

A Closed Hollow Bulb Interim Obturator for A Maxillectomy Defect due to Post-COVID Mucormycosis- A Case Report

Pronoy Mukhopadhyay, Arun Khalikar, Sattyam Wankhade, and Suryakant Deogade

ABSTRACT

An obturator prosthesis functions to obliterate a congenital or acquired maxillary defect. This article documents the prosthetic rehabilitation of a maxillectomy defect due to post-COVID mucormycosis using a one-piece closed hollow-bulb interim obturator. The technique involves fabricating a thermoform resin shell from a putty index of the defect as the hollowing method. The processes involved in this technique ensure a light-weight prosthesis in an economical and less technique-sensitive way. However, more research is warranted to study the properties of thermo-form resins and their integrity maintained in the processing cycle.

Keywords: Hollow-bulb, maxillectomy, obturator, post-COVID mucormycosis.

Published Online: June 28, 2022

ISSN: 2684-4443

DOI : 10.24018/ejdent.2022.3.3.192

P. Mukhopadhyay*

Government Dental College & Hospital,
Nagpur, Maharashtra, India.

(e-mail:

pronoy.mukherjee@yahoo.com)

A. Khalikar

Department of Prosthodontics, Government
Dental College & Hospital, Nagpur,
Maharashtra, India.

S. Wankhade

Department of Prosthodontics, Government
Dental College & Hospital, Nagpur,
Maharashtra, India.

S. Deogade

Department of Prosthodontics, Government
Dental College & Hospital, Nagpur,
Maharashtra, India.

**Corresponding Author*

I. INTRODUCTION

Mucormycosis, an angio-invasive opportunistic fungal infection, has been quite a “talk-of-the-town” in the ongoing COVID-19 pandemic. On the basis of anatomic distribution, it can be classified as Rhino-orbital-cerebral, pulmonary, gastro-intestinal and cutaneous [1]. The Rhino-orbital-cerebral variant is found to be more prevalent in the Indian sub-continent. The etiological factors attributed to the causation are usually uncontrolled diabetes mellitus, patients under immune-suppressive and chemotherapeutic drugs and HIV infections [2]. Most recently, there has been a sharp rise in the incidence in association with the COVID-19 pandemic. The most frequent causes attributed to the rise of mucormycosis in COVID-19 patients are uncontrolled diabetes, the excessively dispensed corticosteroids for suppressing the cytokine storm, and long-term hospitalisation in the intensive care unit [3]. India contributed to approximately 45% of the new cases detected globally and nearly 34% of the deaths globally during the third week of May, 2021 [4].

The therapeutic strategy opted in this disease is the aggressive debridement of all the infected tissues supplemented with systemic antifungal therapy [5]. It, thus, leads to considerable morbidity that requires due anatomical and functional rehabilitation. This case report aims to

demonstrate the prosthetic rehabilitation of a maxillectomy defect in a patient who was surgically treated for post-COVID-19 Rhino-orbital mucormycosis using a closed bulb hollow interim obturator prosthesis.

II. CASE REPORT

A patient was referred from the Department of ENT to the Department of Prosthodontics, for the prosthetic opinion after surgical resection of the right maxilla. On further history taking, the patient described to have been admitted for COVID-19, two months back and was kept under quarantine and medications when symptoms like headache, tooth ache and nasal stuffiness ensued. On further radiographic investigation and endoscopic tissue sampling, a definitive diagnosis of Rhino-orbital Mucormycosis involving the right maxilla due to *Rhizopus oryzae* was confirmed. A maxillectomy of the right side was performed through the Weber-Ferguson approach leaving a large intra-oral unilateral defect (Aramany's Class I Acquired Maxillary defect) (Fig 1) causing nasal regurgitation and speech deficits, which the patient was referred for.



Fig. 1. Intra-oral post-surgical defect of Aramany's Class I variant.

III. TREATMENT STRATEGY

The patient was referred 5 days post-operatively. Hence, a delayed surgical obturator plate was first fabricated which the patient used for 14 days. This was followed by the process of fabricating the interim obturator which was done in the following steps:

- i. An irreversible hydrocolloid preliminary impression was made of the maxillary and mandibular arch using stock impression trays. In the maxillary arch, a gauze pack was placed into the defect prior to impression making to block undesirable undercuts. The impression was then poured using type III Dental stone.
- ii. A custom tray was fabricated on the preliminary model. High-fusing compound was first used to make a preliminary impression of the defect and subsequently relined using low-fusing compound. A wash impression was then made using light-body addition silicone and the assembly was subsequently picked up using irreversible hydrocolloid in a stock tray. This impression was poured using type IV die stone.
- iii. On the master model, a temporary denture base and occlusal rim was fabricated to make occlusal registration record, with the help of which casts were mounted and cross-linked acrylic teeth were set. The posterior teeth were set out of occlusion while the anterior teeth in aesthetic accord. The trial denture was then tried in the patient's mouth.
- iv. After the trial, the trial denture was invested in a varsity flask using dental stone and subsequently dewaxed. The defect site on the model was first covered with modelling wax and then an index of the defect was made using Condensation silicone of putty consistency (Fig 2).
- v. The silicone index was retrieved and with the help of vacuum-form unit covered with a 1mm hard clear thermo-forming acrylic sheet. The silicone index was recovered from the acrylic shell and the shell was repositioned into the defect site on the plaster model to assess the adaptation.
- vi. The open site of the shell was then covered by adapting self-polymerizing acrylic on the shell and repositioning the shell into the defect (Fig 3). The shell was then checked for any leaks by placing it under a beaker of water.

