

# Prosthodontic rehabilitation of a mucormycosis patient: a case report

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## Abstract

Maxillofacial defects can result from congenital disabilities, cancer surgery, trauma, infection, or disease. Facial deformities can affect how a person looks, feels about themselves, and interacts with others. It can significantly impair phonetics, mastication, and deglutition and cause facial deformation. Maxillectomy due to mucormycosis is one such maxillofacial defect and it becomes essential to rehabilitate these cases with modified techniques based on the extension of intraoral defect, the severity, the degree of resection, the type of mucormycosis, the stability of lesions over time, the presence of contiguous disease, the accessibility of dental and prosthetic resources, and patient expectations. The prosthetic reconstruction with a maxillofacial prosthesis can restore function and appearance, comfort, and quality of life. The prosthesis should be simple to handle, easy to maintain, biocompatible, light in weight, and convenient for future adjustments. The maxillofacial surgeon, oncologist, and reconstructive dentist should work together to develop a treatment plan based on these considerations. This case report provides the current treatment options for these patients and rehabilitation of the defect. It also discusses the issues that need to be addressed during the planning of prosthetic treatment and highlights some challenges the clinicians face in providing prosthetic treatment for mucormycosis patients.

**Keywords:** COVID-19, maxillectomy, mucormycosis, prosthetic rehabilitation.

## 1. Introduction

Maxillofacial defects can result from trauma, surgically removing tumors or congenital malformations. Rehabilitation of these defects is difficult for both the clinician and the patient. The formation of a communication between the oral cavity, the antrum, and/or the nasopharynx is one of these defects caused by maxillectomy [1]. The effects of aggressive surgical debridement during the maxillectomy result in changes to facial structure, function, and overall quality of life [2,3]. A prosthetic obturator or soft tissue flaps can be used to reconstruct the maxilla. The goals of prosthetic rehabilitation for these patients include the separation of the oral and nasal cavities to allow adequate deglutition and articulation, support of the soft tissue to restore the contour, and an acceptable esthetic result [3].

The lack of support, retention, and stability are common prosthodontic treatment problems for patients with a maxillectomy [4]. Factors that affect the prosthetic prognosis for these patients are the size of the defect, the number of remaining teeth, the amount of remaining bony structures, the quality of existing mucosa, radiation therapy, and the patient's ability to adapt to the prosthesis [5]. It can

be extremely difficult for a prosthodontist to create a prosthesis because of issues related to treating intraoral defects. Hence, this case report discusses the prosthetic rehabilitation of a maxillectomy patient who had experienced mucormycotic necrosis, from making an adequately extended impression of the defect to making the prosthesis. Following the delivery of prostheses, an improvement in overall function and appearance is anticipated [6].

## 2. Case Report

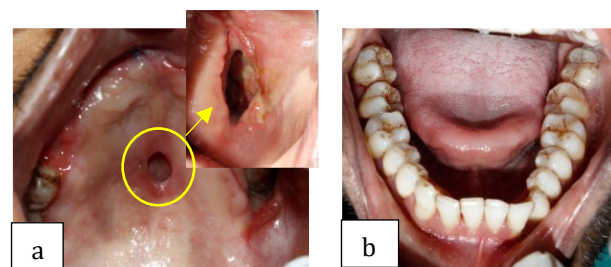
A 24-year-old male patient reported for prosthetic rehabilitation of an acquired defect after surgical debridement of mucormycotic necrosis. Three days after the initial onset of COVID-19 infection, the patient experienced a diffuse, dull, ongoing, progressive toothache in the left upper jaw. Within two days, the severity had worsened and spread to the entire left side of his face. Clinically numerous intraoral ulcerations, diffuse gingival inflammation, and slight swelling on the left side of his face and palate were observed. A random plasma glucose analysis was performed as a screening test for diabetes. The results showed an elevated random blood sugar of 220 mg/dl.

