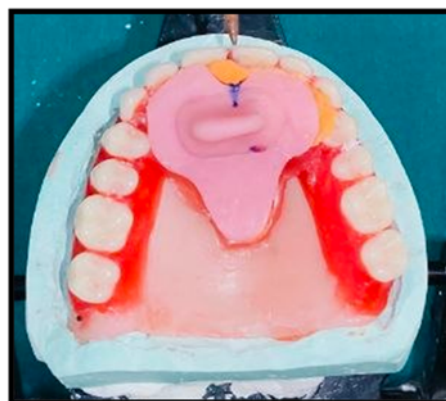


Figure 6. Acrylic stamp adaptation over wax template on palatal area for rugae duplication during try-in.



Figure 7. Waxed up denture with reproduced palatal rugae.



Figure 8. Final acrylized denture with palatal rugae incorporated.

At the time of insertion, the denture exhibited well-defined palatal rugae contours. Phonetic evaluation demonstrated marked improvement in the articulation of linguopalatal sounds. The patient reported enhanced speech clarity and comfort, indicating successful functional and psychological adaptation to the prosthesis.

Discussion

Phonetics is a vital parameter in determining the success of complete denture therapy. Any alteration in oral anatomy, particularly the palatal contours, can significantly affect speech production [5,6]. The palatal rugae play an important role by providing tactile feedback to the tongue, enabling precise positioning during articulation. Their absence in conventional dentures may result in speech disturbances such as lisping, mispronunciation, and reduced clarity [7,8]. In the present case, the patient was a journalist, a profession in which speech clarity, articulation, and verbal communication are critically important. Even minor phonetic discrepancies can impact professional performance and confidence. This highlights the necessity of incorporating functional anatomical features, such as palatal rugae, into denture fabrication to meet not only biological but also occupational demands [9,10]. Various techniques have been proposed for reproducing palatal rugae, including carving, embossing, and the use of impression materials; however, many are technique-sensitive and time-consuming [11,12]. The wax duplication technique used in this case proved to be simple, economical, and effective, allowing accurate reproduction of rugae morphology with minimal clinical complexity [8,13]. Furthermore, the presence of reproduced rugae enhances patient adaptation by restoring familiar tactile sensations, thereby improving neuromuscular coordination and phonetic efficiency [14,15]. In this case, the patient demonstrated noticeable improvement in speech clarity post-insertion, which was particularly beneficial given her professional requirements. In addition to prosthodontic importance, palatal rugae are unique anatomical structures with forensic significance due to their individuality and stability over time.

Conclusion

Reproducing palatal rugae plays a significant role in enhancing phonetic outcomes in complete denture patients by providing a more natural palatal contour that aids in proper tongue placement during speech. The acrylic palatal stamp technique offers a simple, cost-effective, and clinically reliable method for accurately duplicating these anatomical landmarks without requiring complex armamentarium or additional chairside time. By restoring the natural texture of the palate, this approach not only improves speech articulation but also contributes to better patient adaptation and overall comfort. Furthermore, the presence of palatal rugae can enhance proprioception, allowing patients to achieve improved control during functional movements such as swallowing and speaking. Therefore, incorporating such anatomical features should be considered an important and routine step in complete denture fabrication to achieve optimal functional and patient-centered outcomes.

Disclosure Statement

The author does not have conflict of interest in this research.

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