

## Prosthetic Rehabilitation of Patients with Maxillary Defects Post Mucormycosis: Case Series

Yadav S,<sup>1</sup> G Abhinav<sup>2</sup>

<sup>1</sup>Post Graduate Resident, Department of Prosthodontics, Dr. Ziauddin Ahmad Dental College, Aligarh Muslim University (AMU), Aligarh, Uttar Pradesh, India

<sup>2</sup>Professor, Department of Prosthodontics, Dr. Ziauddin Ahmad Dental College, AMU, Aligarh, Uttar Pradesh, India

### Introduction

COVID 19 (Coronavirus Disease 19) is a global disease caused by SARS CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2). Symptoms of COVID 19 can range from asymptomatic to severe COVID-19 pneumonia. Increased use of steroids in treating critically ill patients with COVID 19 has led to the emergence of opportunistic infection like mucormycosis.<sup>1</sup> “Mucorales” and “Entomophthorales” are the order of fungus associated with mucormycosis infection. Rhizopus, Mucor and Absidia are the three most common type of fungi causing this infection in human. Mucormycosis infection in human being is mainly of two types; superficial or localized and visceral or disseminated.<sup>2</sup> The superficial infection includes involvement of the external ear, finger nails and skin. The visceral forms of mucormycosis are of three main types; pulmonary, gastrointestinal and rhinocerebral. Rhinocerebral infections by these organisms are characterized by classical syndrome; uncontrolled diabetes, cellulitis, ophthalmoplegia and meningoencephalitis.<sup>2</sup>

The most common site for the origin of infection is maxillary antrum. Once these organisms enter the mucous membrane, they proliferate very rapidly because they have high affinity for blood vessel walls. After proliferation they invade nearby vessels and causes vascular thrombosis and later necrosis. Initial manifestation is the erosion and ulcer formation in the antrum which eventually leads to osseous destruction and oro-antral fistula formation.<sup>3,4</sup>

The treatment involves intravenous antifungal drugs along with aggressive surgical debridement of the ulcerated and necrotic tissues. This surgical debridement can cause loss of major facial structures like palate, maxilla, floor of orbit, and contiguous structures which results into difficulty in speech, mastication, deglutition and respiration.<sup>5</sup>

An obturator is a maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily of the hard palate and/or contiguous alveolar/soft tissue structures.<sup>6</sup> Most frequently the choice of treatment is an obturator prosthesis due to the complexity of maxillary surgical reconstruction and the uncertainty of the functional outcome.

The function of this prosthesis is to restore the partition between the oral and nasal cavities, improves mastication, articulation, restores facial contour and speech intelligibility, provides lip support and reduces drooling of saliva.<sup>5</sup> This case series reports the rehabilitation of two post-operative mucormycosis cases with extensive maxillectomy treated with a definitive obturator along with a removable partial

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#### **\*Corresponding Author**

Prof. Dr. Abhinav Gupta, Department of Prosthodontics, Dr. Ziauddin Ahmad Dental College, AMU, Aligarh, Uttar Pradesh, India  
Email: abhiprakash2@gmail.com  
Phone No.: 9917290999

denture. Informed consent was obtained from both patients included in this case series.

## Clinical Report

### Case 1:

A 38 years old male referred to the Department of Prosthodontics, Dr. Ziauddin Ahmad Dental College, AMU for prosthetic rehabilitation following the surgical excision of premaxilla. The patient's major complain was impaired speech, aesthetic and mastication. A detailed case history revealed that patient suffered from COVID 19 for which he had been treated with steroids and other drugs. After few months of recovery from COVID 19, he was diagnosed with rhino-orbital mucormycosis about 10 months back for which he has been operated and surgical resection was done. (Fig. 1)

