

Full Mouth Rehabilitation of a Post COVID-19 Mucormycosis Treated Patient using Bar-Retained Prosthesis: A Case Report

ARCHIT KAPADIA¹, SATTYAM WANKHADE², ARUN KHALIKAR³, SURYAKANT DEOGADE⁴, SAMIKSHA LALSARE⁵

ABSTRACT

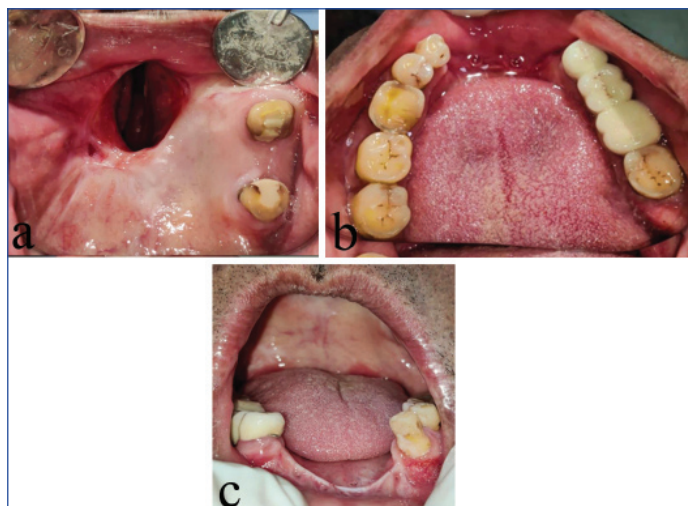
During the second wave of Coronavirus Disease-2019 (COVID-19), the Indian subcontinent had witnessed a steep rise in the post-COVID mucormycosis cases with an alarming rate of about 70 times than that of the rest of the world. Maxillofacial defects amounted to various post-surgical hindrances such as difficulty in mastication, impaired speech, nasal regurgitation, mental despair and socially awkward situations. Dentists all over the world were challenged for fabricating a well-retained and functionally comfortable prosthesis that would contribute in improving the condition of a physiologically-debilitating and psychologically-impaired patient. Here the authors present a case of 65 years old male patient, full mouth rehabilitation of post-COVID mucormycosis treated patient wherein a bar-retained prosthesis was delivered which was not only non-invasive but highly retentive and even pocket-friendly for the patient. This case report also shows that through meticulous planning and execution of the treatment plan, one can achieve the desired results and meet the patient's expectations.

Keywords: Aesthetic correction, Andrew's bridge, Definitive obturator, Hader bar clips, Coronavirus Disease-2019, Psychological health, Speech improvement

CASE REPORT

A 65-year-old male patient reported to the Department of Prosthodontics with a chief complaint of impaired facial appearance with difficulty in chewing food and altered speech after the surgical excision of the infected area both in the maxillary and mandibular arch. The patient gave a medical history of being COVID-19 positive ten months back for which he was under intensive care. Three months after testing positive, he underwent surgical debridement of rhinocerebral mucormycosis involving a part of maxilla and mandible following which he was given a delayed surgical obturator which he used for six months.

Extraorally, there was loss of lip support because of the surgical debridement of anterior part of maxilla [Table/Fig-1]. Intraoral clinical examination revealed that there was a either well healed maxillary arch defect which was classified as Aramany's Class-IV [1] and a completely well healed mandibular defect which was classified as Cantor and Curtis class V [Table/Fig-2] [2]. Teeth present in the maxillary arch according to Fédération Dentaire Internationale (FDI) system were 26 and 28 and in the mandibular arch were 34, 35, 36, 37, 38, 48 and a bridge connecting 45 and 47. The patient was not willing to undergo an implant-retained fixed prosthesis and hence a bar-retained removable prosthesis was planned for both



[Table/Fig-2]: Intraoral photographs after complete healing: a) Maxillary arch; b) Mandibular arch; c) Excessive vertical height in anterior segment of mandibular arch.

