

Prosthetic Rehabilitation of A Post-Covid Mucormycosis Maxillectomy Defect Using A Fused Two-Piece Hollow Obturator: A Fabrication Technique

¹Dr. Kalluri Lakshmi Mounika, ²Dr. M Manoj Kumar, ³Dr. M. Suresh Babu,
⁴Dr. K. Krishna Kishore, ⁵Dr. M Sanjana Reddy, ⁶Dr. Gayathri Bandari

¹Post Graduate Student, Department of Prosthodontic, SIBAR Institute of Dental Sciences, Takkellapadu, Guntur, Andhra Pradesh, India

²Senior Lecturer, Department of Oral & Maxillofacial Surgery, SIBAR Institute of Dental Sciences, Takkellapadu, Guntur, Andhra Pradesh, India

³Professor, Department of Prosthodontic, SIBAR Institute of Dental Sciences, Takkellapadu, Guntur, Andhra Pradesh, India

⁴HOD, Department of Prosthodontic, SIBAR Institute of Dental Sciences, Takkellapadu, Guntur, Andhra Pradesh, India

⁵Post Graduate Student, Department of Prosthodontic, KAMINENI Institute of Dental Sciences, Narketpally, Telangana, India

⁶Post Graduate Student, Department of Prosthodontic, MNR Dental & Hospital, Sangareddy, Telangana, India

Corresponding Author: Dr. Kalluri Lakshmi Mounika (kallurilakshnimounika@gmail.com)

Abstract

Purpose: Intraoral defects in the maxilla cause communication with the nasopharyngeal complex. The surgically removed palate can have a devastating effect on the appearance and speech of the patient. Obturators allow patients to eat and drink without any suspicion of food entering the oroantral cavities/ pharynx during mastication. This clinical report describes fabrication of a closed hollow bulb obturator using the two-piece double flask technique.

Method: After the final teeth arrangement was completed, teeth over the defect were removed and separately processed using heat cure acrylic resin. Both the segments are combined by autopolymerizing acrylic resin to form a single hollow-bodied obturator.

Conclusion: This technique uses a double flasking method of the two segments to control the thickness of the bulb in the defect area, thus decreasing the weight of the obturator.

Keywords: Maxillary defects, Obturators, Hollow bulb, Post-Covid Mucormycosis

1. Introduction

Resection of maxilla due to tumors or any infection leads to facial disfigurement, impaired functions like speech due to hypernasality, rumination, and a significant impact on patients quality of life. Post COVID-19 sepsis is that which occurs after SARS- CoV-2 had a rampage in the human body. It leads to ciliary dysfunction, cytokine storm, thrombo-inflammation, microvascular coagulation, and eventual immune exhaustion. This cascade of events facilitates secondary bacterial and fungal infections, especially in critically ill patients subjected to invasive emergency procedures, mechanical ventilation, prolonged hospital stays, and breaches in asepsis. Further, corticosteroid treatment in these highly susceptible hosts and high fungal spore counts in the environment creates the perfect setting for mold infections. ⁽¹⁾

The infection begins in the nose and paranasal sinuses due to the inhalation of fungal spores. ^(2, 3) This infection can spread to the orbital and intracranial structures by direct invasion or through the blood vessels. ^(4, 5) The fungus invades the arteries leading to thrombosis that subsequently causes necrosis of hard and soft tissues. Early diagnosis and treatment can reduce the mortality and morbidity of this lethal fungal infection. Treatment principles may include antifungal agents along with surgical debridement or resection.

This article discusses an innovative fabrication technique of obturator to treat an acquired maxillary defect due to post Covid-19 mucormycosis. Management of such maxillary defects when surgical resection was performed requires a multidisciplinary approach. Prosthodontic rehabilitation is the most practical, convenient, and cost-effective treatment mode and the added advantage of removing prosthesis and evaluating the infected site efficiently.

