

PROSTHODONTIC REHABILITATION OF COMPLETELY EDENTULOUS PATIENTS WITH MAXILLARY DEFECTS: A CASE SERIES USING THREE OBTURATOR PROCESSING TECHNIQUES

*Silveira Pearl Gregory, **Kala S, ***Harsha Kumar K., **Vivek V Nair

*Post-graduate student, **Professor, ***Vice Principal, Professor and Head of the Department, Department of Prosthodontics and Crown & Bridge, Government Dental College, Thiruvananthapuram 695 011, Kerala, India | Corresponding author: Dr. Silveira Pearl Gregory, Email: pearlsilveira123@gmail.com

<https://doi.org/10.55231/jpid.2026.v10.i01.05>

Abstract

Aim and background: Prosthodontic rehabilitation of completely edentulous patients with maxillary defects presents significant challenges due to the absence of natural teeth for retention and support. Successful obturator therapy requires careful consideration of defect size, available tissue undercuts, and prosthesis weight. Hollow bulb obturators are often indicated to reduce prosthesis weight and improve retention; however, the choice of fabrication technique should be individualized. This case series aims to illustrate the clinical application of three different obturator processing techniques in completely edentulous maxillectomy patients and to highlight factors influencing technique selection.

Case description: Three completely edentulous patients with maxillary defects following surgical resection were rehabilitated with definitive obturator prostheses. In the first case, a conventional solid closed-bulb obturator was fabricated due to the relatively small defect size and acceptable anticipated prosthesis weight. In the second case, a hollow bulb obturator was processed using the lost-wax bolus technique to reduce the weight associated with a larger unilateral defect. In the

third case, involving a bilateral total maxillectomy defect with limited mouth opening and absence of hard tissue support, a hollow bulb obturator was fabricated using the lost salt technique to achieve maximal weight reduction. Clinical outcomes were evaluated based on prosthesis retention, speech intelligibility, swallowing function, aesthetics, and patient satisfaction.

Conclusion: All three patients demonstrated satisfactory functional and aesthetic outcomes following prosthodontic rehabilitation. The selection of obturator processing technique should be guided by defect extent, available retention, and the need for weight reduction. Individualized treatment planning contributes significantly to successful rehabilitation in completely edentulous maxillectomy patients.

Clinical significance: This case series provides clinical options for selecting obturator fabrication techniques based on defect characteristics and prosthetic requirements. Appropriate technique selection can improve retention, reduce prosthesis weight, and enhance functional outcomes in edentulous patients with maxillary defects.

Keywords: Palatal obturators, mouth, edentulous, neoplasm, prosthodontics

Introduction

Maxillary defects arising from surgical resection of neoplasms result in oronasal communication, causing profound impairment of speech, deglutition, and facial aesthetics. Prosthodontic rehabilitation with an obturator prosthesis remains the mainstay of management, offering restoration of oronasal separation and functional recovery without the morbidity of reconstructive surgery.¹ The challenge of obturator fabrication is compounded in completely edentulous patients. Retention must be derived solely from tissue undercuts, scar bands, and the peripheral seal over residual alveolar ridges.^{2,3} Prosthesis weight is a critical variable in obturator design. A large solid obturator may be excessively heavy, overwhelming available soft tissue retention and causing patient discomfort. Hollowing the obturator bulb is therefore frequently necessary. Several techniques for creating a hollow bulb have been described, each with distinct procedural and clinical characteristics.^{4,5}

This case series presents three completely edentulous maxillectomy patients rehabilitated with definitive obturators, each fabricated using a different processing technique, illustrating how defect extent, available retention, and tissue status guide technique selection.

CASE 1

A 58-year-old male patient presented with a history of squamous cell carcinoma of the left maxilla managed by partial maxillectomy approximately 14 years ago. He was completely edentulous in the maxilla and presented with a left-sided hard palate defect extending across the midline with an intact soft palate. (Figure 1a)

A primary impression was made using impression compound to record the defect and the residual ridge. (Figure 1b) A custom tray was constructed, border moulding was performed with low-fusing compound, and the definitive impression was made using light-body addition silicone. (Figure 1c) Jaw relation records were obtained using a record base and occlusal rims. Conventional