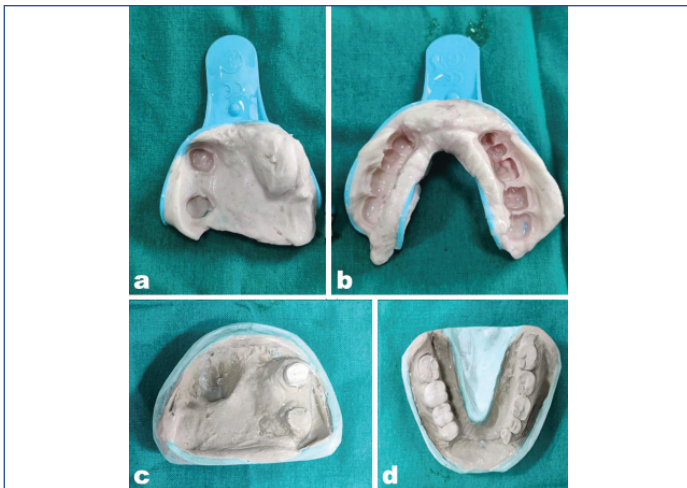
the arches. The retention was obtained from the bar and undercuts of the defect.

Some of the technical difficulties faced were retention of the maxillary prosthesis since there were only two periodontally sound teeth present, achieve a harmonious occlusal plane, restore the excessive vertical restorative space with shallow vestibule in the mandibular arch, achieve an ideal path of insertion for easy insertion and removal of the prosthesis, improve the aesthetics and maintain the oral hygiene.

To begin with, primary impressions were made using irreversible hydrocolloid (Vignette chromatic; Dentsply) and primary casts were poured using Type-III dental stone (Kalstone; Kalabhai) [Table/Fig-3]. Facebow record was made and mounted indirectly on a Hanau wide view semi-adjustable articulator. To check for the aesthetics and phonetics, anterior teeth arrangement was done. This was also helpful for the determination of canine position which was required for establishing a proper plane following the curve of spee [Table/Fig-4]. Mandibular posteriors were ink-stained and a modified customised occlusal plane analyser was used to grind the cast



[Table/Fig-1]: Extraoral photographs: A) Frontal view; b) Sagittal view.

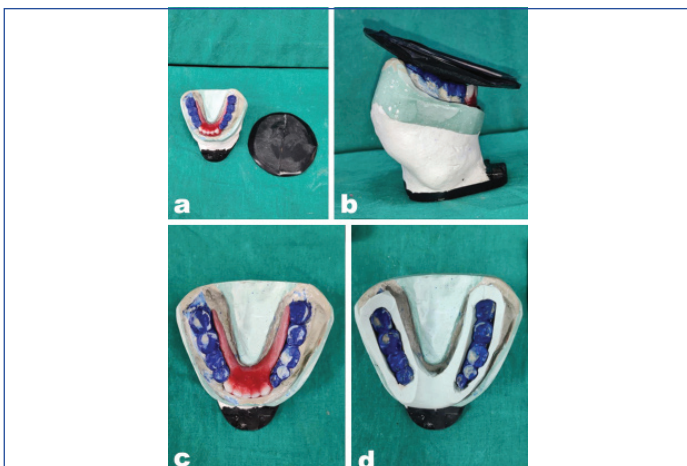


[Table/Fig-3]: Primary impression with irreversible hydrocolloid and primary casts poured with Type-III dental stone: a) Maxillary impression; b) Mandibular impression; c) Maxillary cast; d) Mandibular cast.



[Table/Fig-4]: Indirect facebow transfer with anterior teeth arrangement and try-in. a) Indirect facebow transfer; b) Anterior teeth arrangement; c) Anterior teeth arrangement try-in.

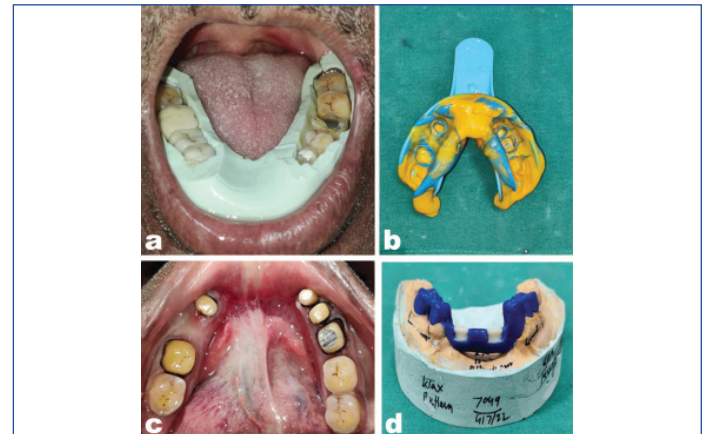
occlusally till both the canine tips and the distobuccal cusps of the first molars contacted the plane analyser simultaneously. This helped to determine which tooth needed enameloplasty and which tooth required a crown [Table/Fig-5]. A putty index was used to transfer the corrected occlusal plane intraorally. The occlusal interferences were removed and tooth preparation was done. A two-stage putty light body impression (Zhermack Elite HD+) was made and master cast was poured in Type-IV die stone (Ultrastone; Kalabhai). Wax pattern followed by casting of the Andrew's bridge with Hader bar