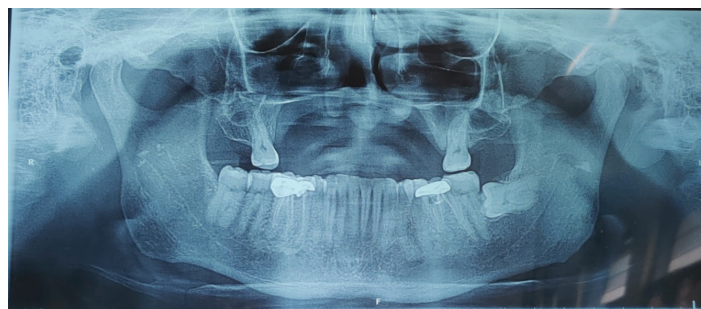
Clinical examination revealed the presence of residual basal bone with only two teeth remaining in the maxilla, right and left maxillary first molar. The remaining maxilla was completely healed and entirely lined with keratinized mucosa (Fig. 2A, 2B). Mandibular movement was within normal range with no evidence of supraeruption of mandibular teeth. Tongue function was normal. His concave profile obliterated the nasolabial fold with drooped corners of the mouth and insufficient upper lip support (Fig. 3A, 3B). Temporomandibular movements were coordinated without any lateroprotrusive deflection during opening and

closing of mouth.

The patient was classified as having class VI defect according to Aramany classification. Aramany classified partially edentulous maxillectomy dental arches on the frequency of occurrence of maxillary defects.<sup>7</sup>

The aim of the prosthetic reconstruction was to restore his facial profile and function. An acrylic resin removable partial denture prosthesis retained by the remaining molars was fabricated.

The primary impression was made with irreversible hydrocolloid impression material using stock metal tray (Fig. 4A, 4B). The impression was poured in type III dental stone and custom tray was fabricated with cold cure acrylic resin over the primary cast. Border moulding was done with green stick compound using segmental border moulding technique. Secondary impression was made with heavy body and light body addition silicone with double mix single step technique (Fig. 5). Impression was poured in type III dental stone. (Fig. 6) Denture base was fabricated using cold cure acrylic resin and occlusal rim was fabricated with modeling wax. Jaw relation and bite registration was done and the cast was mounted on the articulator. (Fig. 7, 8) Teeth setting (Fig. 9) and try in was done in patient's mouth (Fig. 10A, 10B, 10C), then the prosthesis was cured in heat cure acrylic resin (Fig. 11A, 11B, 11C) and inserted in patient's mouth (Fig. 12A, 12B, 12 C).



*Figure 1: OPG X-ray demonstrating missing premaxilla*

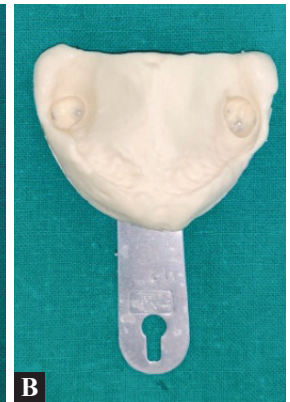




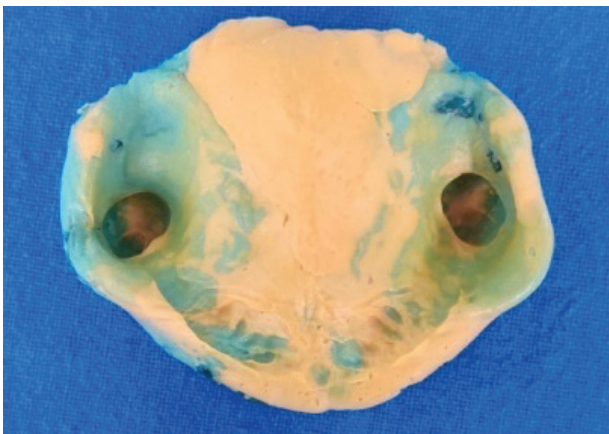
**Figure 2A, 2B:** Intraoral pictures of the patient



