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Post COVID Mucormycosis in maxilla: Rehabilitation of Post-surgical Maxillectomy defects using simple and fast technique to make hollow interim removable prostheses: A clinical case report

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Abstract

Rehabilitation of post-surgical maxillary defects is a complex task, which requires an individualized design of prosthesis for each patient. It is highly technique sensitive procedure. Prosthetic intervention with maxillary obturator prosthesis is necessary to restore the contours of the resected palate and to recreate the functional separation of the oral cavity and sinus and nasal cavities. The immediate line of treatment includes the initial insertion of an immediate surgical obturator at the time of surgery followed by the insertion of interim obturator for initial healing which thereafter replaced by definite prosthesis once the tissues are stabilised. Proper understanding and knowledge of the obturator is a must to make awareness of the efficacy of the treatment modality. The present article describes a simplified

technique for the fabrication of an interim acrylic obturator prosthesis to achieve easy deglutition, improve phonetics (hyper nasal speech),avoid nasal regurgitation, help in eating and improve esthetics.

Keywords: Mucormycosis, Hollow obturator, COVID-19, Maxillary Defect

Introduction

During rapid spread of coronavirus disease (COVID-19) globally, ever since WHO declared COVID-19 as pandemic, there have been various patterns of disease in terms of diagnosis, management and complications.[1] Mucormycosis, one of the most lethal forms of zygormycosis, has been a common finding that has affected post- COVID patients. Mucormycosis refers to a spectrum of diseases caused by infection with fungi in the order of Mucorales. Mucorales with seven genera, Rhizopus, Mucor, Absidia, Saksenaea, Rhizomucor, Apophysomyces, and Cunninghamella, are documented to be pathogenic organisms that produce invasive disease in humans, with the most common causative agent being of the Rhizopus species.[2] As the nature of the disease is still inconclusive, it cannot be confirmed if it is a complication of the disease or its management. Mucormycosis commences with either reactivation of nasal colonization or nasal inoculation of spores which germinates and then spread rapidly through various routes.[3] Sinonasal mucormycosis is an acute invasive fungal infection which is rare, opportunistic and potentially fatal, that mostly occurs in immunocompromised patients caused by saprophytic and opportunistic fungi of class Phycomycetes, order mucorales, family mucoraceae belonging to genus mucor and rhizopus.[4]

Treatment of sinonasal mucormycosis includes prevention of the disease in immunocompromised patients, an early prompt diagnosis, reversal of the immunocompromised status, appropriate aggressive surgical debridement and rapid antifungal therapy.[5] Patients after surgical resection have altered anatomy due to scaring, tissue contracture, lack of bony support, and tissue edema. Surgical resection can lead to the restricted opening of the jaws and altered range of mandibular movements with fibrosis and trismus. These patients have the problem of regurgitation of water and food through nose. There may be difficulty in speech, deglutition, maintaining oral hygiene, and prosthetic treatment.[6]

To prevent this and to help the patient in deglutition and speech, defects must be restored with prosthesis. In such situations, a prosthesis called as an obturator is designed to close the opening between the residual hard and/ or soft palate and pharynx. These changes require the fabrication of prosthesis and sometimes repeated prosthesis adjustments to confirm the soft tissue changes.[6]

Wu and Schaaf[7] designed different types of obturator prostheses (both solid and hollow) based on Aramany's classification and evaluated for weight reduction. They concluded that hollow obturator prostheses had significantly increased weight reduction, from 6.55% to 33.06% depending on the size of the defect. There are numerous processing techniques described in the literature to fabricate the closed-hollow obturator. Need for a water-tight closed-hollow obturator fabricated from a durable material is the principal objective in such situations.[8] This articles deal with easy and accurate technique with require less laboratory time to fabricate a closed hollow interim obturatior for a patient with post-surgical defect (sinonasal mucormycosis) to aid in speech and deglutition by replacing those tissues lost and reduce nasal regurgitation and hypernasal speech and

improvement of articulation, deglutition, and mastication.

Case report

A 39 year old male reported to the Prosthodontics and Implantology with partial maxillary edentulism, a history of and a mucormycosis infection and was operated for the same, which resulted in resection of the right side of hard palate and buccal sulcus area, leading to an Aramany Class I maxillary defect (Fig. 1). Few teeth were also removed on that side. Intraoral examination revealed complete healing of the operated site. The missing teeth were11,12,13,14 15, 16, 17,and 18.(Fig. 2) Chief complain of patient was inability to eat and speak properly.

Figure 1: Maxillar and Mandibular intraoral view (Armany Class I maxillary defect)

Figure 2: Intraoral Frontal View

Procedure

The treatment plan was fabrication of a hollow interim obturator.