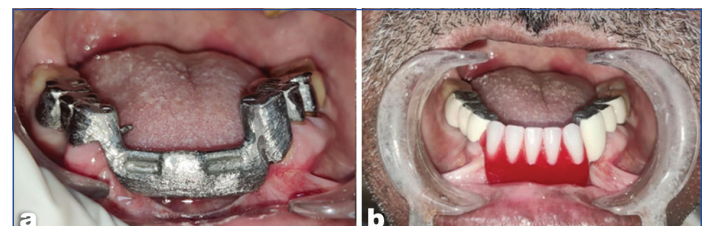
[Table/Fig-5]: Posteriors ink stained and modified customised plane analyser used to get the desired occlusal plane. Corrected occlusal plane transferred intraorally using a putty index: a) Ink-stained mandibular posterior teeth and the modified customised occlusal plane analyser; b) Placement of the occlusal plane analyser on the cast; c) Modified occlusal plane; d) Putty index to transfer the modified occlusal plane intraorally.

and preci-horix attachment (Ceka Preci-Horix) was done. The bar was kept 2 mm away from the ridge to maintain proper hygiene [Table/Fig-6]. Metal framework was tried in the patient's mouth to check for proper marginal fit, occlusal plane and arch form. This was followed by bisque trial along with the clip attachment incorporated in the denture [Table/Fig-7].

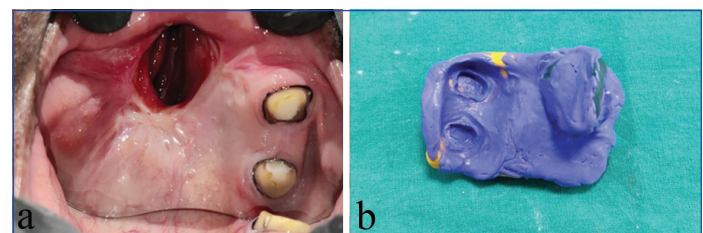
Before the final fabrication of lower denture was carried out, the two periodontally sound maxillary teeth were prepared and a definitive impression of teeth along with the defect was recorded using customised single tray technique [Table/Fig-8]. The master cast was poured and jaw relation was recorded which was then indirectly mounted on the semi-adjustable articulator [Table/Fig-9]. Maxillary



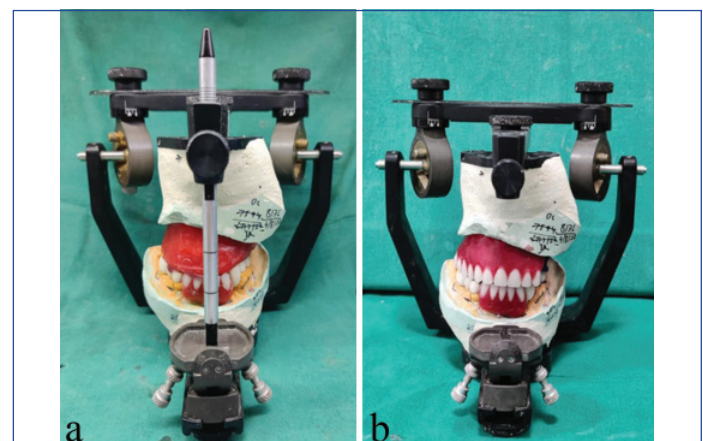
[Table/Fig-6]: Modification of the occlusal plane: a) Occlusal interferences removed; b) Tooth preparation done; c) Definitive impression made with a two-stage putty light body wash impression; d) Cast poured using Type-IV die stone over which wax pattern of the bar was fabricated.



[Table/Fig-7]: Trial stage: a) Metal framework trial; b) Bisque trial with the preci-horix attachment.

