



Fabrication of a Hollow Maxillary Complete Denture Using a Dental Suction Tip as a Permanent Spacer: A Novel Technique

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ABSTRACT:

Introduction: Hollow maxillary complete dentures are indicated for patients with increased interarch space or severe residual ridge resorption to enhance denture retention and patient comfort; however, conventional fabrication techniques often require retrieval of a spacer material, which can be labor-intensive and may increase the risk of leakage. This clinical report describes a simplified technique for fabricating a hollow maxillary complete denture using a dental suction tip as a permanent spacer. A 62-year-old completely edentulous male patient reported for replacement of missing teeth, and during the jaw relation stage, excessive vertical height of the maxillary occlusal rim was observed, indicating the likelihood of a heavy prosthesis. To address this, a hollow denture was fabricated by permanently incorporating a dental suction tip within the denture base, thereby eliminating the need for post-processing spacer retrieval and ensuring uniform acrylic resin thickness. The technique resulted in a noticeable reduction in denture weight, minimized the risk of leakage, and reduced laboratory time. The patient reported improved comfort and satisfaction with the prosthesis. This technique appears to be a simple, cost-effective, and reproducible approach that avoids the additional steps associated with conventional hollow denture fabrication.

Objectives: To describe a simplified technique for fabricating a hollow maxillary complete denture using a dental suction tip as a permanent spacer to reduce prosthesis weight while maintaining strength, retention, and patient comfort.

Methods: A 62-year-old completely edentulous male patient with increased vertical dimension and excessive interarch space was rehabilitated with a hollow maxillary complete denture. Following conventional preliminary impressions, border molding, and final impression procedures, jaw relations were recorded, revealing an increased vertical dimension suggestive of a potentially heavy prosthesis. After trial denture verification, the trial denture was duplicated, and a thermoplastic sheet was vacuum-formed to delineate the hollow area. A heat-cure acrylic resin base plate was fabricated on the final cast, and a 6-mm dental suction tip was positioned on the base plate to act as a permanent spacer. Uniform clearance was ensured using an endodontic file, and the ends of the suction tip were sealed with autopolymerizing acrylic resin and stabilized with cyanoacrylate adhesive. Conventional flasking, packing, curing, finishing, and polishing procedures were completed, followed by evaluation of cavity integrity using a water leakage test before denture delivery.

Results: The incorporation of a dental suction tip as a permanent spacer resulted in a noticeable reduction in denture weight while maintaining uniform acrylic resin thickness and structural integrity. The technique eliminated the need for spacer retrieval and subsequent sealing, thereby reducing laboratory time and minimizing the risk of leakage. The hollow cavity remained intact on water testing, confirming adequate sealing. Clinically, the patient reported improved comfort, satisfactory retention, and acceptable esthetics, indicating that the technique was effective, predictable, and well accepted.

Conclusions: A simple and reproducible method for hollow denture fabrication using a dental suction tip as a permanent spacer is described. This approach shortens fabrication time, reduces



weight, and eliminates risks associated with spacer retrieval while maintaining predictable prosthesis strength.

1. Introduction

Rehabilitation of completely edentulous patients with severely resorbed ridges remains a significant prosthodontic challenge, particularly when excessive interarch space and increased vertical dimension contribute to compromised denture retention, stability, and patient comfort. In maxillary complete dentures, increased prosthesis weight acts as a dislodging force against gravity and negatively influences neuromuscular control, leading to reduced patient acceptance and functional inefficiency. Reducing denture weight without compromising strength or esthetics is therefore a critical consideration in such clinical situations.

The concept of hollow prostheses was first introduced by Brown, who described the fabrication of a hollow-bulb obturator to reduce prosthesis weight while maintaining functional contour and strength¹. This pioneering work laid the foundation for subsequent modifications aimed at improving comfort and retention in maxillofacial and complete denture prosthodontics. McAndrew et al. later introduced an innovative investment method for fabricating closed hollow obturator prostheses, emphasizing predictable cavity formation and improved sealing². Holt subsequently applied the hollow design concept to a complete mandibular denture, demonstrating improved stability and patient comfort following weight reduction³.

Fattore et al. highlighted the clinical usefulness of hollow dentures as an alternative treatment modality for patients with atrophic maxillae, where excessive prosthesis bulk and weight compromise denture performance⁴. O'Sullivan et al. proposed a modified technique for hollow maxillary complete dentures, addressing issues related to cavity integrity and simplifying laboratory procedures⁵. The functional significance of denture weight was further supported by Ohkubo and Hosoi, who demonstrated that changes in mandibular denture weight can directly influence chewing efficiency and denture stability⁶.

