

An anatomical wax index technique for palatal rugae and mid palatine raphe reproduction in maxillary complete denture.

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Abstract

Successful complete denture rehabilitation involves restoration of aesthetics, mastication, comfort, and speech. Among these factors, phonetic rehabilitation is often underestimated despite its significant impact on patient satisfaction and adaptation to dentures. Palatal rugae and the midpalatine raphe serve as important anatomical landmarks that aid tongue positioning during speech and swallowing. Conventional complete dentures frequently lack these anatomical features, resulting in altered speech patterns and prolonged adaptation periods. This clinical case report describes a simple, economical, and clinically effective technique for reproducing a patient's palatal rugae and midpalatine raphe in a maxillary complete denture using a customized wax-assisted index. The technique enabled accurate transfer of anatomical details from the impression to the denture base without the need for specialized equipment or complex laboratory procedures. Following denture insertion, the patient demonstrated improved speech clarity, enhanced comfort, and greater overall satisfaction. The described method is straightforward, inexpensive, and can be readily incorporated into routine complete denture fabrication to improve phonetic outcomes and patient acceptance.

Keywords: Complete denture, Denture characterization, Midpalatine raphe, Palatal rugae, Phonetics, Speech rehabilitation, Wax index technique.

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Introduction

Complete denture therapy aims to restore oral function, facial aesthetics, comfort, and speech in edentulous patients. While considerable emphasis is often placed on retention, stability, and aesthetics, the role of phonetics in determining the success of complete denture treatment is frequently overlooked. Speech difficulties following denture insertion may negatively affect patient confidence and satisfaction, particularly in individuals who rely heavily on verbal communication.^[1]

The anterior region of the hard palate plays a crucial role in speech production by providing tactile guidance for tongue placement during

articulation. Palatal rugae and the midpalatine raphe are distinctive anatomical structures that contribute to the accurate production of linguopalatal sounds. These structures assist the tongue in identifying its position during speech and swallowing, thereby facilitating clear articulation.^[1,2]

In conventional complete denture fabrication, the palatal surface is often smooth and devoid of anatomical landmarks. The absence of these structures may alter tongue perception and movement, resulting in speech disturbances and an extended adaptation period.^[1,3] To overcome this limitation, several techniques have been proposed for reproducing palatal anatomy, including freehand carving, use of

dental floss, tin foil adaptation, acrylic resin templates, and elastomeric indices.^[3-7]

The present clinical report describes a simple wax-assisted technique for reproducing palatal rugae and the midpalatine raphe in a maxillary complete denture. The technique is cost-effective, easy to perform, and capable of accurately transferring individualized anatomical details, thereby enhancing phonetic performance and patient adaptation.

Case Report

A 74-year-old male patient presented to the Department of Prosthodontics with the chief complaint of difficulty in chewing due to complete loss of teeth. The patient had been completely edentulous for approximately twelve years and expressed a desire for prostheses that would restore not only mastication and facial appearance but also facilitate clear speech.

The patient reported active participation in religious and social gatherings, where verbal communication formed an important part of his daily activities. He specifically expressed concern regarding pronunciation and clarity of speech following denture treatment.

Extraoral examination revealed a symmetrical facial profile with reduced lower facial height, consistent with long-term edentulism. Intraoral examination demonstrated completely edentulous maxillary and mandibular arches with healthy supporting tissues and well-formed residual ridges suitable for conventional complete denture therapy.

After clinical evaluation and treatment planning, fabrication of conventional complete dentures was initiated. Considering the patient's phonetic concerns, reproduction of the palatal rugae and midpalatine raphe was planned to restore natural palatal contours and provide tactile guidance for tongue positioning.

Technique

Impression Procedures

Primary impressions of the maxillary and mandibular arches were made using impression compound, and diagnostic casts were obtained. Custom trays were fabricated using autopolymerizing acrylic resin.

Border molding was carried out using green stick impression compound, followed by final impressions using light-body elastomeric impression material. Master casts were poured in Type III dental stone.

Wax-Assisted Index Fabrication

A thin layer of molten modelling wax was carefully poured over the rugae and midpalatine raphe region of the final maxillary impression (Fig. 1). After cooling and solidification, a wax index reproducing the detailed palatal anatomy was obtained and preserved for later use (Fig. 2).

The corresponding region on the master cast was isolated using a separating medium. A thin acrylic resin denture base was fabricated using the sprinkle-on technique to accurately reproduce the palatal anatomy (Fig. 3).

Jaw Relation and Trial Denture Procedures

Occlusion rims were constructed on temporary denture bases, and maxillomandibular jaw relations were recorded. The casts were mounted and teeth arrangement was completed according to established prosthodontic principles. A clinical trial appointment was conducted to verify aesthetics, occlusion, and phonetics.