- vii. This was followed by removal of the modelling wax spacer from the defect site and adaptation of heat-polymerizing acrylic in its dough state into the walls of the defect. The shell was repositioned and covered with another layer of heat-polymerizing acrylic and subsequently packed under pressure. This was followed by the conventional polymerization process, retrieval of the prosthesis and subsequent finishing and polishing.
- viii. To check the weight of the prosthesis, it was immersed in a beaker of water, over which it floated (Fig 4). The prosthesis was then inserted in the patient's mouth (Fig 5) and checked for obturating seal by asking the patient to sip water. Even the speech was significantly improved on insertion. Regular follow-ups were then scheduled to reline the defect surface on a routine basis.

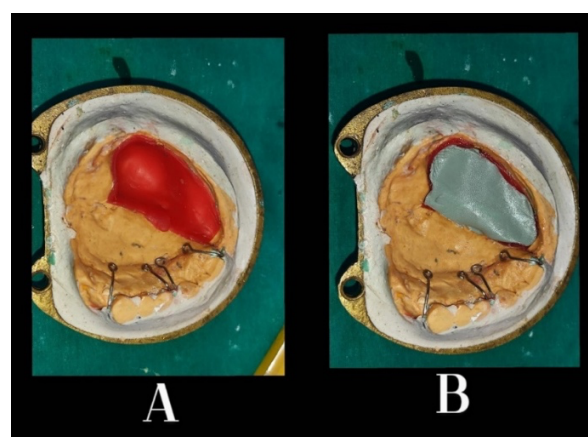


Fig. 2. A) Modelling wax spacer adapted into defect site. B) Condensation silicone putty index of defect site.

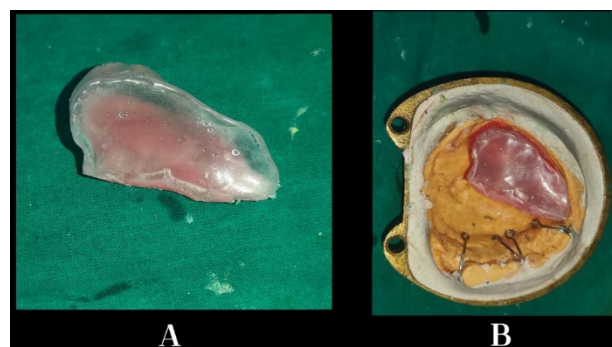


Fig. 3. A) Thermoform Acrylic shell made from putty index and sealed using self-polymerizing resin. B) Acrylic shell checked for adaptation in defect site.

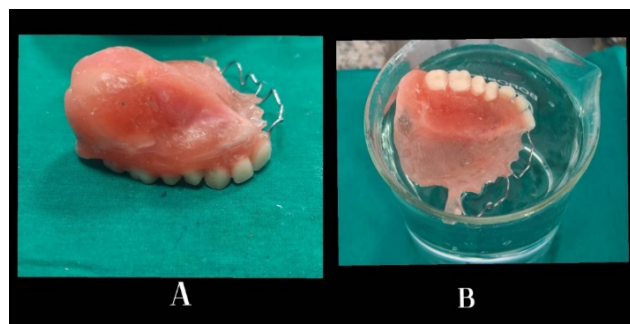


Fig. 4. A) Finished heat-polymerized prosthesis. B) Prosthesis floating in beaker of water demonstrating hollowing-out due to reduced weight.

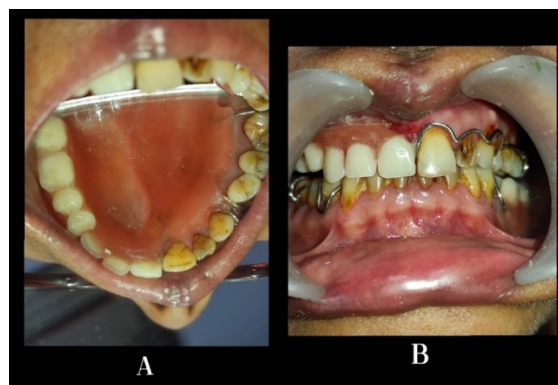


Fig. 5. Prosthesis inserted. A) Occlusal view, B) Frontal view.

