

# Prosthodontic rehabilitation of a sub-total maxillectomy defect with a definitive hollow obturator prosthesis using the modified lost-wax concept: A novel technique

### ABSTRACT

Squamous cell carcinoma (SCC) of the oral cavity is relatively common in the Indian subcontinent with surgical resection and adjuvant radiotherapy/chemotherapy being the treatment modality of choice. Prosthetic rehabilitation with an obturator following resection is more economical and yields satisfactory results. Better patient acceptance and comfort necessitates following the prosthesis to a great extent. This novel method modifies the existing lost-wax technique in fabricating a definitive hollow maxillary obturator. An elderly man had reported to the Department of Prosthodontics with the chief complaint of a “big hole” in the mouth which affected his quality of life. He had undergone subtotal maxillectomy, following a histopathologic diagnosis of SCC, with adjuvant radiotherapy. Examination revealed an Aramany Class II defect with the healthy oral mucosa. A lightweight definitive obturator was designed and fabricated using a simple technique which utilizes easily available modeling wax. This article describes a relatively simple, single-step fabrication of a closed hollow-bulb obturator prosthesis with a uniform thickness of heat-cured resin encapsulating the hollow prosthesis.

**Keywords:** Aramany Class II, hollow obturator, lost wax, maxillectomy

### INTRODUCTION

Squamous cell carcinoma (SCC) represents more than 90% of all oral malignant neoplasms and poses a considerable risk of mortality if intervention is delayed.<sup>[1-3]</sup> Risk factors for oral SCC may include and are not limited to the tobacco (chewable and nonchewable) and alcohol consumption, human papillomavirus infection (high-risk genotypes), and a “cancer-prone diet” which is low on fresh fruits and vegetables.<sup>[1,4]</sup> The prevalence and incidence of oral SCCs in the Indian subcontinent are alarming due to the predominance of tobacco consumption.<sup>[2]</sup> However, this disease entity may have an idiopathic component to its etiology as genetic and environmental factors may either afford protection against the development of oral SCC or may predispose to or even promote the development of oral SCC.<sup>[5]</sup>

Wide surgical resection with adjuvant radiotherapy/chemotherapy remains the treatment modality of choice for SCC. However, the reconstruction and

rehabilitation of the defect created pose a challenge for the prosthodontist as the obturator prosthesis designed usually tends to be bulky causing discomfort to the patient.

This article describes the rehabilitation of a patient who had undergone subtotal maxillectomy with a completely hollow lightweight prosthesis fabricated using a modification of the lost-wax technique.

**NITASHA GANDHI, HARIT TALWAR, SUMIR GANDHI<sup>1</sup>, VIJAY ALAGESHAN, GEORGE ABRAHAM, SURBHI MEHDIRATTA**


Departments of Prosthodontics and <sup>1</sup>Oral and Maxillofacial Surgery, Christian Dental College, Ludhiana, Punjab, India

**Address for correspondence:** Dr. Vijay Alageshan, Department of Prosthodontics, Christian Dental College, Ludhiana - 141 008, Punjab, India.  
E-mail: drvijay.tgs@gmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** reprints@medknow.com

**How to cite this article:** Gandhi N, Talwar H, Gandhi S, Alageshan V, Abraham G, Mehdiratta S. Prosthodontic rehabilitation of a sub-total maxillectomy defect with a definitive hollow obturator prosthesis using the modified lost-wax concept: A novel technique. Natl J Maxillofac Surg 2018;9:225-8.

Access this article online	
<b>Website:</b> www.njms.in	<b>Quick Response Code</b> 
<b>DOI:</b> 10.4103/njms.NJMS_26_18	

## CASE REPORT

A 79-year-old elderly man had presented to the Department of Prosthodontics with the chief complaint of inability to chew effectively due to a “big hole” in his mouth following surgery. The patient’s medical history revealed a diagnosis of SCC of the maxilla about 5 years ago. A 5-year follow-up revealed no recurrence, but the patient’s quality of life was affected because of his inability to chew properly due to the lack of posterior teeth in his second quadrant along with a defect in his hard palate. The patient though advised rehabilitation earlier did not go through with the treatment for financial reasons and continued to suffer from his oral impediment.