**Figure 3A, 3B:** Extraoral pictures of the patient



**Figure 4A, 4B:** Irreversible hydrocolloid impression of maxillary and mandibular alveolar arches



**Figure 5:** Secondary impression



**Figure 6:** Secondary cast



**Figure 7:** Occlusal rim



**Figure 8:** Bite registration



**Figure 9:** Teeth arrangement





*Figure 10A, 10B, 10C: Try-in procedure*



*Figure 11A, 11B, 11C: Processing of the prosthesis*



*Figure 12A, 12B, 12C: Intraoral and Extraoral pictures after prosthesis insertion*

## Case 2

A 42 years old male referred to the Department of Prosthodontics, Dr. Ziauddin Ahmad Dental College, AMU for prosthetic rehabilitation following hemimaxillectomy. The patient's chief complaints were nasal regurgitation, oroantral communication, hypernasal speech, masticatory difficulty and aesthetics. He had received a hemimaxillectomy 1 year back after mucormycosis infection as a result of COVID 19 infection (Fig. 13A).

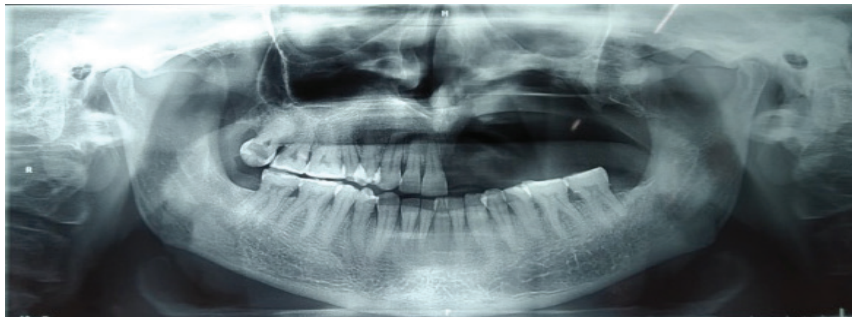
The maxilla, hard palate, and nasal floor were missing on the left side, according to the intraoral examination. Teeth were present on the right side of alveolar ridge. Completely healed left side was there with oroantral communication with respect to the molar region. Mandibular arch was healthy with no evidence of supra eruption (Fig. 13B,13C).

Tongue movements were normal. Extraoral examination revealed drooping of lip, obliterated

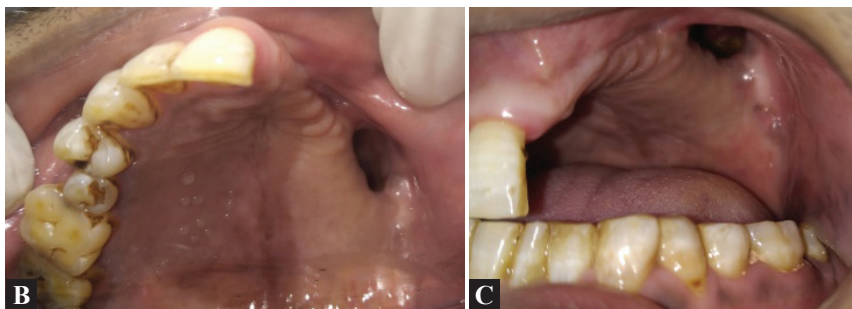
nasolabial fold and unsupported lip on the left side of face (Fig. 14A, 14B). TMJ movements were within normal range with no deviation of mandible on opening and closing. The aim of the prosthesis was to cover the oroantral communication and to restore the aesthetics and function.

The primary impression was made with irreversible hydrocolloid using a stock metal tray,

and all the procedures were followed the same as in case 1. Obturator prosthesis was cured in heat cure acrylic resin in conventional manner. (Fig. 15A,15B) Insertion of the prosthesis was done and the patient was instructed oral hygiene procedures. (Fig. 16A, 16B, 16C) Follow up appointments were recommended to evaluate the fit of the prosthesis and underlying supporting structures.



