Journal of Indian Dental Association Madras (JIDAM), 2025; Volume No: 12 , Issue No: 4

Review Article | ISSN (O): 2582-0559

Rehabilitation of a Post-Mucormycosis Maxillary Defect Using Interim and Definitive Hollow Bulb Obturators: A Case Report

Dr.Manoj A[1], Dr.Prithivi[2], Dr. Ranjith[3], Dr.Deepa[4]

[1234]RVS Dental College and Hospital, Coimbatore.

(Received th October 2025; Accepted 12th November 2025; Published 27th December 2025)

Abstract

Background:

The defects in the maxillary region secondary to mucormycosis present significant functional and esthetic challenges, requiring a staged prosthodontic approach for optimal rehabilitation. Obturators remain the standard treatment option when surgical reconstruction is not feasible or deferred.

Case presentation:

A 43-year-old male with a history of right-sided maxillectomy for mucormycosis presented with oronasal communication, impaired mastication, hyper nasal speech, and aesthetic concerns. After initial healing with a surgical obturator, an interim hollow bulb obturator was fabricated to restore function during the healing phase. Subsequently, a definitive /cobalt–chromium hollow bulb obturator with a metal framework was designed for long-term use. Both prostheses were fabricated following meticulous clinical and laboratory steps to ensure optimal retention, stability, and patient comfort.

Conclusion:

Rehabilitation with interim and definitive obturators in a sequential manner effectively restored function, speech, and esthetics in a post-mucormycosis maxillary defect. A well-planned treatment approach improved patient adaptation and quality of life.

Categories:

Dentistry, Prosthodontics, Maxillofacial Rehabilitation

Keywords: Maxillary defect, mucormycosis, obturator, hollow bulb, cobalt–chromium framework, prosthodontic rehabilitation

Introduction

Maxillofacial defects may be either congenital or acquired due to trauma, resection of a tumor, or aggressive infections such as mucormycosis. (1) The COVID-19 pandemic showed a significant rise in cases of mucormycosis, especially in immunocompromised patients, necessitating aggressive surgical debridement, including partial or total maxillectomy. (2) Such resections lead to oronasal communication, nasal regurgitation, hyper nasal speech, impaired mastication, and midfacial collapse, profoundly affecting the quality of life of patients. (3,4)

Prosthodontic rehabilitation aims to restore the physiological function of the oral cavity, separate the oral and nasal cavities, and improve esthetics. (5) The Aramany classification system guides obturator design in partially edentulous patients, with the choice of material and retention method developed according to the defect type and patient needs. (6)

Rehabilitation typically follows a three-stage sequence: (1) a surgical obturator placed immediately after surgery; (2) an interim obturator worn during tissue healing and defect stabilization; and (3) a definitive obturator fabricated after 3–6 months for long-term function. Hollow bulb obturators are favoured for their reduced weight and improved patient comfort, particularly in large defects. (6,7)

This report describes the sequential rehabilitation of a post-mucormycosis Aramany Class I defect using interim and definitive hollow bulb obturators, highlighting design considerations and clinical outcomes. (6)

Case Presentation:

Interim Hollow Bulb Obturator Rehabilitation

Patient Information:

A 43-year-old male reported to the Department of Prosthodontics with the chief complaint of missing teeth in the upper right anterior and posterior region, along with difficulty in chewing, nasal regurgitation, and altered speech. The patient had a history of rhino-maxillary mucormycosis diagnosed in 2022, which was managed surgically by removal of the affected right maxillary segment at a multispecialty hospital. Following surgery, a surgical stent was placed, and after six months, the patient was referred for prosthetic rehabilitation.

Objectives:

In April 2023, an interim hollow bulb obturator was planned and fabricated with the primary objectives of restoring mastication and speech during the healing phase, maintaining a barrier between the oral and nasal cavities to prevent regurgitation, and allowing the patient to gradually adapt to the presence of an intraoral prosthesis before definitive rehabilitation.