IV. DISCUSSION

An obturator prosthesis has been well defined in the Glossary of Prosthodontic terms as “a maxillo-facial prosthesis that is used to close a congenital or acquired tissue opening, primarily of the hard palate and/or contiguous alveolar/soft tissue structures [6]. The prosthesis functions not only to replace missing structures but also replace functional aspects such as mastication and speech efficiently [7]. This requires the prosthesis to engage the defect extensively, that might even add to the weight of the prosthesis. Many strategies have been developed and archived in literature over the years to mitigate this issue.

Techniques involving alterations through grinding of unwanted areas of the bulb were first described to reduce the weight [8]. Materials such as sugar, salt, ice, soap, caramel, Styrofoam and a wax-bolus have been documented as contents used to hollow-out the defect and subsequently dissolve or retrieve [9]-[11]. These methods are believed to be associated with an inadequate seal and chances of possible contamination. A two-stage heat-processing technique involving heat-polymerizing resin has also been described in literature which has been believed to be associated with considerable dimensional changes [12]. Use of thermoform resins has also been chronicled and documented in literature [13]-[15]. The technique reported in this article establishes an ease of fabrication since it alleviates the issues of retrievability of the contents of the bulb, and also involves a single flasking method. The thermoform shell was checked for any leaks prior to adaptation as well. The wax spacer ensures a uniform bulb wall around the shell. The method proved economical, easier to execute and with less post-processing alterations. A possible loophole would be the correct re-orientation of the shell into the bulb during packing and processing and also a questionable integrity of the shell under the load and heat of the processing methods. This warrants research in the properties of thermo-form resins and their ability to withstand the temperatures and pressures simulated in the processing cycle.

V. CONCLUSION

The methodology employed in this report ensures a facilitated approach towards fabricating a hollow-bulb obturator without much technical difficulties involved in the

fabrication steps. Moreover, the technique takes an edge off the burden of additional expertise and economy. Functional and social rehabilitation of a patient with morbidity associated with post-COVID Mucormycosis must thus, be an utmost priority to improve their quality of life.

CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

REFERENCES

- [1] Jeong W, Keighley C, Wolfe R, Lee WL, Slavin MA, Kong DCM, et al. The epidemiology and clinical manifestations of mucormycosis: A systematic review and meta-analysis of case reports. *Clin. Microbiol. Infect.* 2019; 25: 26–34.
- [2] Prakash H, Chakrabarti A. Epidemiology of Mucormycosis in India. *Microorganisms.* 2021; 9(3): 523.
- [3] John TM, Jacob CN, Kontoyiannis DP. When uncontrolled diabetes mellitus and severe COVID-19 converge: the perfect storm for mucormycosis. *J Fungi.* 2021; 7: 298.
- [4] Singh AK, Singh R, Joshi SR, Misra A. Mucormycosis in COVID-19: A systematic review of cases reported worldwide and in India. *Diabetes Metab Syndr.* 2021; 15(4): 102146.
- [5] Onyango JF, Kayima JK, Owen WO. Rhinocerebral mucormycosis: Case report. *East Afr Med J.* 2002; 79: 390–3.
- [6] The Glossary of Prosthodontic Terms: Ninth Edition. *J Prosthet Dent.* 2017; 117(5S): e1-e105.
- [7] Taylor TD. *Clinical Maxillofacial Prosthetics*, Quintessence Publishing, 2000.
- [8] Habib BH, Driscoll CF. Fabrication of a closed hollow obturator. *J Prosthet Dent.* 2004; 91: 383–385.
- [9] Buzayan, MM. The Hollow Bulb Obturator Fabrication, where do We Stand in 2017. *Periodontics and Prosthodontics* 2017.
- [10] Patil PG, Patil SP. A hollow definitive obturator fabrication technique for management of partial maxillectomy. *J Adv Prosthodont* 2012; 4: 248–53.
- [11] Parab M, Aras M, Chitre V. Technique of Fabrication of Definitive Hollow Obturator for Partial Maxillectomy Patient. *International Journal of Prosthodontics & Restorative Dentistry.* 2017; 7: 38–41.
- [12] McAndrew KS, Rothenberger S, Minsley GE: An innovative investment method for the fabrication of a closed hollow obturator prosthesis. *J Prosthet Dent* 1998; 80: 129–132.
- [13] Didier M, Laccoureye O, Brasnu D, et al. New surgical obturator prosthesis for hemimaxillectomy patients. *J Prosthet Dent* 1993; 69: 520–523.
- [14] Keyf F. Obturator prostheses for hemimaxillectomy patients. *J Oral Rehabil* 2001; 28: 821–829.
- [15] Buzayan MM, Ariffin YT, Yunus N. Closed hollow bulb obturator-one-step fabrication: a clinical report. *J Prosthodont.* 2013; 22(7): 591–595.