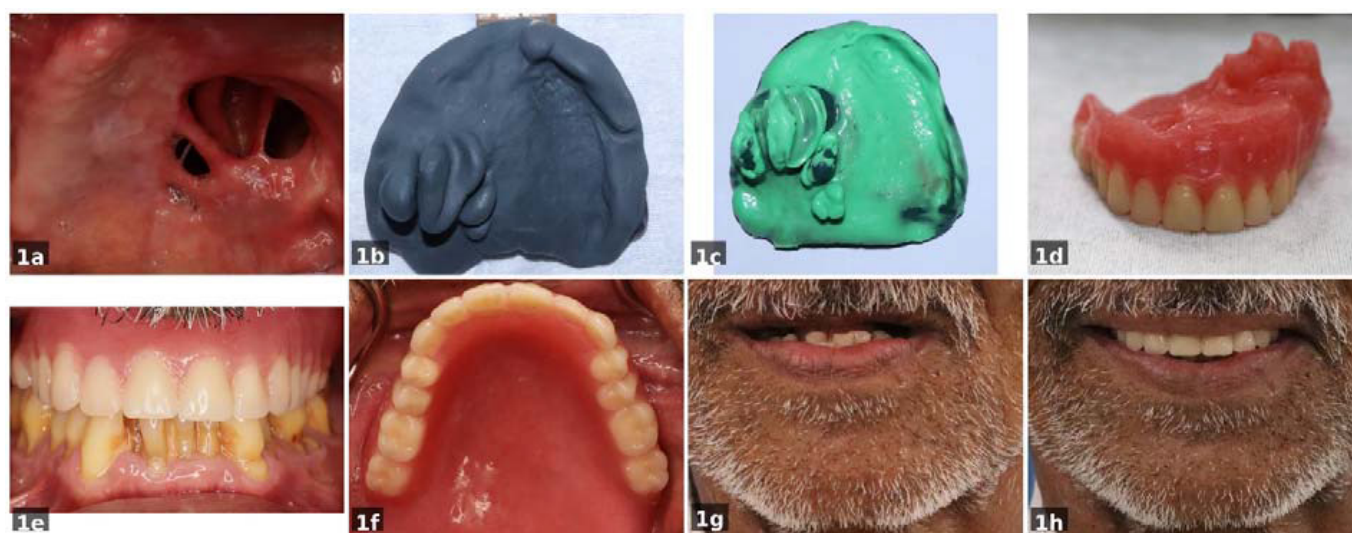


Fig. 1: Case 1. 1a: Pre-operative intraoral view; 1b: Primary impression; 1c: Definitive impression; 1d: Conventional solid obturator prosthesis; 1e: Prosthesis in situ; 1f: Post-operative intraoral view; 1g: Pre-operative extraoral view; 1h: Post-operative extraoral view.

PROSTHETIC AND IMPLANT DENTISTRY

Official Publication of Indian Prosthodontic Society
Kerala State Branch

complete denture teeth were arranged, and a wax try-in was conducted to verify aesthetics and occlusion.

Given the modest defect dimensions and limited vertical depth, the anticipated prosthetic weight was within acceptable limits. A conventional solid closed-bulb obturator was therefore processed using heat-polymerised polymethylmethacrylate (PMMA) without hollowing. (Figure 1d) Post-insertion adjustments were completed over subsequent review appointments. Residual alveolar ridge, intact soft palate and scar tissue along the lateral defect margins provided palpable undercuts that were engaged for retention. (Figure 1e and Figure 1f). At the one-year follow-up, the patient demonstrated marked improvement in speech intelligibility and deglutition. Adequate prosthetic stability was maintained, and the patient expressed satisfaction with functional and aesthetic outcomes. (Figure 1g and Figure 1h)

CASE 2

A 66-year-old male patient presented with a maxillary defect following partial maxillectomy

for acanthomatous ameloblastoma of the right maxilla. Clinical examination showed a completely edentulous maxilla with the defect extending to the right side, crossing the midline, making it substantially larger than in Case 1. (Figure 2a) Clinical procedures mirrored those of Case 1. (Figure 2b and Figure 2c)

In view of the larger defect volume, a solid obturator was expected to produce excessive prosthetic weight that would overwhelm the available retention. Hollowing was planned using the lost-wax bolus technique. Following investing and dewaxing, double-thickness modelling wax was adapted over the master cast and counter flask surfaces to create a uniform spacer, with three rectangular windows to ensure consistent acrylic wall thickness. (Figure 2d and Figure 2e) Following a second dewaxing cycle and PMMA packing, the wax bolus was repositioned as a spacer and the prosthesis was processed conventionally. (Figure 2f) 3 holes were made on the cameo surface and the obturator was flushed with hot water to eliminate the wax, followed by sealing using auto-curing resin. The bilateral tuberosities provided primary hard



Fig. 2: Case 2. 2a: Pre-operative intraoral view; 2b: Primary impression; 2c: Definitive impression; 2d: Double-thickness modelling wax adapted over the master cast with three rectangular windows; 2e: Double-thickness modelling wax adapted over the counter flask surface; 2f: Wax spacer demonstrating uniform space maintained for acrylic resin; 2g: Hollow-bulb obturator prosthesis; 2h: Post-operative intraoral view; 2i: Pre-operative extraoral view; 2j: Post-operative extraoral view.

tissue retention, supplemented by engagement of scar bands at the lateral margin of the defect. (Figure 2g and Figure 2h) Speech, swallowing, and aesthetics improved at the six-month follow-up. (Figure 2i and Figure 2j)

CASE 3

A 68-year-old male patient reported with a bilateral maxillary defect following total maxillectomy for squamous cell carcinoma. He had received radiation therapy a decade prior to presentation and was completely edentulous. The defect was the largest of the three cases, with complete absence of residual hard palatal tissue and no bony undercuts available. The patient had reduced mouth opening secondary to post-surgical and post-radiation fibrosis. He had previously worn an obturator without denture teeth and wished to continue with this preference.

