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(CASE REPORT)

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Fabrication of a definitive obturator for a patient with partial maxillectomy defect following post-covid mucormycosis: A case report

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Abstract

Mucormycosis was a rapidly progressing and life-threatening fungal infection. After surgery, we should anticipate seeing more individuals with orofacial abnormalities given the total number of cases and the orofacial region's primary involvement in the previous COVID-19 pandemic. Thus, in order to improve the quality of life for individuals suffering from mucormycosis, maxillofacial prosthetic rehabilitation is of paramount importance. Postoperative maxillary defects can be rehabilitated through surgical and prosthetic procedures. An obturator was utilized as a part of prosthetic management to facilitate efficient deglutition and articulation. It also provides support for the facial soft tissue to restore the midfacial contour in cases of palatal defects. This case report describes about the fabrication of a definitive palatal obturator for a patient with postsurgical maxillary defect wearing interim obturator made of polymethyl methacrylate (PMMA). Food impaction and irritation of the fitting surface over the tissue defect, resulting in erythema to the tissue surface and discomfort of using interim obturator. With the remaining teeth and tissues serving as support, the definitive obturator made of cobalt and chromium was made. With no degradation in the prosthesis, the follow-up showed satisfactory outcomes.

Keywords: Mucormycosis; Obturator; Palatal obturator; COVID-19

1. Introduction

Fungal infections such as mucormycosis have become more common after the SARS-CoV-2 pandemic. The rise in the number of individuals with severe immunocompromised conditions was the primary cause of the rising incidence of mucormycosis in recent decades [7]. During the catastrophic COVID-19 epidemic's second wave, mucormycosis, also known as black fungus, caused havoc in India with a sudden and deadly surge that had a 50% fatality rate [8].

Antifungal drugs and addressing underlying risk factors were advised in addition to an early and comprehensive surgical course of treatment for mucormycosis whenever it was feasible. We can anticipate seeing more patients with orofacial abnormalities following surgery in the current COVID-19 epidemic. Not in every situation surgical reconstruction was an option for post-operative defect. Therefore, in order to improve the quality of life for individuals suffering from mucormycosis, maxillofacial prosthetic rehabilitation is the most essential modality [9, 10].

As a result, maxillary defects affecting oro-antral connections can lead to masticatory issues, hypernasal speech, fluid leakage, and cosmetic issues that can compromise the stomatognathic system's normal shape and function and lower the quality of life for the patients [11].

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Prosthetic rehabilitation presents a considerable difficulty in circumstances where patients' adaptive capabilities are severely reduced. This case report describes about the fabrication of a hollow definitive obturator using cast metal framework for a patient with partial maxillectomy defect following the surgical resection of post covid mucormycosis of maxilla.

2. Case report

A 54-year old male patient reported to the Department of Prosthodontics with a chief complaint of fractured interim obturator with difficulty in speaking and regurgitation of liquids and food particles through the nose while having food. The patient told about the history of rhino orbital mucormycosis one year back. The patient underwent for hemimaxillectomy six months back and was given an interim obturator to provide function and esthetics **(fig-1)**. Later patient accidentally fell and fractured his interim obturator, patient was still continued wearing the ill-fitting interim obturator and had difficulty in speech and mastication.

Upon extraoral inspection, the right side of the face showed signs of facial deformation. A significant hemimaxillectomy defect of the right side alveolus involving the posterior section of the hard palate and the premaxilla was seen during an intraoral examination. There was a through-and-through communication between the nasal and oral chambers with partial restriction of mouth opening. There was facial asymmetry due to depression in right malar prominence. The surgical defect was classified as class I defect according to Aramany's classification.

Considering the clinical situation, a treatment plan was made to fabricate a hollow definitive obturator with cast metal framework.

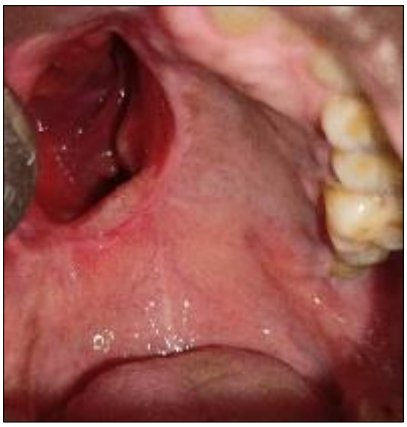

Figure 1 Intraoral image showing a patient with right partial maxillectomy defect following post covid mucormycosis

3. Technique

- A conventional preliminary impression of the post maxillectomy defect was made using alginate impression material with prior packing of the defect using gauze piece to prevent entry of the impression material. After proper disinfection of the impression, the primary cast was poured with type Ill dental stone.
- The framework for the cast partial denture was designed after an initial surveying of the cast marking the undesirable undercut and locating the guide plane for mouth preparation.
- By utilizing the dentition on the contralateral side, the framework was designed with I -bar and embrasure clasp to provide the greatest amount of stability, support, and retention possible.
- Mouth preparation was completed in subsequent appointment with occlusal rest seat preparation on premolar and molars.
- Special tray was constructed on the primary cast, border moulding was done on the defect region with green stick compound involving the maxillary defect without distorting the tissues and final impression was made with light body elastomeric impression material **(fig-2).** Master cast was prepared with type IV dental stone.