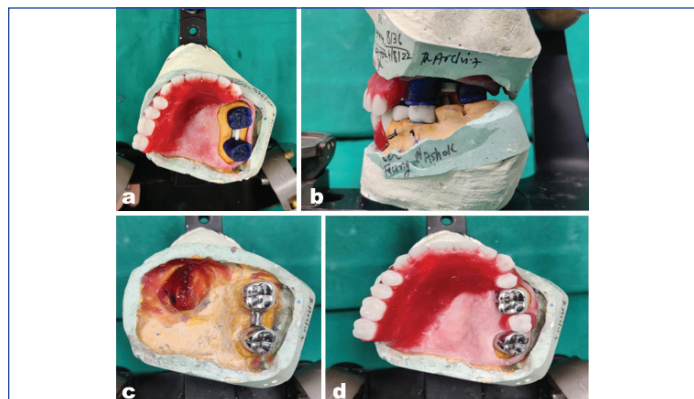


[Table/Fig-8]: Preparation of maxillary arch prosthesis: a) Maxillary teeth preparation; b) Definitive impression using customised single tray technique.



[Table/Fig-9]: Facebow transfer with teeth arrangement: a) Indirect facebow transfer; b) Teeth arrangement.

teeth arrangement along with the wax pattern trial with bar and preci-horix attachment was done intraorally. The bar attachment was then casted and in the final teeth arrangement, a tooth was added over the bar attachment [Table/Fig-10]. The final try-in along with the casted bar attachment was done to check for occlusion, lip support and aesthetics [Table/Fig-11].

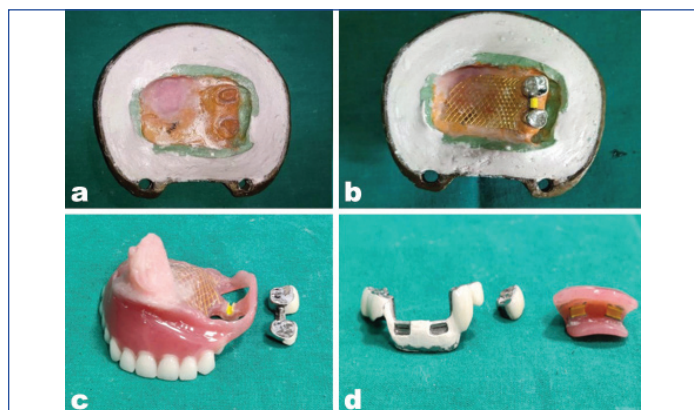


[Table/Fig-10]: Final teeth arrangement: a,b) Fabrication of wax pattern with bar; c) Casting of the bar; d) Final teeth arrangement with tooth added over the bar.



[Table/Fig-11]: Try-in of maxillary and mandibular prosthesis with bar and preci-horix attachment.

Acrylisation of the mandibular and maxillary denture was done using compression moulding technique. Hollowing of the maxillary denture was done using the lost salt technique and an aluminium mesh was adapted over the master cast to reinforce the denture [Table/Fig-12]. The final prosthesis was delivered by following a certain protocol of cementing the bar attachment followed by clipping of the polished dentures upon them [Table/Fig-13,14]. This case was followed-up for six months to check for the wear of any attachments, fracture in the prosthesis and the oral hygiene maintenance by the patient. The patient was able to insert and remove the prosthesis easily and above all was able to maintain oral hygiene. There were no issues with the attachments and the prosthesis was nicely retained in the oral cavity. There was no problem in mastication, there was a drastic



[Table/Fig-12]: Processing of the dentures: a,b) Hollowing of the maxillary denture and reinforcing with aluminium mesh; c) Final maxillary prosthesis with preci-horix attachment; d) Final mandibular prosthesis with preci-horix attachment.



[Table/Fig-13]: Final prosthesis cemented and dentures clipped upon the bar: a) Crowns with the bar cemented in the maxillary arch; b) Maxillary denture clipped upon the bar; c,d) Crowns and bridges cemented in the mandibular arch with dentures clipped upon the bar.



[Table/Fig-14]: Final prosthesis in occlusion.

change in his speech, no fluid leaking into the nasal cavity and was more than satisfied with the final aesthetics as well [Table/Fig-15].



[Table/Fig-15]: Extraoral view after delivering the final prosthesis. a) Frontal view; b) Sagittal view where restoration of the lost lip support can be appreciated.

DISCUSSION

There was a steep rise in patients infected by the opportunistic fungal infection of mucormycosis in the second wave of COVID-19 which had imposed an immense physiological and psychosocial burden on the patients affected by it [3,4]. The in-ordinate use of corticosteroids to suppress the cytokine storm had paved way for opportunistic infections like mucormycosis across India [5]. The surgical resection of such extensive infection led to the formation of a multitude of acquired maxillofacial defects which posed a number of challenges for the clinicians to rehabilitate the same.