Primary and secondary impressions were made in a conventional manner. (Figure 3a and Figure

3b) Given the total maxillectomy defect volume, a solid obturator would have been excessively heavy, compromising retention. The lost salt technique was therefore selected. Processing was accomplished using base-flask with 2 counter lids. Initially, a hollowed-out base was acrylicized. (Figure 3c) Next, the lid of the obturator wax was waxed-up and invested. (Figure 3d) Following dewaxing, finely granulated salt was packed into the hollow bulb region to a uniform depth. (Figure 3e) The assembly was flaked and processed conventionally. Following deflasking, 3 holes were made on the cameo surface and the prosthesis was immersed in warm water, allowing complete dissolution and evacuation of the salt crystals yielding a smooth, uniformly hollow chamber. (Figure 3f) The holes were then sealed using auto-curing acrylic resin. Retention was primarily achieved through posterior scar band engagement and soft tissue undercuts at the lateral margins of the defect. (Figure 3g). At the six-month follow-up, speech and swallowing showed meaningful improvement. The markedly

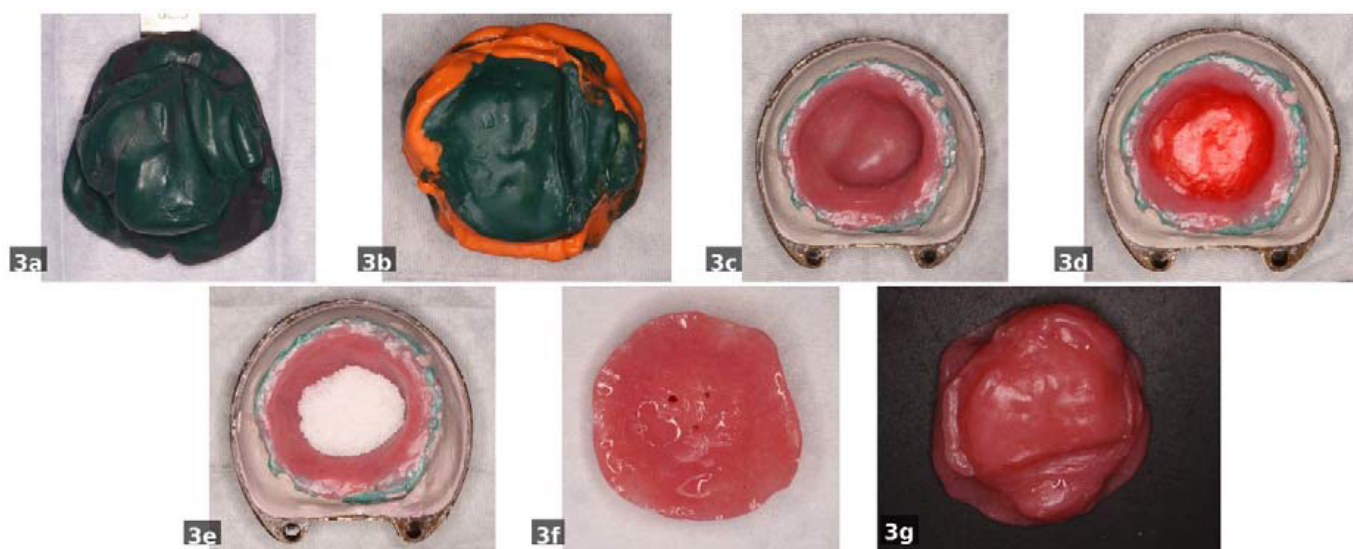


Fig. 3: Case 3. 3a: Primary impression; 3b: Definitive impression; 3c: Hollowed-out acrylic base; 3d: Wax-up to normal contour; 3e: Salt packed into the hollow-bulb region; 3f: Vent holes on the cameo surface; 3g: Hollow-bulb obturator.

PROSTHETIC AND IMPLANT DENTISTRY

Official Publication of Indian Prosthodontic Society
Kerala State Branch

reduced prosthetic weight was critical to achieving functional retention in the complete absence of hard tissue support.