Transfer of Palatal Anatomy

The previously fabricated wax index was positioned on the palatal surface of the denture base in correspondence with the patient's original anatomical landmarks. Gentle adaptation of the index enabled accurate

transfer of the palatal rugae and midpalatine raphe pattern to the denture base (Fig. 4).

Processing and Denture Delivery

During flasking and investing procedures, special care was taken to preserve the reproduced anatomical details. A layer of dental stone was adapted over the rugae region to maintain the integrity of the pattern during processing.

The dentures were processed using conventional heat-polymerized acrylic resin techniques. Following deflasking, finishing, and polishing, the reproduced palatal anatomy was clearly visible on the tissue surface of the maxillary denture (Fig. 5).

The dentures were inserted and evaluated clinically. Post-insertion assessment revealed satisfactory retention, stability, aesthetics, and phonetic performance. The patient reported improved comfort and greater clarity of speech, particularly during routine conversations and religious recitations.

Discussion

The palatal rugae and midpalatine raphe serve as important anatomical landmarks that contribute to proper tongue orientation during speech. Accurate tongue-palate contact is essential for the articulation of several consonant sounds, particularly linguopalatal phonemes such as /t/, /d/, /n/, and /l/. The loss of these tactile landmarks following complete denture fabrication may interfere with speech production and delay neuromuscular adaptation.^[1,2]

Various techniques have been described in the literature for reproducing palatal anatomy in complete dentures. These include freehand carving of rugae patterns, adaptation of dental floss or tin foil, use of elastomeric indices, acrylic resin templates, and metal palate techniques.^[3-7] Although these methods have demonstrated satisfactory results, some

require additional laboratory procedures, specialized materials, or considerable operator skill.

The technique presented in this report offers several practical advantages. The wax-assisted index enables precise reproduction of patient-specific anatomical details while remaining simple, economical, and minimally time-consuming. Because the anatomical pattern is directly obtained from the impression, the resulting reproduction closely resembles the patient's original palatal morphology. Furthermore, the technique can be incorporated into routine denture fabrication without additional equipment or significant modification of conventional procedures.^[4-7]

In the present case, the patient reported noticeable improvement in speech clarity and comfort following insertion of the dentures. The reproduced palatal anatomy appeared to facilitate tongue positioning and contributed to a shorter adaptation period. These findings support previous reports suggesting that restoration of palatal contours may improve phonetic performance and patient acceptance of complete dentures.^[1,3,5]

Despite its advantages, the technique has certain limitations. Distortion or loss of anatomical detail may occur during processing if adequate care is not taken during investing, packing, and finishing procedures. Additionally, long-term clinical studies involving larger patient populations are required to evaluate the durability of the reproduced structures and their influence on speech outcomes over time.^[7]

Conclusion

Reproduction of palatal rugae and the midpalatine raphe in complete dentures can enhance phonetic function by restoring important tactile landmarks that guide tongue movement during speech. The wax-assisted technique described in this report is simple, cost-effective, and clinically reliable for

transferring individualized palatal anatomy to the denture base. Incorporation of this method into routine complete denture fabrication may improve patient adaptation, speech intelligibility, and overall satisfaction with treatment.

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FIGURES

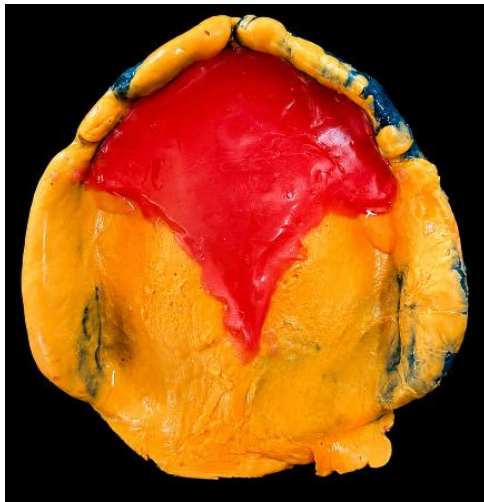


Figure 1

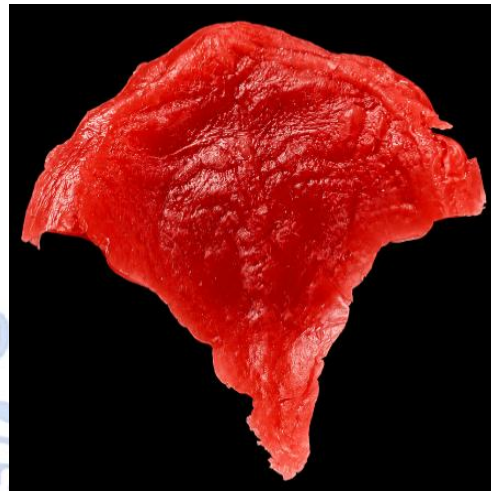


Figure 2



Figure 3



Figure 4



Figure 5