IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 25, Issue 6 Ser. 4 (June. 2026), PP 01-08
www.iosrjournals.org

Prosthetic Rehabilitation of a Diabetic Geriatric Patient with Hollow Obturator Using a 3D-Printed Template

Dr. Neha Dhruve[1], Dr. Sanjay Lagdive[2], Dr Renuka Dange[3]
[1]*Postgraduate Student, Department of Prosthodontics, Government Dental College and Hospital, Jamnagar, Gujarat, India*
[2]*Professor and Head, Department of Prosthodontics, Government Dental College and Hospital, Jamnagar, Gujarat, India*
[3]*Postgraduate Student, Department of Prosthodontics, Government Dental College and Hospital, Jamnagar, Gujarat, India*
Corresponding Author: *Dr. Neha Dhruve*

Abstract
Background: *Maxillary defects following surgical resection for mucormycosis in diabetic patients compromise mastication, speech, and deglutition. Hollow obturators are often used to restore function, but conventional hollowing techniques lack predictability. This report presents a digital–conventional hybrid approach for fabricating a hollow obturator using a 3D-printed hollow template in a geriatric patient with a total maxillary defect.*
Case Description: *A 65-year-old diabetic male with a history of post-COVID mucormycosis and total maxillectomy two years prior reported with complaints of impaired function. A primary impression was made with a thermoplastic tray and irreversible hydrocolloid. A primary plate was fabricated using a plaster index and Molloplast B to simulate defect resiliency. A special tray was fabricated and used for border molding and definitive impression with light-body elastomer. Following master cast pouring, record bases and occlusal rims were constructed, jaw relations were recorded, and teeth were arranged with trial verification. The trial prosthesis was flasked and dewaxed. Hollowing was achieved through double-thickness wax adaptation and putty indexing, followed by scanning of the waxed template with intraoral scanner, which was digitally hollowed in Exocad software. A hollow template was 3D-printed, incorporated during packing, and the final obturator was processed with Lucitone heat-cure resin.*
Results: *The prosthesis was lightweight, comfortable, and provided excellent function with predictable hollowing.*
Conclusion: *A digital–conventional hybrid technique offers a precise and reliable method of obturator hollowing, improving accuracy, retention, and patient comfort compared with conventional approaches.*
Keywords: *Hollow obturator, Maxillary defect, post-COVID mucormycosis, 3D printing, Molloplast B.*

Date of Submission: 06-06-2026 Date of Acceptance: 17-06-2026

I. Introduction

Maxillectomy defects resulting from oncologic resection, fungal infections such as mucormycosis, or trauma create complex functional and esthetic challenges. The loss of maxillary structures leads to oro-nasal communication, resulting in impaired speech, nasal regurgitation, and difficulty in mastication and swallowing.

Obturator prostheses are widely used for rehabilitation of such defects. However, large defects require hollow obturators to reduce prosthesis weight and improve retention. Conventional techniques for hollow obturator fabrication, such as double flasking or sugar/lost salt techniques, are technique-sensitive, time-consuming, and prone to errors.

With the advancement of digital dentistry, 3D printing and CAD software have enabled more precise control over prosthesis design. This case report highlights a hybrid technique combining conventional prosthodontic workflow with digital hollowing using a 3D-printed template to improve accuracy and predictability.

II. Case Report

A 65-year-old male patient reported to the Department of Prosthodontics with difficulty in speech, mastication, and nasal regurgitation. Medical history revealed uncontrolled diabetes mellitus and a previous history of post-COVID mucormycosis, for which a total maxillectomy was performed two years earlier.

Clinical Examination

Intraoral examination revealed a total maxillary defect communicating with the nasal cavity. The defect showed well-healed mucosal lining with no active infection. Mandibular arch was dentulous with acceptable occlusion.

Treatment Procedure

Primary Impression

A preliminary impression of the maxillary defect was made using a thermoplastic stock tray and irreversible hydrocolloid impression material. The impression was poured in dental stone to obtain a primary cast.

Fabrication of Temporary Obturator Plate

On the primary cast, a plaster index of the defect was prepared to record the extension and morphology of the defect accurately. Using this index, a temporary obturator plate was fabricated.

A Molloplast B resilient liner was adapted over the defect area to simulate soft tissue resiliency and improve adaptation to undercut regions. The temporary plate was then processed and finished. This step helped in evaluating the defect dynamics, improving comfort, and guiding subsequent impression procedures.

Special Tray Fabrication and Final Impression

A custom special tray was fabricated on the primary cast. Border molding was performed using low-fusing impression compound in incremental steps to accurately record functional borders of the defect and surrounding tissues.