Discussion

The three cases presented demonstrate the spectrum of clinical complexity in completely edentulous obturator rehabilitation and illustrate how processing technique selection must be individualised to patient-specific factors. Unlike dentate patients, the completely edentulous maxillectomy patient has no teeth to serve as retentive abutments. The prosthesis must rely entirely on tissue undercuts, peripheral seal, and scar band engagement. Devlin and Barker underscored the particular difficulty of achieving adequate retention in the edentulous maxillectomy patient, noting that the reduction in denture-bearing area combined with altered ridge morphology demands careful impression technique and prosthesis design.³ Yenisey et al. similarly emphasised the use of anatomical undercuts within and around the defect as the primary retentive mechanism.²

Prosthesis weight emerges as a dominant factor in these patients. A heavy prosthesis exerts a displacing force that soft tissue retention alone cannot resist, compromising stability and patient comfort. Hollowing the obturator bulb substantially reduces this load and has been shown to improve retention and patient-reported outcomes.^{4,6}

The conventional solid technique employed in Case 1 was appropriate for a smaller defect with limited vertical extension. In this context, the simplicity and structural durability of a solid prosthesis outweigh the modest weight disadvantage². The wax bolus technique offered an efficient solution for a larger defect requiring weight reduction. Its limitation lies in

the requirement for predictable wax adaptation within the bulb, best suited to defects of moderate and regular geometry. Nimonkar et al. reviewed various hollow bulb methods and noted that wax-based spacer techniques provide acceptable outcomes in moderately sized defects when wall thickness can be controlled.⁴

The lost salt technique provided the greatest degree of hollowing for the most complex defect. Salt crystals pack uniformly into cavities of any shape, enabling reliable hollowing of irregularly contoured bulbs where wax adaptation would be imprecise.^{5,7} Complete salt dissolution leaves no residue, and the smooth internal chamber ensures optimal weight reduction. The altered prosthodontic approach required for a bilateral total maxillectomy including limited mouth opening, dependence on soft tissue alone, is consistent with the challenges reported by Cheng et al.⁸

Conclusion

Prosthodontic rehabilitation of completely edentulous patients following maxillary resection is a challenging undertaking, demanding careful assessment of defect extent, available retention, and individual patient factors. This case series demonstrates that, with meticulous clinical planning and technique individualisation, satisfactory outcomes in speech, deglutition, and aesthetics can be achieved even in the most complex cases.

References

1. Quintessence Publishing United Kingdom [Internet]. [cited 2026 Jun 7]. Maxillofacial Rehabilitation | John Beumer III / Mark T. Marunick / Salvatore J. Esposito (Editor). Available from: <https://www.quintessence-publishing.com/gbr/en/product/maxillofacial-rehabilitation>
2. Yenisey M, Külünk Ş, Kaleli N. An Alternative Prosthetic Approach for Rehabilitation of Two Edentulous Maxillectomy Patients: Clinical Report. *J Prosthodont*. 2017 Jul;26(5):483–8. doi:10.1111/jopr.12617 PubMed PMID: 28383117.

3. Devlin H, Barker GR. Prosthetic rehabilitation of the edentulous patient requiring a partial maxillectomy. *J Prosthet Dent.* 1992 Feb;67(2):223–7. doi:10.1016/0022-3913(92)90458-m PubMed PMID: 1538331.
4. Nimonkar SV, Belkhode VM, Asiri AM, Aldossary MF, Nimonkar PV. A method of hollowing the obturator prosthesis and an overview on the pros and cons of the various materials used for hollowing. *J Med Life.* 2021;14(3):383–9. doi:10.25122/jml-2020-0142 PubMed PMID: 34377205; PubMed Central PMCID: PMC8321610.
5. Brown KE. Fabrication of a hollow-bulb obturator. *J Prosthet Dent.* 1969 Jan;21(1):97–103. doi:10.1016/0022-3913(69)90035-3 PubMed PMID: 4881714.
6. Wu YL, Schaaf NG. Comparison of weight reduction in different designs of solid and hollow obturator prostheses. *J Prosthet Dent.* 1989 Aug;62(2):214–7. doi:10.1016/0022-3913(89)90317-x PubMed PMID: 2760863.
7. Joshi S, Basnet BB, Parajuli PK, Suwal P. Lost Salt Technique for Fabrication of Closed Hollow Bulb Obturator in Maxillectomy: A Case Report. *Journal of Nepalese Prosthodontic Society.* 2024 Oct 4;7(1):49–56. doi:10.3126/jnprossoc.v7i1.70459
8. Cheng AC, Somerville DA, Wee AG. Altered prosthodontic treatment approach for bilateral complete maxillectomy: a clinical report. *J Prosthet Dent.* 2004 Aug;92(2):120–4. doi:10.1016/j.prosdent.2004.04.020 PubMed PMID: 15295318.