Clinical and Laboratory Procedure:

A primary impression of the maxillary defect was made with irreversible hydrocolloid (alginate) and poured to obtain a primary cast. A wax pattern for the hollow bulb portion was fabricated to conform to the defect outline, and the bulb was processed in heat-cure acrylic resin to provide rigidity while maintaining reduced weight. A denture base incorporating clasps for mechanical retention on the remaining dentition was fabricated over the bulb. To preserve the hollow configuration, the bulb was filled with silicone putty during processing and sealed with self-cure resin. Jaw relations were recorded using wax rims, and casts were articulated. Artificial teeth were arranged according to esthetic and functional requirements and verified at the wax try-in stage. During final processing, the silicone putty was replaced with salt, which was subsequently leached out through a buccal access hole after curing to reduce prosthesis weight. The finished obturator was polished, delivered to the patient, and detailed instructions regarding insertion, removal, and hygiene maintenance were provided.

Outcome:

The interim obturator successfully restored the patient's masticatory efficiency, improved speech clarity, and minimized nasal regurgitation. The patient adapted well to the prosthesis, which facilitated a smoother transition to definitive prosthetic rehabilitation in the subsequent phase.

Figure 1 Preoperative Clinical Image

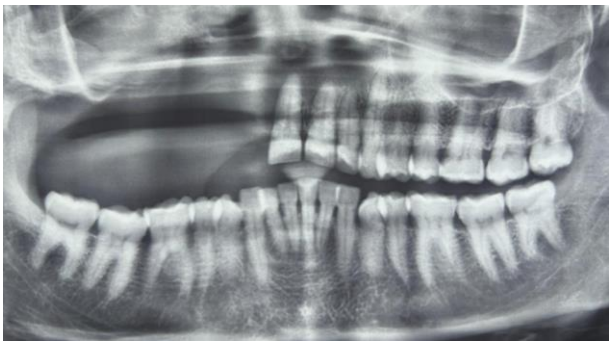

Figure 2 : Postoperative OPG after maxillectomy

Figure 3 : Impression making using Alginate

Figure 4 : Hollow Bulb & denture base fabrication with clasp assembly

Figure 5 : Bite Registration

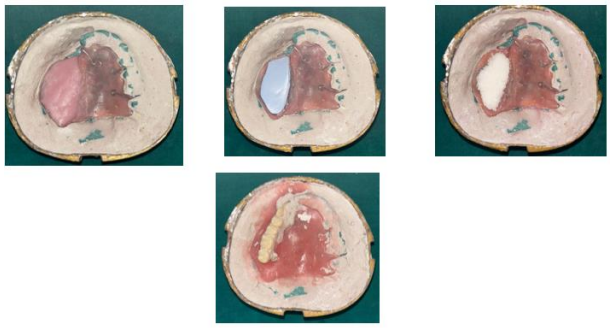

Figure 6: Processing of interim prosthesis

Figure 7: Finishing, polishing, and insertion of an interim Obturator

Definitive Hollow Bulb Obturator Rehabilitation

Patient Information:

The same 43-year-old male patient reported in January 2024 for definitive prosthetic rehabilitation after satisfactory adaptation with the interim obturator.

Objectives:

The definitive hollow bulb obturator was planned with the objectives of providing a durable and retentive long-term prosthesis, enhancing stability with a cobalt–chromium metal framework, improving esthetics, and maintaining reduced weight for patient comfort during prolonged use.