Anterior diagnostic rhinoscopy was performed as part of the investigation, which revealed blackish discoloration over both nasal turbinates. The patient was diagnosed with left rhinosinomaxillary mucormycosis and right mucormycosis (Figures 1a and b). Following surgical excision with the left total maxillectomy and right hemimaxillectomy (Figure 2a), the patient was referred for the obturator fabrication. On extraoral examination, no gross asymmetry was noted. No abnormality was noted in the TMJ movements or lymph nodes. There was an adequate mouth opening. Intraoral examination revealed a communication between the oral and nasal cavities, which fell into the Aramany Class IV category in the hard and soft palate. There was a total lack of hard and soft palate concerning the missing teeth from 16 to 11 and 21 to 28. Grade I mobility was noted in 17, and 18 with limited alveolar support. A movable mucosal tissue was seen in the posterior 1/3<sup>rd</sup> of the hard palate. Diffuse erythematous areas with discrete areas of slough were noted on the adjacent oral mucosa in the left molar region. In the lower arch, all the teeth were intact (Figure 2b). The recommended prosthetic treatment plan included an interim prosthesis to close the oroantral communication and to close the defect, taking retention and support from anatomical undercut within the defect, and direct retention from 17, and 18. The fabrication of a definitive prosthesis after three months once the complete healing has taken place. After taking all necessary safety measures, maxillary and mandibular preliminary impressions were made by positioning the gauge pack tied with floss in the maxillary oronasal communication area to prevent the flow of impression material into the defect site and making an impression with irreversible hydrocolloid (DPI Algitex, India) and pouring Type 3 dental stone (Kaldent, Kalabhai, India) (Figure 4a). A custom tray was fabricated for the upper arch with an auto-polymerizing acrylic resin (Figure 4a). Border molding was performed with putty consistency addition silicone material and the final impression was made using light-body elastomeric impression material by placing the gauze pack tied with floss to prevent accidental slippage of material into the defect site (Figure 4b). The final impression was then poured into the Type 4 dental stone (Kaldent, Kalabhai, India). With the aid of clasps encircling teeth 17, and 18, and a slight elevation created at the left posterior region to support the buccal mucosa and cheek, a clear self-cure transitional obturator was made without placing the teeth and relined with soft liner (Figures 4c-f). The patient was advised to wear the transitional plate for two months and made necessary corrections during the follow-up based on the closure and healing of the soft tissue defect and oroantral communications. After three months, the definitive prosthesis was fabricated by making the preliminary impression with an intact transitional plate with an irreversible hydrocolloid (DPI Algitex, India) and pouring with Type 3 Dental stone (Kaldent, Kalabhai, India). A special tray was fabricated for the upper arch with an auto-polymerizing acrylic resin. Border molding was performed with the addition silicone putty, and the final impression using light body elastomeric impression material poured with Type 4 dental stone (Kaldent, Kalabhai, India) (Figures 5a and b). Jaw relations were done considering adequate lip fullness, and visibility. A vertical dimension was established, and centric relation was recorded with the help of an interocclusal record. The teeth arrangement was made, and trial insertion was done. The denture was processed using heat-cured acrylic (Trevalon

HI Denture Base Material, Dentsply, India), and the weight of the prosthesis was measured (Figures 5c-f). Denture insertion was done and checked for occlusion, phonetics, and esthetics (Figure 5g). Post-insertion adjustments were made after 24 and 72 h and one week after denture insertion. Follow-up was done after three months. Instructions were given about denture hygiene, placement, and removal. Nutrition counselling was done, keeping in mind his systemic health. The patient reported an improvement in overall mastication, deglutition, phonetics, and esthetics.



**Figure 1. a. Extra Oral Front View, b. Extra Oral Profile View.**



**Figure 2. a. Maxillary Defect with Oro-Antral Communication, b. Mandibular Arch.**



**Figure 3. OPG**

### 3. Discussion

This case report presents a patient with mucormycosis infection that resulted in extensive surgical removal of the maxillae, alveolar process, teeth, and soft tissue. It has thus advanced to unpredictable prosthetic rehabilitation outcomes and poor prognoses of the prosthesis [7]. Following surgical resection, a transitional plate separated the communication between the oral and nasal cavities, followed by the definitive prosthesis. Surgical resection alters the facial appearance and causes psychological and social impairment; a carefully designed prosthesis enhances masticatory efficiency and speech intelligibility and relieves psychological distress [8,9].