Figure 2 Border moulding and final impression made using putty wash technique with condensation silicone impression material

- A final surveying of the master cast was done to facilitate the location of survey line for placement clasp and minor connectors **(fig-3)**. The design was transferred to the master cast and block out was done using hard baseplate wax for duplication using agar- agar hydrocolloid impression material.

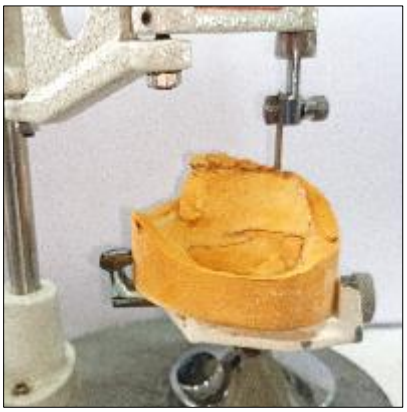

Figure 3 Final surveying done on master cast using dental surveyor

- A refractory cast was poured after duplication of the master cast and cast hardening was done using durol solution after heating the refractory cast to 250 degree for 20mins in a preheat furnace.
- The casting wax sheet and pattern wax were used to create the final wax pattern for the framework, which was then invested with phosphate-bonded investment material after attachment of sprue and crucible former **(fig-4).** The casting was done in a centrifugal casting machine with adequate melting of the co-cr metal alloys.

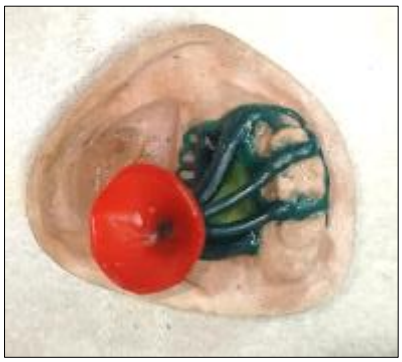

Figure 4 Wax pattern and sprue attachment done for casting procedure to fabricate framework for definitive obturator

- After fabrication of cast metal framework, it was tried intraorally for evaluation of fit. Selfcure acrylic record base was added on the defect region of the framework and the tray was verified intraorally to check for overextension.
- Occlusal rim was fabricated with baseplate wax and Jaw relation was recorded and transferred on to the mean value articulator. Teeth arrangement and waxing-carving was completed and evaluated intraorally.
- The Try-in was done with monoplane dentition taking into consideration the esthetic and phonetic requirements.
- The waxed-up obturator was sealed with the master cast and invested in a base-flask with the help of type II Gypsum material. All metallic components of the obturator were covered with investing-plaster except the teeth and waxed-up portion.
- Flasking procedure was completed in conventional manner by pouring a type II gypsum material in a counter flask. The flask was kept under a mechanical clamp for 1 hours. The flask-clamp assembly was immersed in a de-waxing unit at 100℃ for 15 min and de-waxing procedure was carried out in a conventional manner.
- Complete wax elimination was ensured from the cast, metal framework and investing-plaster surface. During trial closure, the defect region was filled with salt crystals and packing was done using the heat cure denture base resin and allowed for conventional curing cycle under water bath.
- Following acrylization, the obturator was removed, and a hole was made in the defect site so that water could be injected to remove the salt. Upon elimination of salt from the defect, a hollow chamber remains inside the obturator. Thus, this procedure is called lost salt technique of fabricating definitive hollow obtuator.

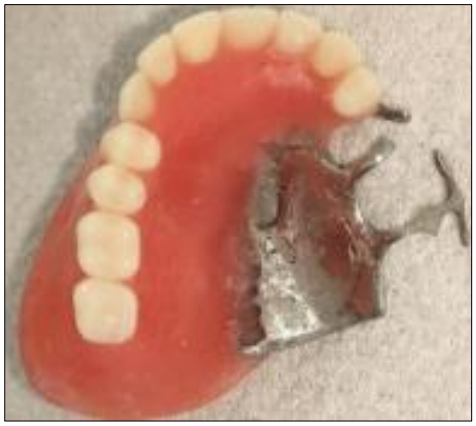

Figure 5 Finished and polished hollow Definitive obturator

- The hollow cavity was air dried and sealed with autopolymerizing acrylic resin. The final definitive obturator was delivered to the patient after proper trimming, finishing and polishing **(fig-5&6)**.