Final impression was made using light-body addition silicone impression material, ensuring precise recording of both the defect and peripheral sealing areas.

Master Cast and Jaw Relations

The final impression was poured in Type III dental stone to obtain a master cast. Record bases were fabricated, and occlusal rims were constructed.

Maxillomandibular jaw relations were recorded using conventional methods. Teeth arrangement was carried out, and trial prosthesis was evaluated intraorally for esthetics, phonetics, and occlusion.

Flasking and Hollow Obturator Fabrication

Following trial approval, the prosthesis was flasked and dewaxed. A double-flask wax adaptation was first carried out, wherein wax was adapted in both halves of the flask to establish the planned hollow space within the obturator bulb.

Subsequently, a putty index was introduced into the wax-adapted space, and the flask was closed to form a precise putty-based negative template of the hollow cavity.

This putty template was then retrieved and scanned using an intraoral scanner (Shining 3D). The scanned data were transferred to Exocad software, where the internal geometry was digitally hollowed and standardized to ensure uniform wall thickness and accurate hollow space design.

Based on this finalized digital design, a 3D-printed hollow template was fabricated and later incorporated during the packing stage of heat-polymerized acrylic resin processing.

Processing of Definitive Prosthesis

The obturator was processed using Lucitone heat-polymerized acrylic resin following standard flasking and dewaxing procedures. During the packing stage, the previously fabricated 3D-printed hollow template was precisely positioned within the mold space to create and maintain the internal hollow cavity.

Care was taken to ensure accurate seating of the template so that uniform wall thickness and controlled hollow geometry were achieved. After completion of packing, trial closure, and curing, polymerization was carried out under conventional heat-curing protocols.

Following polymerization, deflasking was performed carefully to preserve the integrity of the hollow space created by the 3D-printed template. The printed component was then retrieved without damaging the internal hollow structure.

Finishing and polishing were completed using standard laboratory protocols, ensuring smooth external surfaces, optimal hygiene maintenance, and patient comfort.

Insertion and Follow-up

The definitive obturator was inserted and evaluated for retention, stability, phonetics, and esthetics. Minor adjustments were made intraorally.

The patient reported improved comfort, reduced prosthesis weight, and enhanced functional performance during follow-up visits.