Several techniques have since been described to achieve hollow cavities within dentures and obturators using different spacer materials. Gardner et al. reported a simplified technique employing vinyl polysiloxane as a spacer⁷, while Jhanji and Stevens described fabrication

of one-piece hollow obturators to eliminate junctional weaknesses⁸. With advances in digital dentistry, Alfaraj et al. introduced a CAD-CAM hollow obturator prosthesis, highlighting improved precision and uniform thickness control⁹.

Recent case reports and technical notes continue to emphasize the relevance of hollow dentures in managing severely resorbed maxillary ridges. Brintha Jei et al.¹⁰, Rai et al.¹¹, Barman et al.¹², and Rajavadha et al.¹³ each reported simplified approaches for fabricating hollow maxillary complete dentures with favorable clinical outcomes. Alternative material-based approaches have also been described, including the use of light-cured resin systems¹⁴, three-dimensional printed templates¹⁵, and controlled-thickness hollow designs for severely resorbed ridges¹⁶. Earlier studies have additionally focused on methods to regulate hollow cavity thickness¹⁷ and the use of thermoplastic resin materials for fabricating closed hollow bulb obturators¹⁸.

Despite the wide range of techniques available, the existing literature is predominantly composed of case reports and technical notes, with limited long-term clinical trials or standardized outcome measures. Many previously described methods are technique-sensitive, involve complex laboratory steps, or carry a risk of leakage and compromised structural integrity. Furthermore, publication bias toward successful outcomes and limited evaluation of patient-centered parameters such as comfort, adaptation, and satisfaction remain notable limitations.

The objective of this clinical report is to describe a simplified and predictable technique for fabricating a hollow maxillary complete denture in a patient with increased vertical dimension and excessive interarch space, aimed at reducing prosthesis weight while maintaining adequate strength, retention, and esthetics.

2. Objective

To describe a simplified technique for fabricating a hollow maxillary complete denture using a dental suction tip as a permanent spacer to reduce prosthesis weight while maintaining strength, retention, and patient comfort.



3. Methods

A 62-year-old male patient reported for fabrication of complete dentures. Preliminary impressions were made using impression compound and poured in dental plaster. Border molding was carried out with low-fusing modeling compound, followed by a final impression using condensation silicone. Vertical and centric jaw relations were recorded (figure 1), and it was observed that the vertical dimension at rest (VDR) and vertical dimension at occlusion (VDO) were more than average; therefore, a hollow denture was planned to reduce the overall weight of the prosthesis. After anterior and final trial denture verification, the trial denture was duplicated using alginate and poured in dental stone. A hard thermoplastic sheet was vacuum-formed over the duplicate cast of the waxed-up denture to determine the extent of the area to be made hollow. A heat-cure acrylic resin base plate was then fabricated on the final cast (figure 2). A 6-mm wide dental suction tip was positioned on the base plate to act as a spacer (figure 3), the adapted thermoplastic sheet was placed over this and a K-file was used to ensure a uniform 3-mm clearance between the spacer and the marginal gingiva (figure 5). The ends of the suction tip were sealed with autopolymerizing acrylic resin and secured in position using cyanoacrylate adhesive. Conventional flasking, packing with heat-cure acrylic resin, curing, and deflasking procedures were carried out. After finishing and polishing, the denture was evaluated for leakage using a water test to confirm the integrity of the hollow cavity (figure 6). The prosthesis was then delivered, and the patient expressed satisfaction with both esthetics and comfort (figure 7).

4. Results

The incorporation of a dental suction tip as a permanent spacer resulted in a noticeable reduction in denture weight while maintaining uniform acrylic resin thickness and structural integrity. The technique eliminated the need for spacer retrieval and subsequent sealing, thereby reducing laboratory time and minimizing the risk of leakage. The hollow cavity remained intact on water testing, confirming adequate sealing. Clinically, the patient reported improved comfort, satisfactory retention, and acceptable esthetics, indicating that the technique was effective, predictable, and well accepted.

5. Discussion

The concept of reducing the weight of maxillofacial prostheses through hollowing was first introduced by Brown (1969), who described a technique for the fabrication of a hollow-bulb obturator. This innovation greatly improved comfort and retention for patients by decreasing prosthesis weight without compromising strength (1). Building on this foundation, Holt (1981) applied the hollow design to complete mandibular dentures, demonstrating its usefulness beyond obturators in improving retention and patient adaptation (3). To further refine prosthesis control, a 1983 study described a method for regulating the thickness of hollow obturator prostheses, ensuring uniformity and durability (17).