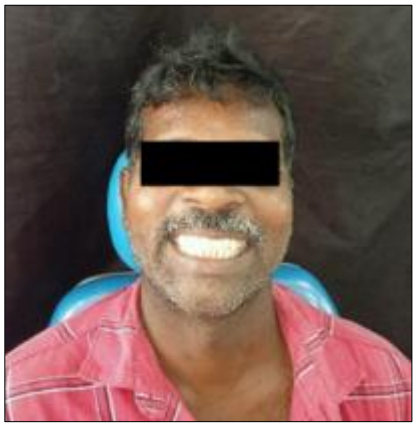

Figure 6 Post-operative image of the patient with definitive obturator

4. Discussion

Patients with maxillofacial deformities need both psychological and physical rehabilitation, which can be accomplished by using a multidisciplinary team approach. Following surgery, there may be minimal or significant loss of palatal tissues. It may affect a significant amount of the palate, nasal cavity, and/or maxillary sinus. The inability to speak, eat, and drink regularly has a negative impact on the patient's quality of life [1, 5].

Even with advancements in plastic surgery, the traditional obturator prosthesis remains the best therapeutic option in a variety of clinical scenarios. Prosthetic rehabilitation is preferred to reconstructive surgery for people with recurring infections. In this case, any recurrence can be diagnosed early in the recovery period, which is not clinically possible after reconstructive surgery [6].

In our clinical case, surgical resection maintained the natural teeth, which were crucial in providing prosthetic support through well-distributed bilateral supports. To achieve adequate prosthetic stability, maximum surface covered by the obturator along with I –bar and mesial guiding plate.

The retention of an obturator is determined by a variety of factors, including direct and indirect retention provided by the remaining teeth, defect size, tissue undercuts available around the cavity, and the development of muscle control [12]. It is important to note that the type of obturator influences the prosthesis's stability. There are many types, including rigid acrylic obturators, flexible silicone obturators and hollow acrylic obturators[2,3].

In edentulous or partially edentulous patients with huge defect extending into the nasal chamber, a hollow obturator is often chosen. This obturator can vary in shape and size and must contribute to the stability, retention and provide a complete seal against water and air seepage into the prosthesis. In any cases of extensive tissue loss, hollow obturators were preferred because of their light weight improves retention of the prosthesis [4].

In this case, a good distribution of the support and retention elements was achieved thanks to the presence of the natural teeth and hollow chamber of the definitive obturator made of cobalt and chromium framework.

5. Conclusion

This case report demonstrates the efficacy of a definitive hollow obturator in restoring function and aesthetics in a patient with partial maxillectomy defect following post-covid mucormycosis. A prosthesis customized to the patient's individual requirements were developed after careful consideration, allowing them to restore a higher quality of life. However, it is essential to note that each clinical case is unique, and an individualized strategy is required to achieve the best results.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Beumer J, Curtis T, Marunick M. Maxillofacial rehabilitation: Prosthodontic and surgical considerations. St. Louis: Ishiyaku EuroAmerica, Inc; 1996. p. 113–223.

[2] Patil PG. Modified technique to fabricate a hollow light-weight facial prosthesis for lateral midfacial defect: a clinical report. J Adv Prosthodont 2010; 2:65-70.

[3] Patil PG, Patil SP. A hollow definitive obturator fabrication technique for management of partial maxillectomy. J Adv Prosthodont. 2012; 4(4):248.

[4] Fernandez T, Rodrigues SV, Vijayanand KR. A Titanium Cast Hollow Definitive Obturator Prosthesis for a Maxillectomy Patient. Int J Prosthodont Restor Dent.2016;6(3):69–72

[5] Skiada A, Lass-Floerl C, Klimko N, Ibrahim A, Roilides E, Petrikkos G. Challenges in the diagnosis and treatment of mucormycosis. Med Mycol 2018; 56 (suppl_1):93–101.

[6] MM, Kasim M, Arjun KK, Athiban I. A modified technique to fabricate a complete hollow obturator for bilateral maxillectomy in a patient with mucormycosis – a technical case report. Spec Care Dent 2019; 1-7.

[7] Ahmed ZU, Flynn J, Riedel ER et al. Definitive maxillary obturator prosthesis: Timelines for fabrication and follow-up. Spec Care Dentist. 2020;40(3):315–9

[8] Singh M, Limbu IK, Parajuli PK et al. Definitive obturator fabrication for partial maxillectomy patient. Case Rep Dent. 2020: 5(2):1–4.

[9] Rathee M, Alam M, Ahlawat A, S D et al. Management of Mucormycosis Resultant Hemimaxillectomy Defect from Interim Hollow Obturator to Definitive Two-Piece Magnet Retained Prosthesis - A Case Report. RGUHS Journal of Dental Sciences. 2022; 14(1):56–9.

[10] Rathee M, Singh S, Malik S, Divakar S, Alam M. Reconstruction and rehabilitation of maxillary defects secondary to mucormycosis. Saudi J Oral Dent Res 2022;7(1):1–7

[11] Farghal AE. Fabrication of a definitive obturator for a patient with a maxillary defect: A case report. Cureus. 2023; 15(12):e50578.

[12] Rifai Y, Rhamdani R, Mude AH. The surgical and definitive obturator after hemimaxillectomy of the palate. Indonesian Journal of Prosthodontics. 2023; 4(1):49–52.