- The primary maxillary and mandibular impression were taken with irreversible hydrocolloid material alginate (Zelgan 2002; Dentsply-India, Gurgaon, India) (Fig. 3) and the cast was poured with die stine (type IV) (Kalstone; Kalabhai Karson, Mumbai, India).
- The primary maxillary cast was obtained and special impression tray (Fig. 4) was fabricated with cold cure acrylic resin.
- Border molding was done with green stick material (DPI Pinnacle Tracing Sticks) (Fig. 5) on the right edentulous side.
- The final impression was recorded using putty addition silicone material on the dentulous side (Fig. 6) and wash impression with light-body addition silicone material. (Fig 7)
- This impression was poured with die stone (type IV) (Kalstone; Kalabhai Karson, Mumbai, India) and Jaw relation was recorded with modeling wax (No. 2; MDM Corporation, New Delhi, India) and after teeth arrangement, a try-in was done. (Fig 8,9)
- After the try-in of the waxed-up palatal obturator prosthesis, free the wire clasps (if any) by removing the surrounding acrylic resin from the record base. Reseat the clasps and the obturator on the master cast in original position and fill the space created while clasp removal Seal the borders of the waxed-up prosthesis in conventional manner with the baseplate wax. Wax up and investment of cast was done in the flask.(Fig. 10)
- Perform “dewaxing” procedure in conventional manner and remove the record base from the flask.
- Identify the area of future hollow space in the obturator and adapt double thickness baseplate wax on the maxillary cast (in the base flask) in the defect space.
- Prepare rectangular windows (3 mm × 3 mm) in the adapted wax sheet in the base flask on all the 4 walls

as well as on the base. A thin cold cure acrylic bulb was fabricated with a lid on it on the wax with the stops in it. (Fig. 11,12) (Stops will allow a uniform layer of heat cure acrylic and also helps in the proper placement of the acrylic bulb)

- Wax was removed and packing was done with the heat cure acrylic resin (Trevlon; Dentsply, Gurgaon, India) with the cold cure acrylic bulb in the defect.(Fig. 13)
- The prosthesis was cured, finished and polished. The prosthesis was finally inserted and the patient was educated regarding oral hygiene and future maintenance of the prosthesis.(Fig 14,15)