Clinical and Laboratory Procedure:

Primary impressions of both arches were recorded with irreversible hydrocolloid (alginate) and poured to obtain diagnostic casts. The maxillary cast was surveyed to design the framework, and mouth preparations, including guiding planes and rest seats, were made on abutment teeth. Final impressions were recorded with a putty-wash polyvinyl siloxane (PVS) technique to capture accurate details of the defect and supporting structures. A cobalt–chromium framework was fabricated using CAD–CAM technology for enhanced precision and fit. A framework try-in was then carried out intraorally to verify adaptation and support. Jaw relations were recorded using wax rims, and casts were articulated. Artificial teeth were arranged according to esthetic and functional needs and verified at the wax try-in stage. The hollow bulb component was incorporated into the cobalt–chromium denture base during processing to maintain lightweight while ensuring durability. The prosthesis was finished, polished, and inserted in the patient's mouth, followed by instructions on insertion, removal, and hygiene.

STEPS IN DEFINITIVE OBTURATOR:

Figure 8: Impression making and Hollow bulb fabrication

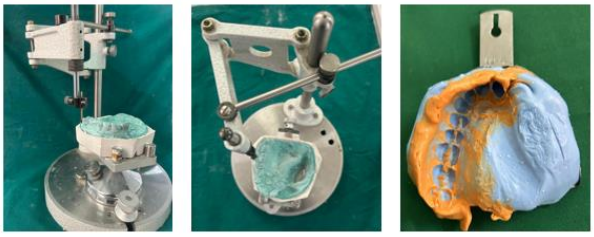

Figure 9 : Surveying and secondary impression made

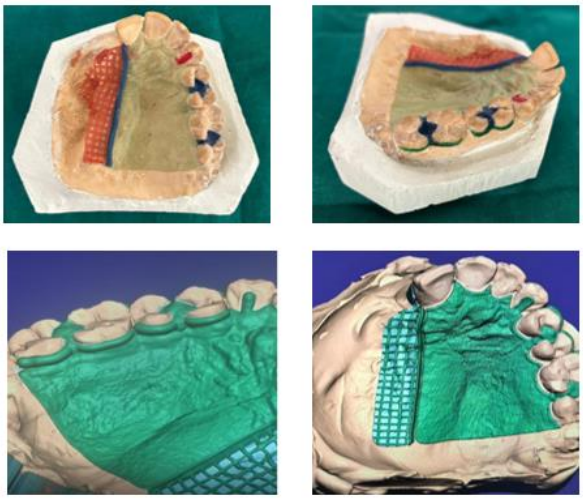

Figure 10 : Wax pattern followed by CAD CAM designed framework

Figure 11Fabrication of the metal framework and try-in is done

Figure 12 : Bite Registration done

Figure 13 :Wax try-in & Processing of the Definitive obturator

Figure 14 : Insertion of Definitive Obturator

Outcome:

The definitive obturator provided excellent retention, stability, and esthetics. It significantly improved the patient's masticatory efficiency and speech clarity while ensuring long-term comfort. The patient expressed high satisfaction with functional performance and esthetics, along with improved social confidence

Discussion:

Rehabilitation of maxillary defects following mucormycosis has unique clinical challenges that need a multidisciplinary approach involving oral and maxillofacial surgeons, prosthodontists, speech therapists, and, in a few cases, psychologists. (5,8) The rapid progression and destructive nature of mucormycosis often result in extensive maxillary bone loss, resulting in oro-nasal communication that significantly impacts mastication, swallowing, speech, and esthetics. (9) In such cases, prosthodontic rehabilitation with hollow bulb obturators remains a well-established and predictable treatment modality, offering improved patient comfort, reduced prosthesis weight, and an effective seal between the oral and nasal cavities. (10)

The step-by-step treatment protocol adopted in the present case, progressing from surgical to interim and finally to a definitive obturator, is consistent with established recommendations in the literature. The interim hollow bulb obturator served as a functional and psychological bridge during the healing phase, restoring speech intelligibility, preventing nasal regurgitation, and allowing the patient to gradually adapt to prosthesis use. This step also evaluates patient compliance and identifies any functional limitations before committing to a definitive design. (10,11)