The technique gained clinical importance when Fattore et al. (1988) highlighted its application in managing atrophic maxillae, offering a lightweight alternative that improved retention and patient comfort (4). Continued efforts to simplify the laboratory process were seen in the early 1990s. Gardner et al. (1991) introduced a simplified vinyl polysiloxane spacer technique for hollow obturator fabrication, reducing complexity and cost (7), while Jhanji and Stevens (1991) presented a one-piece hollow obturator design, eliminating the need for joining separate parts (8).

Further advancements were reported by McAndrew et al. (1998), who developed an innovative investment method for closed hollow obturator fabrication, providing better control over internal spaces and ensuring watertight integrity (2). The functional significance of prosthesis weight was later supported by Ohkubo and Hosoi (1999), who demonstrated that weight reduction in mandibular dentures improved chewing efficiency and denture stability (6). O'Sullivan et al. (2004) subsequently refined the hollow maxillary denture fabrication process with a modified, efficient method that reduced laboratory challenges while maintaining strength (5).

In the mid-2000s, Bhat (2006) emphasized the clinical benefits of hollow dentures in severely resorbed ridges, reporting improved comfort and retention (16). The introduction of newer materials was seen in a 2013 study in the Journal of Indian Prosthodontic Society, which utilized a light-cured resin system to fabricate hollow obturators with enhanced control and reduced processing time (14).

The integration of digital technology further transformed fabrication approaches. Barman et al. (2020) proposed a



simplified and cost-effective method for hollow maxillary complete dentures suitable for routine practice (12). Similarly, a 2020 report in the Journal of Prosthodontics demonstrated the use of a 3D-printed template to fabricate hollow dentures with precise control over internal thickness (15).

In recent years, multiple studies have reinforced the relevance of the hollow prosthesis concept. Alfaraj et al. (2022) described a CAD-CAM-based approach for hollow obturators, improving precision and reducing manual errors (9). Case reports by Brintha Jei et al. (2022) and Rai et al. (2022) emphasized the hollow denture's role in enhancing retention, comfort, and patient satisfaction in atrophic ridges (10,11). Barman et al. (2020) and Rajavadha et al. (2024) further supported the concept, with the latter introducing a novel method specifically for severely resorbed maxillae (12,13).

Recent advances have also explored material innovations. The thermoplastic resin-based technique for closed hollow bulb obturators provided adaptability, ease of processing, and biocompatibility, making it a practical alternative to conventional methods (18).

Overall, literature spanning over five decades consistently supports the hollow obturator and hollow denture concept as an effective solution to enhance retention, comfort, and function by reducing prosthesis weight. The present case aligns with these findings, offering a lightweight and retentive prosthesis tailored to the patient's needs while ensuring functional efficiency and long-term comfort.

The technique described offers several advantages over conventional hollow denture fabrication methods:

No spacer retrieval: Eliminates post-processing window creation and sealing, reducing potential for leakage.

Uniform thickness: The rigid walls of the suction tip ensure consistent acrylic thickness, preventing deformation during flask closure.

Time and cost efficiency: Fewer laboratory steps, use of inexpensive, readily available materials.

Structural integrity: No large junction lines prone to seepage or weakening of the denture base.

These advantages align with principles established by earlier authors but avoid their documented limitations. 6-8 The approach is particularly beneficial in cases with excessive vertical dimension or severely resorbed ridges

where denture weight impacts retention and patient comfort.

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FIGURES

Figure 1. Jaw relation recorded

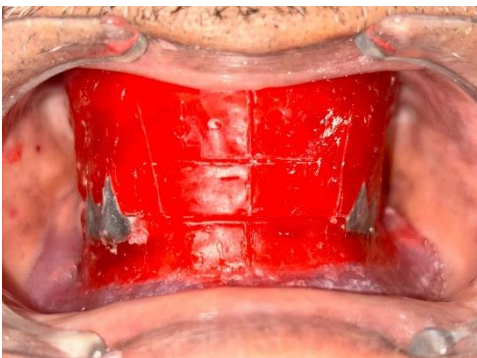


Figure 2. Heat cure base plate on final cast



Figure 3. suction tube adapted on base plate with ends sealed using acrylic resin

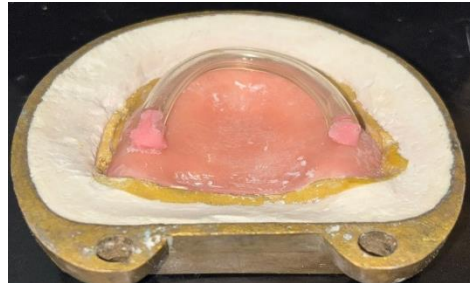


Figure 4. Thermoplastic sheet placed on cast



Figure 5. Endodontic file used to measure the distance between suction tube and free gingival margin



Figure 6. Evaluation for leakage using a water test to confirm the integrity of the hollow cavity.





Figure 7. Final prosthesis