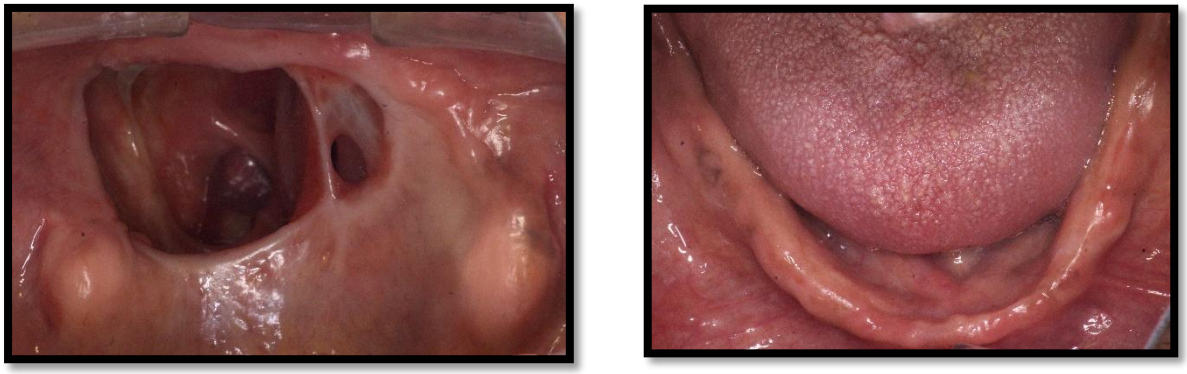

Figure 1: Intraoral view of maxillary defect and mandibular ridge

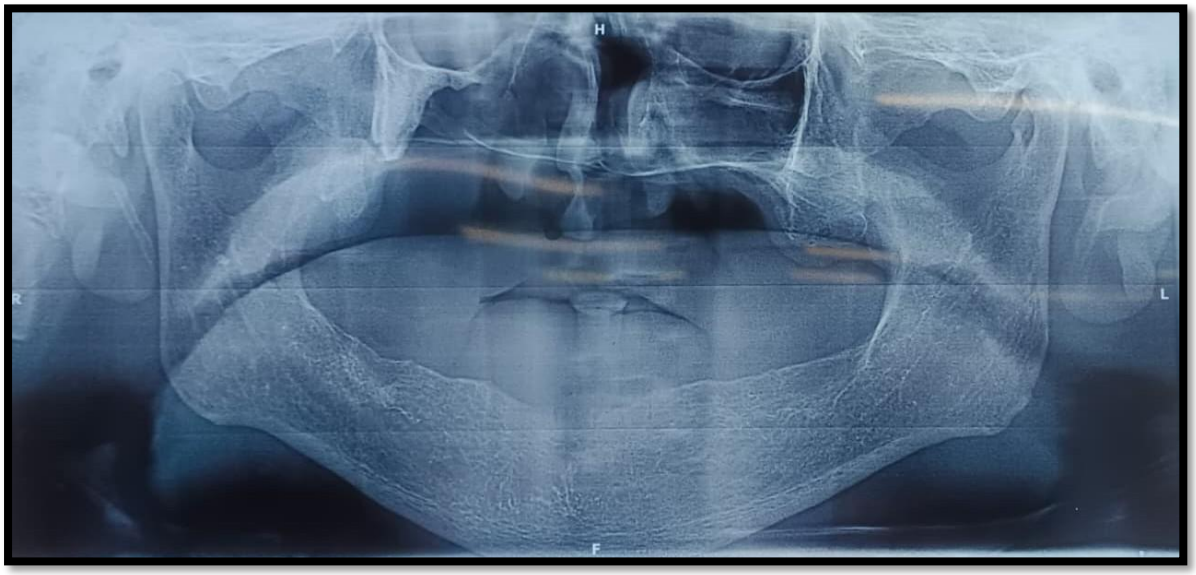

Figure 2: OPG

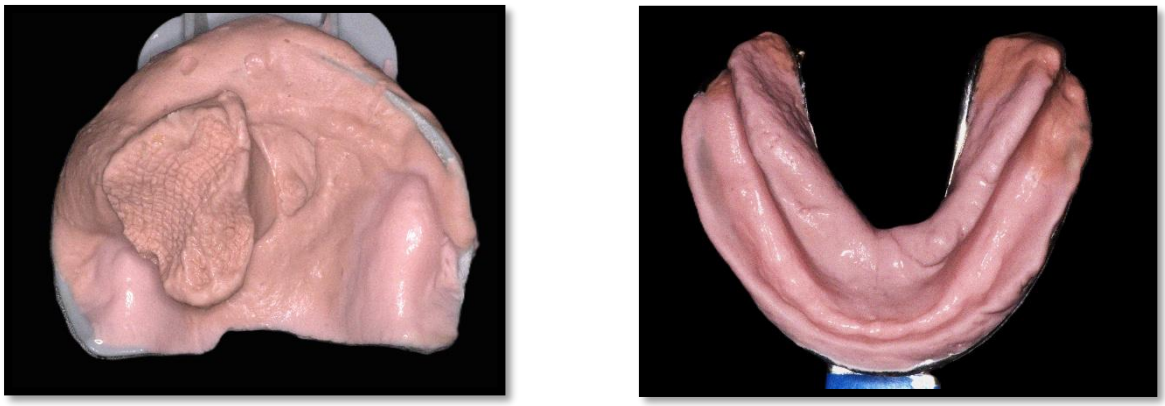

Figure 3: Primary Impression

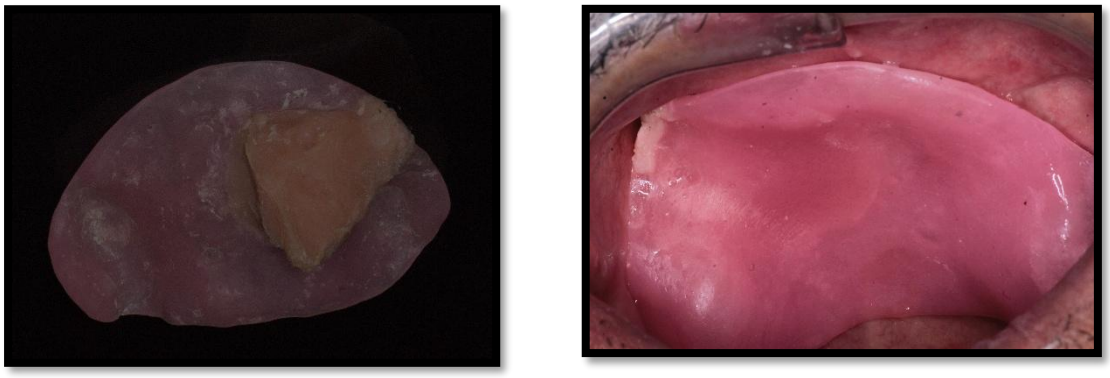

Figure 4: Temporary obturator plate with Molloplast B adaptation over defect area