On examination, a depression was observed on his left cheek which affected his appearance. Intraorally, the maxillary defect was classified as an Armany Class II defect.<sup>[6]</sup> The oral mucosa was healthy with no signs of pathology. An extremely lightweight obturator was planned for the patient using a novel technique which modified the lost-wax procedure used in metal casting.

### Procedure

- A modified stock tray was used to obtain a preliminary impression using irreversible hydrocolloid (Septodont Marieflex®, Septodont Healthcare India). The preliminary cast obtained was used to fabricate a custom impression tray using autopolymerizing resin (Trevalon Rapid Repair®, DENSTPLY India)
- Recording the extensions of the defect was done with elastomeric impression putty material (GC-Flexceed®, GC India) and following border molding, the definitive wash impression of the maxillary defect and the residual ridge was obtained using light body polyvinyl siloxane impression material (GC-Flexceed®, GC India). Figure 1 and a master cast was obtained
- A cobalt-chromium cast partial framework was fabricated following prosthodontic principals of survey and design
- Maxillomandibular jaw relation record was obtained following which teeth arrangement and wax-up were carried out. This was then duplicated using duplicating

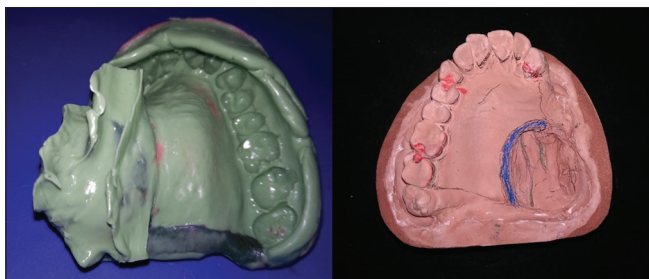


Figure 1: Final impression and master cast with design for cast partial denture

vinyl polysiloxane impression material (Elite Double 22®, Zhermack Dental, Italy)

- A thermoplastic resin sheet (Andent India Pvt. Ltd.) of 2 mm thickness was adapted over the duplicated cast [Figure 2].
- A double thickness modeling wax was adapted to the defect portion of the cast (Rolex®, Ashoosons API India) [Figure 3]. Moreover, three widely distributed rectangular windows (3 mm × 3 mm) were prepared on the adapted wax sheet followed by an application of Vaseline petroleum jelly onto the adapted wax sheet
- A soft wax bolus was then placed into the defect space and the framework seated on to the cast. This was done to obtain the hollow-bulb portion of the prosthesis [Figure 4] The wax bolus was retained by the meshwork of the cast partial denture
- A second bolus of wax was then placed onto framework toward the cameo surface of the denture, and the clear thermoplastic template was positioned over it [Figure 5]
- An endodontic file with a rubber stop positioned to ensure a 2 mm clearance between the template and the wax [Figure 6]
- The adapted wax sheet and the thermoplastic template were removed, and the denture was cured using heat-cure polymethyl methacrylate resin (Trevalon®, DENTSPLY India) as per the manufactures instructions
- The wax inside the prosthesis was eliminated through the openings created by the three stops incorporated earlier
- The openings were then sealed with autopolymerizing resin, and the prosthesis finished, polished, and delivered to the patient [Figure 7].
- A 2-month follow-up revealed a happy patient who experienced a considerable improvement in speech, function, and esthetics [Figure 8].



Figure 2: Thermoplastic resin sheet (2 mm thickness) adapted over the duplicated cast of trial denture



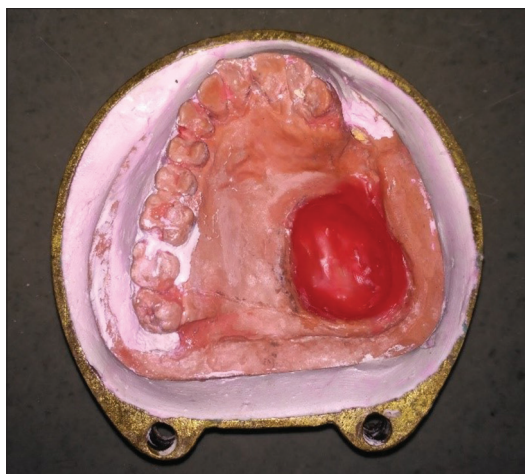


Figure 3: Double thickness modeling wax was adapted onto the defect portion of the cast