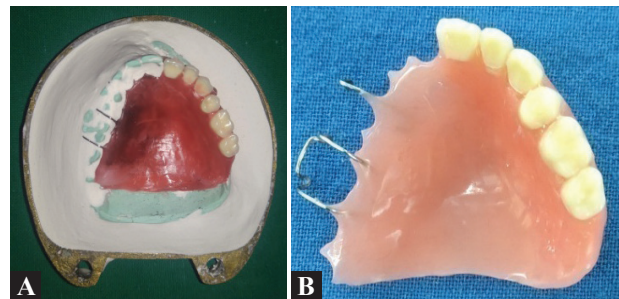
*Figure 13: OPG X-ray demonstrating hemimaxillectomy*



*Figure 13B, 13C: Intraoral pictures*



*Figure 14A, 14B: Extraoral pictures*



*Figure 15A, 15B: Processing of the denture*





**Figure 16A, 16B, 16C:** Intraoral and Extraoral pictures after insertion of prosthesis

## Discussion

Mucormycosis has emerged as an epidemic within a pandemic of COVID 19 in India. The Indian subcontinent has witnessed a sudden and alarming surge in the number of mucormycosis cases in patients of COVID-19.<sup>8</sup> Four major factors which are critical for the treatment of mucormycosis are rapidity of diagnosis, reversal of underlying predisposing factors (if possible), appropriate surgical debridement of infected tissue and appropriate antifungal therapy.<sup>9</sup> The key factor for the management of mucormycosis is surgical debridement. The amount of surgical debridement is guided by extent of invasion.<sup>10</sup>

Before the surgical site is healed, dimensionally stable, and the patient is ready physically and emotionally for any necessary restorative therapy, a definitive obturator is not recommended.<sup>11</sup> In the present cases obturator was fabricated to prevent oronasal regurgitation to give aesthetics, function and to improve quality of life. In Case 1, an intraoral examination revealed an Aramany class VI maxillary defect with the maxillary first molars present bilaterally in the posterior region as the abutment teeth. In this case, clasp was given on both the abutments for retention of the obturator. In Case 2, the left maxilla had an Aramany class I maxillary defect, and the right side's teeth were all that were left. In this case, the obturator was retained using an Adams clasp on #16 and a pin head clasp between #14 and #15. The teeth are the best means of ensuring that the obturator prosthesis

is retained. The bracing parts of the prosthesis framework can be used to reduce movement in all three dimensions if there are still healthy natural teeth present. The most important factors in determining how much stress the remaining teeth may be able to withstand are their number, position, and periodontal health.<sup>11</sup>

With mastication stress, the obturator may be moved superiorly and will likely drop without occlusal contact. The number and placement of teeth, the size and configuration of the defect, the quantity and shape of the remaining palatal region, the height of the remaining alveolar ridge, the size, contour, and lining mucosa of the defect, and the presence of undercuts will all affect how much movement occurs.<sup>11</sup> Patients who have undergone a maxillectomy frequently experience issues with treatment related to retention, stability, and support. In both edentulous and dentulous patients, it's vital to consider the height, shape, and depth of the remaining alveolar ridge as well as the sulcus. A large, broad ridge, a ridge with a square or oval shape, or a ridge with a tapering contour typically offer superior retention, stability, and support.<sup>11</sup>

Due to scar contracture and additional wound organization, tissue dimensions continue to change for at least a year. To account for these modifications, the prosthesis is rebased. Compared to tissues supporting a more conventional prosthesis, those supporting a maxillofacial prosthesis may undergo changes

more quickly. As a result, the occlusion and base adaptation need to be regularly assessed and adjusted, either by selective occlusion grinding or by rebasing the prosthesis.<sup>12,13</sup> Both the patients were instructed oral hygiene procedures. Follow up appointments were recommended to evaluate fit of the prosthesis and underlying supporting structures.

## Conclusion

Patient with maxillary resection presents a challenging situation for the prosthodontist. Prosthetic rehabilitation is often difficult to achieve in such cases due to absence of many teeth and lack of favorable tissue undercuts. Obturator prosthesis should recreate the partition between oral and nasal cavities to restore oral function and esthetics. This case series presented the prosthodontic management of patients with hemimaxillectomy and premaxillary resection secondary to mucormycosis using maxillary interim obturator.

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