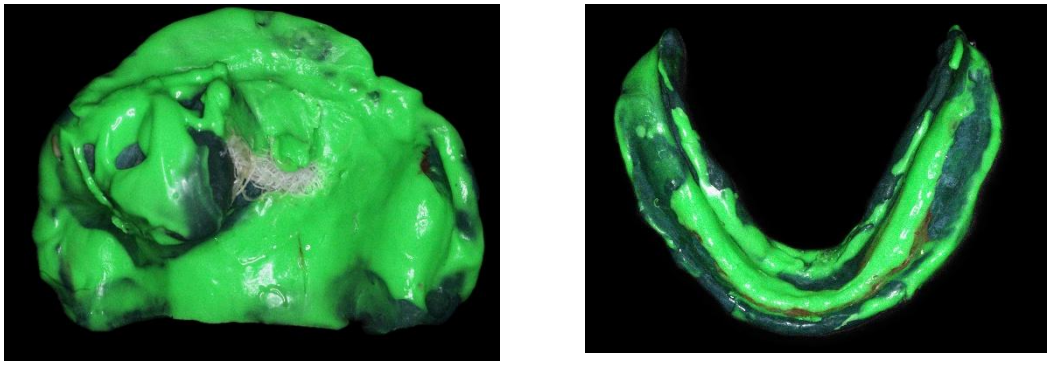

Figure 5: Final Impression

Figure 6: Master Cast

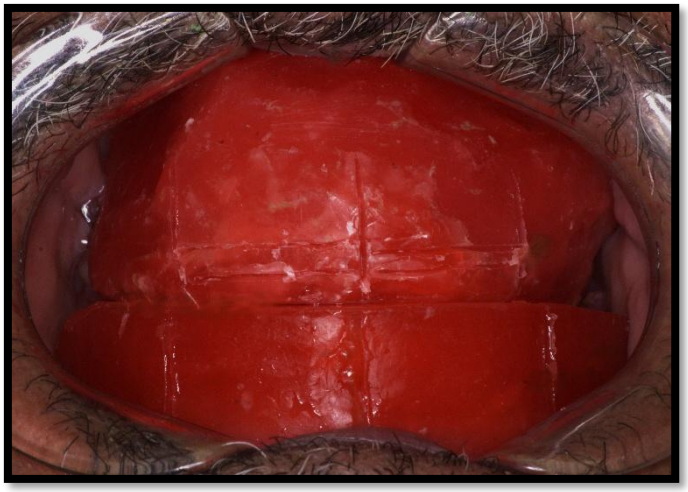

Figure 7: Jaw Relation

Figure 8: Final Try in

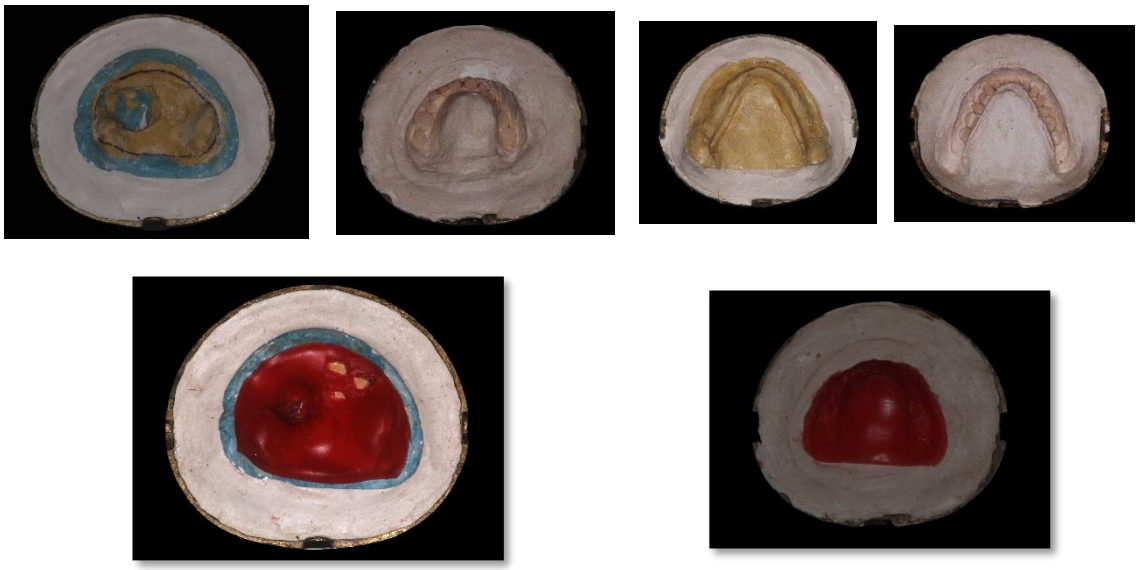

Figure 9: Flasking, dewaxing and wax sim fabrication

Figure 10: Putty negative index for hollow obturator template fabrication

Figure 10: Scanned image of putty index

Figure 11: 3D Printed Template and hollow Obturator