The definitive obturator in this case was fabricated with a metal framework, which offered superior strength, resistance to deformation, and improved hygiene maintenance compared to an all-acrylic prosthesis. The rigidity of the framework allowed for a more favorable distribution of occlusal loads, reducing localized stress on the remaining dentition and soft tissues. Such load distribution is particularly important in large maxillary defects, where unilateral occlusal forces could otherwise result in destabilization of the prosthesis. (11)

From a design perspective, Aramany Class I defects, as seen in this patient, require careful consideration of cross-arch stabilization and maximal utilization of remaining abutments. Retention in this case was achieved through clasps, guiding planes, and the incorporation of a hollow bulb to minimize the prosthesis weight. (6) Weight reduction of approximately 30–35%, as achieved here, aligns with previous findings by Edelstein et al, which emphasize that lighter prostheses are better tolerated and less likely to dislodge during function. (12)

Weight reduction of the prosthesis plays a role in the biomechanical behavior of the obturator. Heavier prostheses can transmit excessive torque to abutment teeth, leading to mobility or periodontal breakdown. In the interim stage, the salt-leaching method was selected for hollowing the bulb due to its simplicity and cost-effectiveness. Although economical, this method requires meticulous technique to avoid internal surface porosity, which may harbor microorganisms. (13)

For the definitive stage, CAD–CAM–assisted framework fabrication was employed, which has been shown to enhance precision, improve fit, and reduce the duration of chairside adjustment. Digital workflows also provide more accurate replication of complex defect geometries and allow for virtual design modifications before manufacturing. This is particularly beneficial in maxillofacial prosthodontics, where anatomic variations between patients are considerable. (14)

The functional outcomes in this case, improved mastication, clearer speech and enhanced social confidence are consistent with reports demonstrating significant improvements in quality of life following obturator rehabilitation. (15) Studies have also shown that obturators can maintain midfacial contour and lip support, thereby contributing to overall esthetics. Long-term success, however, depends on regular recall visits to monitor the prosthesis fit, oral hygiene, and the health of the abutment tooth. (16,17)

While implant-supported obturators have emerged as an alternative in certain cases, they are not always possible due to factors such as bone availability, patient health status, or financial considerations. (18,19) In mucormycosis patients, delayed implant placement is often advisable due to compromised healing potential and the risk of recurrence. Thus, conventional removable obturators, when well-designed and maintained, remain a gold standard for functional rehabilitation in such patients. (20,21)

In summary, this case underlines the importance of a systematic, staged approach in obturator therapy, the value of combining conventional prosthodontic principles with modern digital design techniques to optimize outcomes in maxillofacial defect rehabilitation.

Conclusion:

A staged prosthodontic approach with interim and definitive hollow bulb obturators can restore not just function and esthetics, but also confidence and quality of life for patients with post-mucormycosis maxillary defects. Success depends on precise design, meticulous execution, and ongoing patient guidance, turning the prosthesis into a tool for regaining the physiological function.

References:

1. Mantri S, Khan Z. Prosthodontic rehabilitation of acquired maxillofacial defects. Head and neck cancer. 2012 Mar 14:13-315.

2. Al-Tawfiq JA, Alhumaid S, Alshukairi AN, Temsah MH, Barry M, Al Mutair A, Rabaan AA, Al-Omari A, Tirupathi R, AlQahtani M, AlBahrani S. COVID-19 and mucormycosis superinfection: the perfect storm. Infection. 2021 Oct;49(5):833-53.

3. Nagalli S, Kikkeri NS. Mucormycosis in COVID-19: A systematic review of literature. Le infezioni in medicina. 2021 Dec 10;29(4):504.

4. Singh AK, Singh R, Joshi SR, Misra A. Mucormycosis in COVID-19: a systematic review of cases reported worldwide and in India. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2021 Jul 1;15(4):102146.

5. Ali IE, Chugh A, Cheewin T, Hattori M, Sumita YI. The rising challenge of mucormycosis for maxillofacial prosthodontists in the Covid-19 pandemic: a literature review. Journal of Prosthodontic Research. 2022;66(3):395-401.