2. Case Report

A 65-year-old male patient reported to the Department of Prosthodontics with a chief complaint of difficulty in consumption of food and speech discrepancies. Intraoral examination revealed large maxillary defect on the left side with oroantral communication and partially edentulous arch. (Fig 1)



Fig. 1) Pre-operative intra oral view

On past medical history, it was found that the patient underwent maxillectomy for post Covid-19 necrosis of maxilla due to mucormycosis six months back. The treatment plan was to fabricate a hollow bulb obturator using a two-piece double flask technique.

3. Treatment

A linear design for a Class-IV defect was selected for this case according to design principles described by Aramany in 1978 in which remaining palatal tissues provided the support and retention was achieved from the ball end clasps and C clasps made on the remaining intact dentition. ⁽⁶⁾

Fabrication of the Obturator

A primary impression was made with irreversible hydrocolloid impression material (Fig 2 a) using a stock tray. After obtaining the primary cast, (Fig 2 b) a special tray was fabricated with self-cure acrylic resin.



Fig. 2 a) Primary impression with irreversible hydrocolloid



Fig. 2 b) Primary cast

Border moulding was done (Fig 3a) with greenstick material and the full extent of the defect was recorded using an impression compound. 1mm impression compound was scraped, and a light body secondary impression was made to record the undercuts which aid in anatomic retention. A final pick-up impression was made with alginate to record existing dentate segment (Fig 3 b). The master cast was obtained with type IV gypsum (Fig 3 c).



Fig. 3 a) Border moulded impression & the extended depth of defect recorded

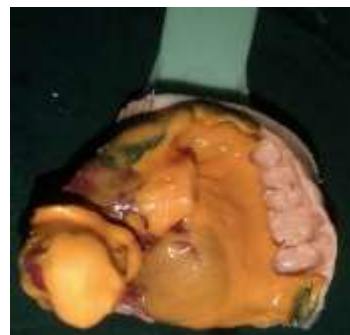


Fig. 3 b) Secondary pick up



Fig. 3 c) Secondary cast of maxilla

A temporary denture base with occlusal rim was fabricated on the master cast. Bite registration was done. Maxillary and mandibular casts were mounted on the semi-adjustable articulator (Hanau wide vue). Teeth arrangement and try-in were done. Occlusion, aesthetics, and phonetics were evaluated and found to be acceptable by the patient. A C-clasp on canine and molar as well as ball-ended clasps in the embrasures between canine and premolars were given (Fig 4). The final wax-up was done.



Fig 4) Final wax up & clasps placed for retention

Procedure for Two-Piece Hollow Obturator

The teeth overlying the defect area were cut (Fig 5), and the defect area was hollowed out. The hollow space was filled with putty material (Fig 6a), over which a segment with the posterior teeth was fabricated (Fig 6b).



Fig 5) Teeth portion over the defect area removed



Fig 6 a) Putty packed into the defect Fig. 6 b) Second segment fabricated

Orientation grooves were placed to prevent the misfit of the two pieces after fabrication and were re-checked for occlusion on the articulator. Both the segments were flaked and processed separately. (Fig 7, 8)



Fig.7) Flasking of the two segments separately



Fig 8) Mould spaces created

After retrieval, the segments were approximated with sticky wax before the obturator was removed from the cast (Fig 9a). Occlusion was checked by remounting the cast and the approximated segment onto the articulator (Fig 9b).



Fig 9 a) Approximated segments & stabilized using sticky wax



Fig. 9 b) Occlusion is checked after remounting

The necessary corrections were made, and finally, the two segments were adhered using auto polymerizing clear acrylic resin. After final finishing and polishing, the prosthesis was weighed 29 grams (Fig 10 a, b). Insertion of the prosthesis was done (Fig 11 a, b) and post-insertion instructions were given.