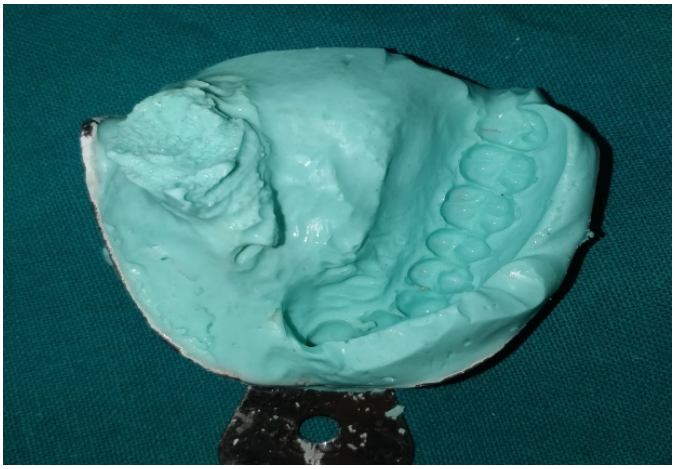

Fig. 3: Maxillary alginate impression

Fig. 4: Special tray

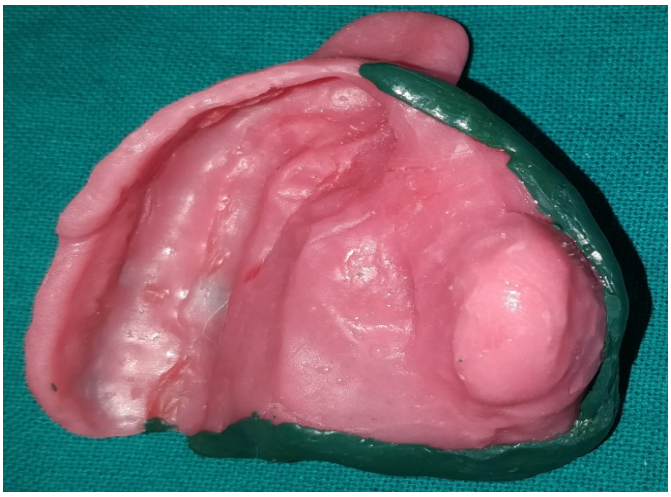

Fig. 5: Border moulding

Fig. 6: Putty impression

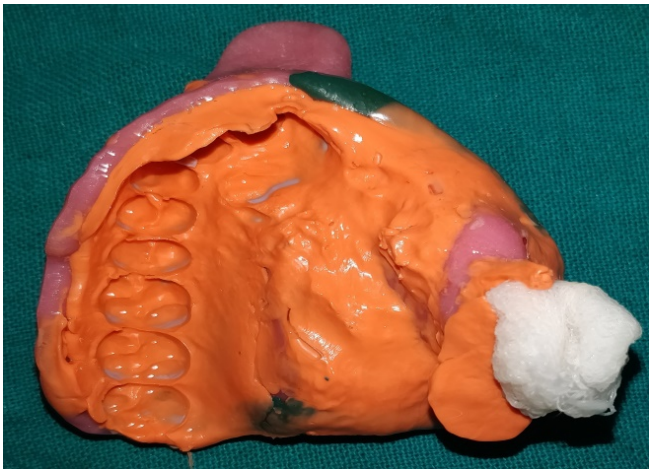

Fig. 7: Light body wash impression

Fig. 8: Jaw relation

Fig. 9 Try-in

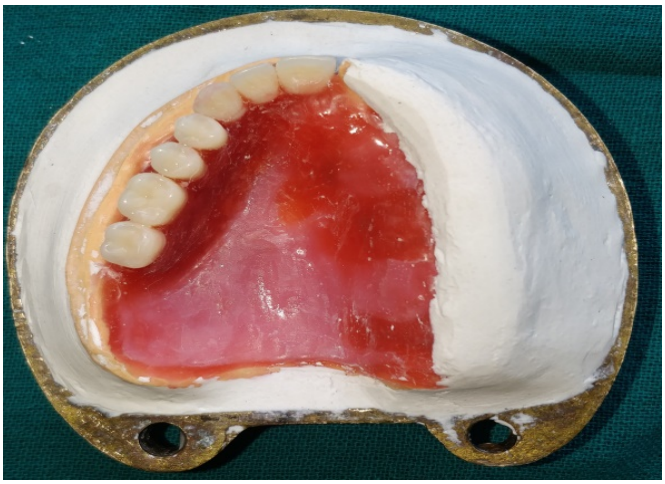

Fig. 10: Investment and wax up of cast

Fig. 11: Modelling wax layer with windows

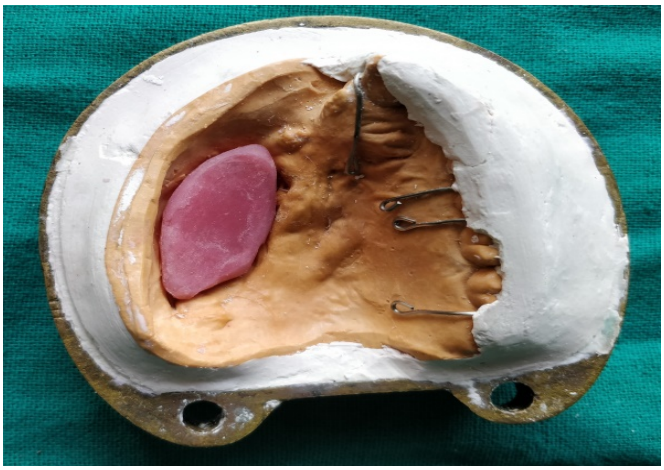

Fig. 12: Cold cure acrylic resin bulb with lid

Fig. 13: Packing with heat cure acrylic resin

Fig. 14: Finished and polished hollow prosthesis

Fig. 15: Insertion floating in water

Discussion

A definitive obturator is not indicated until the surgical site is healed and dimensionally stable and the patient is prepared physically and emotionally for the restorative care that maybe necessary. Interim obturators of this type favour rapid recovery, speech and swallowing, and their construction is less stressful to the patient than many alternative procedures. The procedure has a number of advantages: (i) weight is low because the bulb is hollow [7] and, (ii) the bulb is covered with a soft reline that does not damage tissues and that favours both a good seal and good retention.

The technique described in this article for the fabrication of the hollow bulb obturator was described by Chalian and Drane.[9] Many authors have described various other techniques for the fabrication of the hollow bulb obturator. Grinding out the interior of the bulb,[10] fastening the lid to the superior border,[11,12] incorporation of the materials like sugar by LaFuente [10, 13] and ice[11] during packing are some of the methods to create the hollow prostheses. El Mahdy et al.[14] described the two flask technique to process the obturator and the tooth portion separately. Mc Andrew et al. [15] described the technique of fabricating the prosthesis in two halves and sealing them using autopolymerizing resin. Iramaneerat et al. [16] described the technique of injecting argon gas into the bulb of the obturator. Buzayan et al. [17] described the use of hard thermoforming splint to fabricate closed hollow bulb obturator. Plaster index was used as a matrix for the fabrication of hollow obturator by Asher et al. [18] Separate processing of two halves followed by joining them with an autopolymerizing resin. Additional techniques with the use of combinations of impressions, casts and multiple laboratory procedures rendered them time-consuming and limited in application.[19,20] The uniform wall thickness of a hollow prosthesis ensures the least possible weight. Worley and Kniejski [21] described a method for the fabrication of a closed hollow obturator while controlling the thickness of the hollow portion.

The advantages of fabricating one piece obturator are; it is hygienic, more esthetic, simple, and accurate and there are no lines of demarcation between heat cure and autopolymerizing resin and size and shape of the hollow space achieved allow uniform wall thickness for closed hollow obturator. Due to these advantages the technique described by Chalian et al. is being followed for decades The disadvantages are additional processing time required to process the lid, acrylic resin may seep into the hollow portion of the obturator, seepage of fluids is possible if the seal is improper. Time and tested methods are most of the time advisable, as they give predictable restorative outcome.

Conclusion

Through knowledge of the post-surgical defect anatomy, methods of fabrication of prosthesis, material science, patient's expectations and needs is required before any prosthetic rehabilitation. Advantage of using time and tested method is that a lot of literature available to predict the restorative outcome.

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