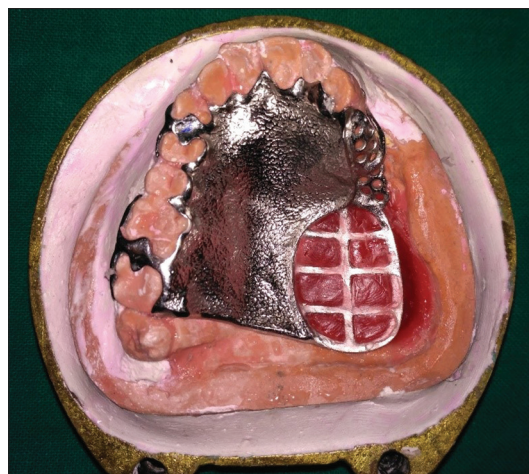


Figure 4: Wax bolus into defect space with overlaying framework

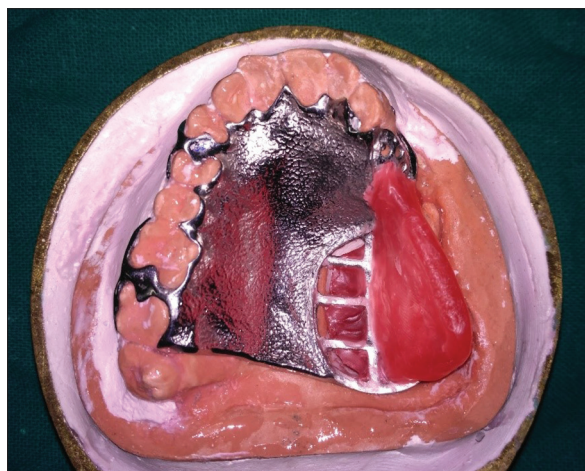


Figure 5: Wax adapted over framework toward the palatal surface

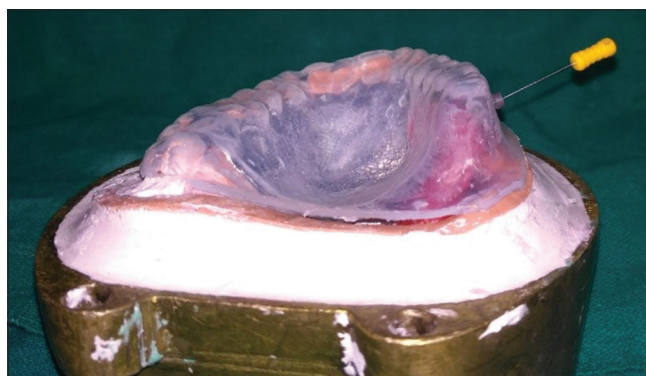


Figure 6: Endodontic file with a rubber stop positioned to ensure a 2 mm clearance between the template and the wax