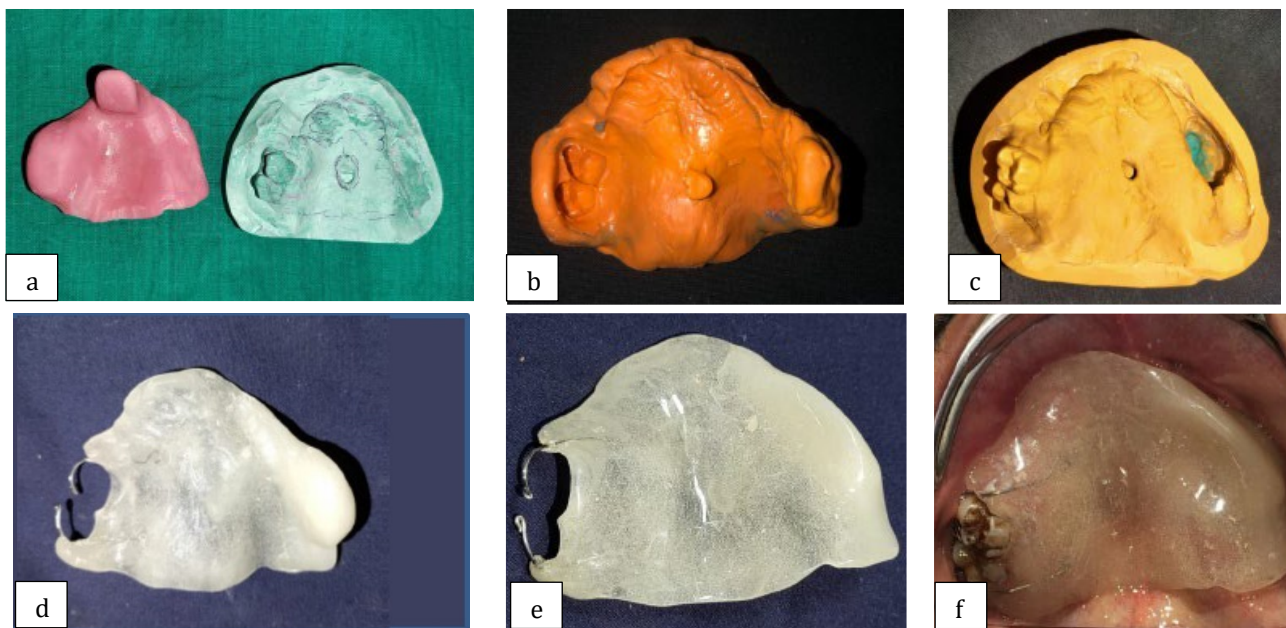


Figure 4. a. Maxillary diagnostic cast with custom tray, b. Maxillary final impression made with elastomeric impression material, c. Maxillary master cast made with die stone, d. Clear self-cure transitional obturator (intaglio surface), e. Clear self-cure transitional obturator (cameo surface), f. Transitional obturator in oral cavity.