In central India, the most common extent of the defect site was Aramany's class 1 (46%) in the maxillary arch with only 24% of the cases having Class-IV defect whereas the mandibular arch was rarely infected [6]. Use of implants for support or retention of the prosthesis is one of the most promising options for rehabilitating such patients. Nonetheless, the financial burden on the patients with mucormycosis was massive in India wherein not all could afford

such treatment options and not everyone had a positive mindset of undergoing a second surgery [7].

This case report describes one such case wherein a full mouth rehabilitation of a patient who was surgically treated for post-COVID mucormycosis both in the maxillary and mandibular arch was done following which he was prosthetically rehabilitated using a bar-retained prosthesis.

In patients who have undergone resective surgeries for post-COVID-19 mucormycosis, an early and appropriate prosthetic rehabilitative effort is essential for the physical, social and psychological well-being. Hypernasal speech, fluid leakage into the nasal cavity, impaired masticatory function and varying degrees of cosmetic deformities are the post-surgical defects these patients are predisposed to [8]. The prescribed prosthetic rehabilitative options usually range from heat-cure acrylic surgical obturators to implant-supported definitive obturators. The final prosthesis depends upon the extent of defect, healing phase, patient's choice and economic conditions [9].

Use of a hader bar with preci-horix attachment improved the retention of maxillary and mandibular prosthesis. Use of a self-grinding occlusal plane template to modify the uneven mandibular occlusal plane before providing the definitive restorations was useful to achieve the harmonious occlusal plane [10]. The occlusal surface was kept in metal since it was opposed by acrylic teeth and hence this reduced the wear of the acrylic teeth. The bar was kept 2 mm above the vestibule for easy cleaning and maintaining the oral hygiene. The maxillary prosthesis was reinforced with aluminium mesh to prevent fracture of the prosthesis. The defect area recorded was made hollow by using the lost salt technique which made the prosthesis light in weight [11]. The normal contour of patient's upper lip that was compromised due to maxillectomy was restored by adding adequate permissible bulk to anterior region of the maxillary prosthesis that acted as a lip plumper [12].

Novel methods to rehabilitate post-COVID mucormycosis surgically treated patients using Patient Specific Implants (PSI) also represent a valid alternative for the same [13]. But not all patients are willing for a second surgery and not all patients can afford them. The patient in the current case report was not willing for a surgical re-entry and hence the described method being non-invasive, unlike in cases of implant-supported prosthesis, cost-effectiveness had a positive psychological effect on the patient's mind. Nevertheless, the attachments need to be changed in the future due to wear as the prosthesis is inserted and removed daily.

CONCLUSION(S)

This case report describes the rehabilitation of post COVID-19 mucormycosis affected maxillary and mandibular arches wherein

the affected parts were surgically excised. The patient had been explained about all the possible prosthetic rehabilitation options from an implant-supported fixed prosthesis to a removable heat cure prosthesis retained by clasps. The patient was not ready for a surgical re-entry and hence, keeping in mind the patient's choice of treatment of being non-invasive and at the same time being economical, the following prosthetic treatment was planned. The patient was satisfied with the aesthetics and the phonetics also improved drastically. Therefore, implant is not the only available option for rehabilitating such cases. With proper planning, a well-fitted and a physiologically comfortable prosthesis can be fabricated.

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PARTICULARS OF CONTRIBUTORS:

1. Student (Postgraduate), Department of Prosthodontics, Government Dental College and Hospital, Nagpur, Maharashtra, India.
2. Associate Professor, Department of Prosthodontics, Government Dental College and Hospital, Nagpur, Maharashtra, India.
3. Professor and Head, Department of Prosthodontics, Government Dental College and Hospital, Nagpur, Maharashtra, India.
4. Associate Professor, Department of Prosthodontics, Government Dental College and Hospital, Nagpur, Maharashtra, India.
5. Student (Postgraduate), Department of Prosthodontics, Government Dental College and Hospital, Nagpur, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Archit Kapadia,
Postgraduate Student, Department of Prosthodontics, Government Dental College and Hospital, Medical Chowk, Nagpur-440009, Maharashtra, India.
E-mail: kapadiaarchit58@gmail.com

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