Figure 12: Evaluation of hollow obturator using float test

Figure 13: Final Prosthesis

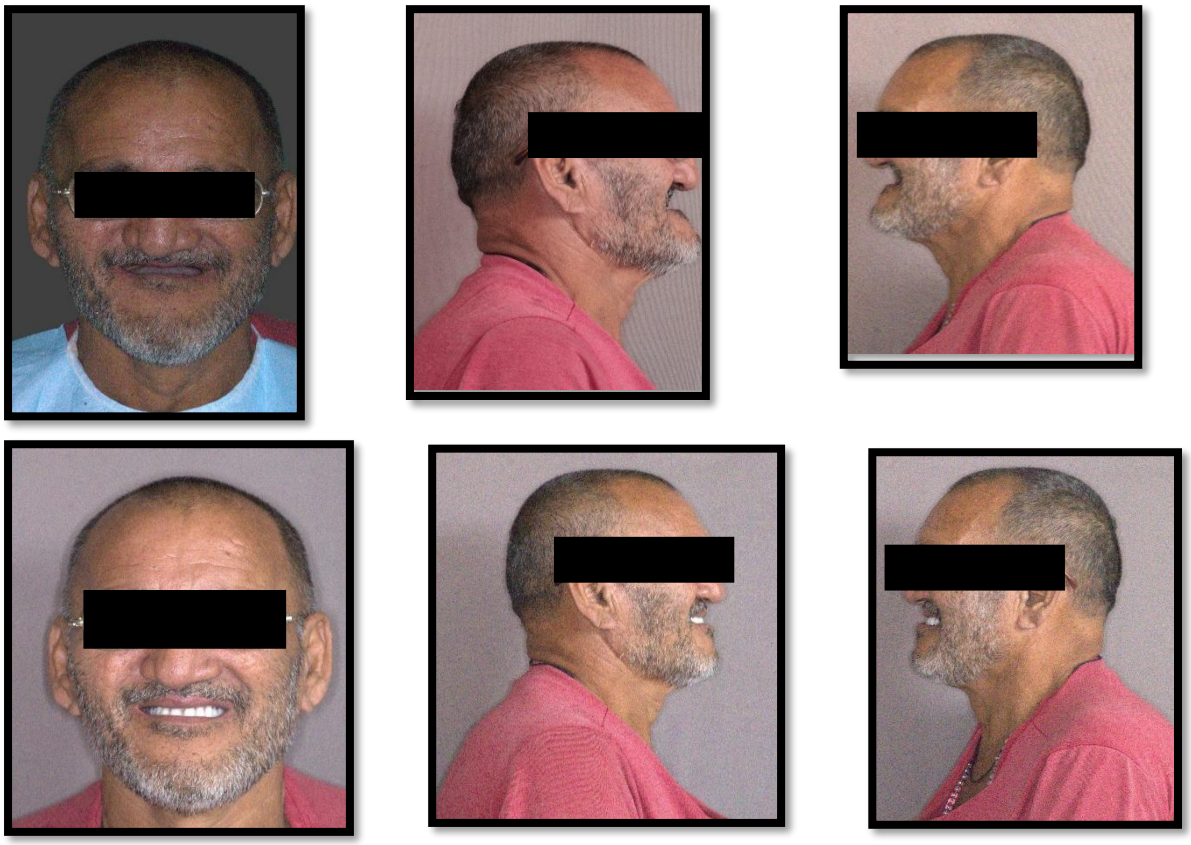

Figure 14 : Pre and post operative extraoral photographs

Acknowledgments
The authors would like to thank the faculty, staff, and dental laboratory technicians of the Department of Prosthodontics, Government Dental College and Hospital, Jamnagar, for their support in the clinical procedures, prosthesis fabrication, and digital workflow for this case report.