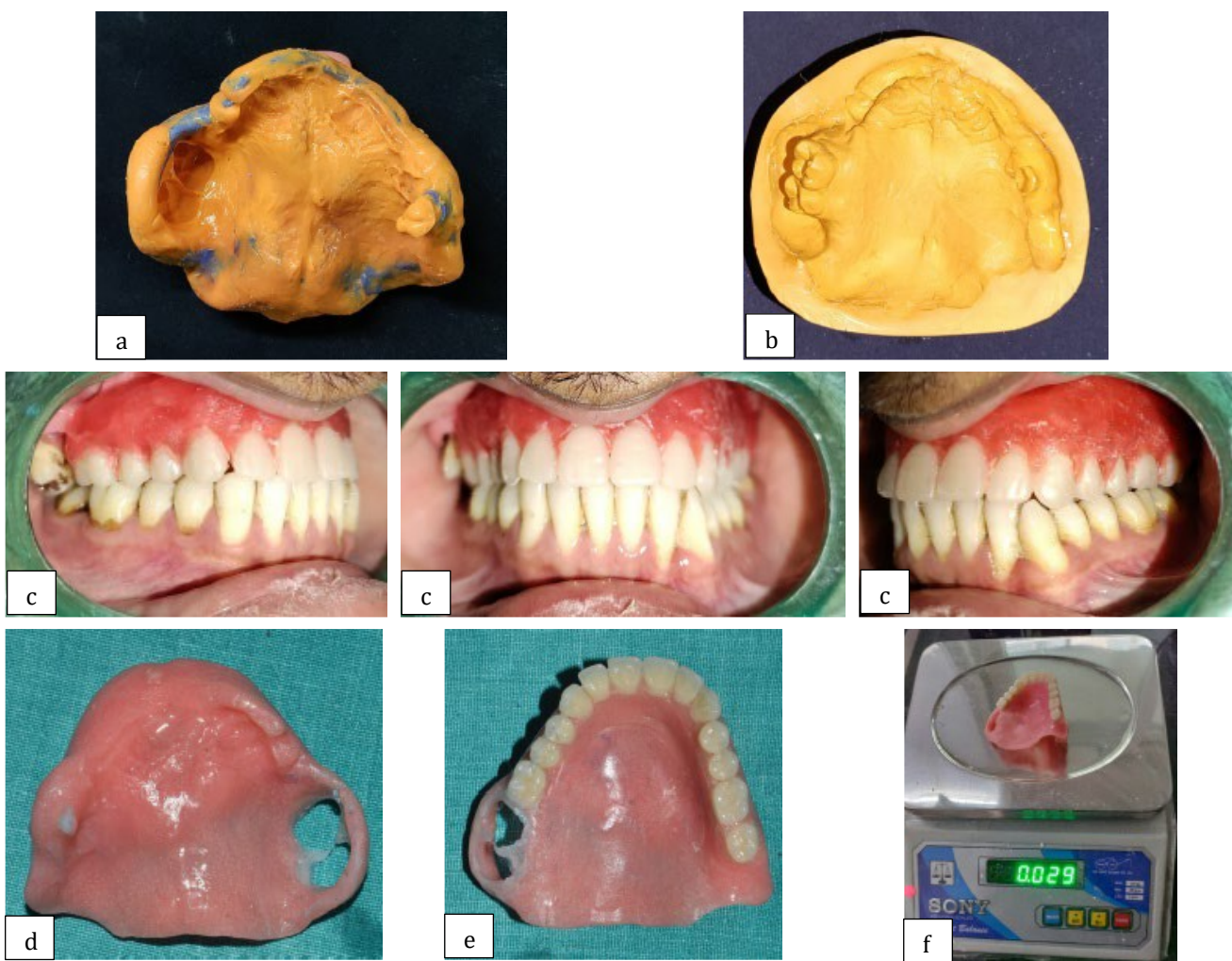


Figure 5. a. Maxillary Final impression made with elastomeric impression material for fabrication of definitive prosthesis, b. Maxillary master cast, c. Trial verification, d. Definitive prosthesis (Intaglio surface), e. Definitive prosthesis (Cameo Surface), f. Weight of the Definitive prosthesis.



**Figure 5. g. Definitive Prosthesis insertion.**



**Figure 6. Top: Pre-operative, and below: post-operative images**

The best treatment for such severe defects is an obturator retained by the zygomaticus and nasal implants. The cost of the treatment may also be a burden on the patients. Hence, conventional approaches were followed for the fabrication of the prosthesis. To create a denture with good retention, stability, and support, an accurate impression of the supporting tissues and/or nearby teeth is the first step. Due to the severity of the defect and the reduced mouth opening following surgical resection, loss of soft and hard tissue and microstomia as a post-operative complication further adds to the case's complexity. The impression, in this case, was made using an irreversible hydrocolloid impression material and was reoriented with the pickup impression [9].

There was a significant complication due to the absence of nearly the entire basal seat, the presence of only two teeth, and a mobile soft tissue flap. The gauge pack was placed in the defect areas during the primary impression-making to prevent the entry of impression material into the defect area. A palatal plate was made with self-cure polymer. Additionally, over this 24 h, the viscoelasticity of the material continued to create a cushioning effect between the tissues lining the defect and the plate. Over the following 24 h, 48 h, 72 h, and three months there was a discernible postoperative improvement in their masticatory effectiveness, swallowing capacity, and speech understanding. When speaking in the local vernacular language, the patients noticed improvements in their syllable enunciation and pronunciation. The patient's overall health ultimately improved, resulting in a significant decrease in psychological stress.

## 6. Conclusion

Due to Mucormycosis highly invasive pathogenesis, extensive surgical resection is frequently necessary. This can significantly impair phonetics, mastication, and deglutition and cause facial deformation. It becomes essential to rehabilitate these cases with some modified techniques based on the extension and severity of the defect. Various factors need to be considered, including the extent of resection, the type of mucormycosis, stability of lesions over time, the presence of contiguous disease, available dental and prosthodontic resources, and patient expectations.

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