6. Durrani Z, Hassan SG, Alam SA. A study of classification systems for maxillectomy defects.

Journal of Pakistan Prosthodontics Association. 2013 Dec 30;1(2):117-24.

7. Alqarni H, Alfaifi M, Ahmed WM, Almutairi R, Kattadiyil MT. Classification of maxillectomy in edentulous arch defects, algorithm, concept, and proposal classifications: A review. Clinical and Experimental Dental Research. 2023 Feb;9(1):45-54.

8. Rathee M, Singh S, Malik S, SD AM. Reconstruction and rehabilitation of maxillary defects secondary to mucormycosis. Saudi J Oral Dent Res. 2022;7(1):1-7.

9. Iyer SR. Post-COVID mucormycosis rehabilitation: Challenges and solutions. Journal of Dentistry Defense Section. 2022 Jul 1;16(2):97-9.

10. Satya PM, Ashok V, Nesappan T, Ganapathy DM. Prosthodontic Rehabilitation of Maxillary Defect in a Patient with Mucormycosis. Journal of Evolution of Medical and Dental Sciences. 2020 Oct 19;9(42):3163-7.

11. Gowda M, Shashidhar MP, Prakash P, Sahoo NK. Rehabilitation of a defect secondary to sino-orbital mucormycosis prosthodontic challenge. IP Ann Prosthodont Restor Dent. 2021 Feb 15;7(1):41-5.

12. Edelstein J, Carroll K. Prosthetics and Patient Management: A Comprehensive Clinical Approach. CRC Press; 2024 Jun 1.

13. Butterworth C, Vosselman N, Malhotra T, Dawood A. Prosthetic rehabilitation. InStell & Maran's Head and Neck Surgery and Oncology 2025 Jan 15 (pp. 344-367). CRC Press.

14. Kapos T, Ashy LM, Gallucci GO, Weber HP, Wismeijer D. Computer-aided design and computer-assisted manufacturing in prosthetic implant dentistry. International Journal of Oral & Maxillofacial Implants. 2009 Oct 2;24.

15. Chen C, Ren W, Gao L, Cheng Z, Zhang L, Li S, Zhi PK. Function of obturator prosthesis after maxillectomy and prosthetic obturator rehabilitation. Brazilian journal of otorhinolaryngology. 2016;82(2):177-83.

16. Chigurupati R, Aloor N, Salas R, Schmidt BL. Quality of life after maxillectomy and prosthetic obturator rehabilitation. Journal of Oral and Maxillofacial Surgery. 2013 Aug 1;71(8):1471-8.

17. Corsalini M, Barile G, Catapano S, Ciocia A, Casorelli A, Siciliani R, Di Venere D, Capodiferro S. Obturator prosthesis rehabilitation after maxillectomy: functional and aesthetic analysis in 25 patients. International journal of environmental research and public health. 2021 Nov 28;18(23):12524.

18. Omo JO, Sede MA, Enabulele JE. Prosthetic rehabilitation of patients with maxillary defects in a Nigerian tertiary hospital. Annals of medical and health sciences research. 2014;4(4):630-3.

19. Sharma AB, Beumer J. Reconstruction of maxillary defects: the case for prosthetic rehabilitation. Journal of oral and maxillofacial surgery. 2005 Dec 1;63(12):1770-3.

20. Sharaf MY, Ibrahim SI, Eskander AE, Shaker AF. Prosthetic versus surgical rehabilitation in patients with maxillary defect regarding the quality of life: systematic review. Oral and Maxillofacial Surgery. 2018 Mar;22(1):1-1.

21. Dholam KP, Bachher G, Gurav SV. Changes in the quality of life and acoustic speech parameters of patients in various stages of prosthetic rehabilitation with an obturator after maxillectomy. The journal of prosthetic dentistry. 2020 Feb 1;123(2):355-63.