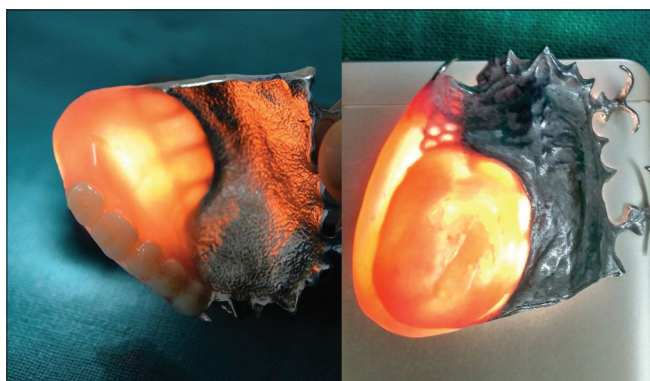


Figure 7: Hollow prosthesis allowing light to pass through

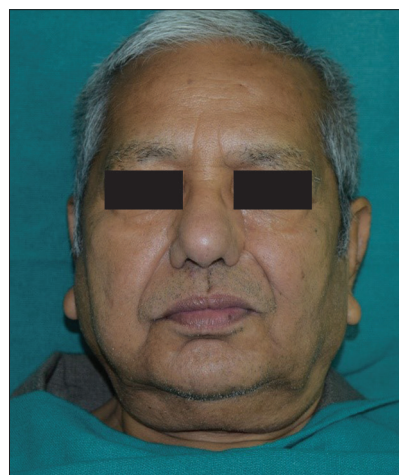


Figure 8: Posttreatment photograph

## DISCUSSION

It is a well-established fact that hollowing an obturator leads to a significant reduction in its weight (6.55%–33.06%) depending on the size of the defect.<sup>[7]</sup> Over the years, numerous techniques have been employed for hollowing

an obturator with materials such as sugar,<sup>[8]</sup> ice,<sup>[9]</sup> and polyurethane foam.<sup>[10]</sup> Polyvinyl siloxane putty has been used, but that requires creating large access channels to scrape out the material. Resealing the channels with auto-polymerizing resin or light-cured resin can be quite cumbersome. The above-mentioned techniques also require the use of two

cope during acrylization. Recently, a lost-wax bolus technique has been suggested to hollow an interim obturator prosthesis.<sup>[11]</sup> A problem that is frequently encountered with the above techniques is the difficulty in achieving a uniform thickness of heat processed resin around the bulb.

This article describes the use of a thermoplastic sheet to replicate the final cameo surface of the denture and thus achieves a uniform thickness of resin around the hollow portion of the denture. This combined with the use of wax provides a greatly simplified technique for the fabrication of a hollow definitive prosthesis in a single-step while maintaining a predictable thickness of resin.

## CONCLUSION

An obturator prosthesis is still considered to be one of the more affordable reconstructive options for patients postexcision surgery. Prosthetic rehabilitation focusses on decreasing the weight of the obturator for better patient tolerance and comfort while not compromising function.

The technique followed in this article is relatively simple and cost-effective as it uses easily available modeling wax to successfully hollow the definitive obturator prosthesis. A single flasking procedure was adopted, and no additional material or equipment was required in the process. The use of the thermoplastic template ensured a predictable thickness of resin around the cameo surface of the prosthesis. This article describes a single-step fabrication of a closed hollow-bulb obturator prosthesis with a uniform thickness of heat cured resin encapsulating the hollow prosthesis.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have

given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Shah JP, Gil Z. Current concepts in management of oral cancer – Surgery. *Oral Oncol* 2009;45:394-401.
2. Attar E, Dey S, Hablas A, Seifeldin IA, Ramadan M, Rozek LS, *et al.* Head and neck cancer in a developing country: A population-based perspective across 8 years. *Oral Oncol* 2010;46:591-6.
3. Bagan J, Sarrion G, Jimenez Y. Oral cancer: Clinical features. *Oral Oncol* 2010;46:414-7.
4. Petti S. Lifestyle risk factors for oral cancer. *Oral Oncol* 2009;45:340-50.
5. Feller L, Lemmer J. Oral squamous cell carcinoma: Epidemiology, clinical presentation and treatment. *Cancer Ther* 2012;3:263-8.
6. Aramany MA. Basic principles of obturator design for partially edentulous patients. Part I: Classification. *J Prosthet Dent* 1978;40:554-7.
7. Wu YL, Schaaf NG. Comparison of weight reduction in different designs of solid and hollow obturator prostheses. *J Prosthet Dent* 1989;62:214-7.
8. Parel SM, LaFuente H. Single-visit hollow obturators for edentulous patients. *J Prosthet Dent* 1978;40:426-9.
9. Schneider A. Method of fabricating a hollow obturator. *J Prosthet Dent* 1978;40:351.
10. Tanaka Y, Gold HO, Pruzansky S. A simplified technique for fabricating a lightweight obturator. *J Prosthet Dent* 1977;38:638-42.
11. Patil PG, Nimbalkar-Patil S. Lost wax-bolus technique to process closed hollow obturator with uniform wall thickness using single flasking procedure. *J Indian Prosthodont Soc* 2017;17:84-8.