Fig. 10 a)



Fig. 10 b)

Final Prosthesis



Fig. 11 a) Intra Oral View



Fig. 11 b) Frontal View

Post-Operative View

4. Discussion

The primary goal of a prosthodontist is to rehabilitate a maxillary defect by closing the oronasal communication with a retentive and a stable seal using an obturator. Extension of the bulb into the maxillary defect is advantageous to provide resonance during the speech. The fabrication of a hollow bulb obturator in patients with severe maxillary defects can provide retention and stability by decreasing the weight. There are many techniques for fabricating hollow bulb obturators by using sugar, salt, or alum in the defect area while packing. Matalon and LaFuente⁽⁷⁾ used sugar during the processing of the obturator, which was removed by drilling a hole. Iramaneerat *et al.*⁽⁸⁾ used the technique of injecting argon gas into the obturator bulb. Buzayan *et al.*⁽⁹⁾ used a rigid thermoforming splint to fabricate a hollow bulb obturator. Asher *et al.*⁽¹⁰⁾ used plaster index as a matrix to fabricate a hollow obturator.

El Mahdy *et al.*⁽¹¹⁾ described the two-flask technique to process the obturator and the tooth portion separately. Mc Andrew *et al.*⁽¹²⁾ fabricated the prosthesis in two halves and sealed them using autopolymerizing resin. Few authors suggested the use of acrylic resin shim and polyurethane foam while packing.⁽¹³⁾ Use of attachment for hollow bulb obturators, though advantageous, the cost of treatment would be high.⁽¹⁴⁾

5. Conclusion

Fabrication of a two-piece obturator using the double flasking technique is an easy and conventional method. Hollowing of the obturators not only reduce the weight but also adds resonance to speech. The defect was closed, and a satisfactory esthetics, phonation and function was achieved. Prosthetic rehabilitation will improve the patient's quality of life and confidence.

References

- 1) Rajeev Soman, Ayesha Sunavala Post COVID-19 Mucormycosis - from the Frying Pan into the Fire January – 2021 Volume : 69
- 2) Leitner C, Hoffmann J, Zerfowski M, Reinert S. Mucormycosis: Necrotizing soft tissue lesion of the face. *J Oral Maxillofac Surg.* 2003; 61:1354–8.
- 3) Pogrel MA, Miller CE. A case of maxillary necrosis. *J Oral Maxillofac Surg.* 2003; 61:489–93.
- 4) Del Valle Zapico A, Rubio Suárez A, MelladoEncinas P, Morales Angulo C, Cabrera Pozuelo E. Mucormycosis of the sphenoid sinus in an otherwise healthy patient. Case report and literature review. *J Laryngol Otol.* 1996; 110:471–3.
- 5) Jones AC, Bentsen TY, Freedman PD. Mucormycosis of the oral cavity. *Oral Surg Oral Med Oral Pathol.* 1993; 75:455–60.
- 6) Aramany MA. Basic principles of obturator design for partially edentulous patients. Part I: classification. *J Prosthet Dent* 2001;86:559–61
- 7) Matalon V, Lafuente H. A simplified method for making a hollow obturator. *J Prosthet Dent* 1976; 36:580-2.
- 8) Iramaneerat W, Seki F, Watanabe A, Mukohyama H, Iwasaki Y, Akiyoshi K, et al. Innovative gas injection technique for closed-hollow obturator. *Int J Prosthodont* 2004;17:345-9
- 9) Buzayan MM, Ariffin YT, Yunus N. Closed hollow bulb obturator - One-step fabrication: A clinical report. *J Prosthodont* 2013; 22:591-5.
- 10) Asher ES, Psillakis JJ, Piro JD, Wright RF. Technique for quick conversion of an obturator into a hollow bulb. *J Prosthet Dent* 2001; 85:419-20.
- 11) El Mahdy AS. Processing a hollow obturator. *J Prosthet Dent* 1969;22:682-6
- 12) McAndrew KS, Rothenberger S, Minsley GE. 1997 Judson C. Hickey Scientific Writing Awards. An innovative investment method for the fabrication of a closed hollow obturator prosthesis. *J Prosthet Dent* 1998; 80:129-32.
- 13) Patil PG, Patil SP. A hollow definitive obturator fabrication technique for management of partial maxillectomy. *J Adv Prosthodont* 2012; 4:248-53.
- 14) Elangovan S, Loibi E. Two-piece hollow bulb obturator. *Indian J Dent Res* 2011; 22:486-8.