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Case Report

Prosthetic rehabilitation of a case of post-covid mucormycosis with customized hollow-bulb interim oburator- A case report

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ABSTRACT

As the on-going battle against COVID-19 continues around the world, India was severly affected during the second wave of the pandemic. Dentists especially Prosthodontists face a special challenge in the aftermath of the pandemic due to the destructive nature of post-covid mucomycosis. There arise a need for the rehabilitation of the maxillofacial structures that have been surgically debrided and removed due to the said fungal infection. The prosthodontist plays an important role in the rehabilitation of such defects with obturators. This paper reports a clinical case of a post-covid Mucormycosis patient with total maxillectomy and fabrication of a customized interim hollow bulb obturator prosthesis.

1. Introduction

Mucormycosis (earlier called Zygomycosis) is a rare but severe fungal infection caused by a group of molds called mucoromycetes. It is a potentially lethal infection occurring primarily in immunocompromised patients, particularly in those with diabetes mellitus, hematological malignancy, hematopoietic stem cell transplantation, and solid organ transplantation.[1]

According to The US Centre for Diseases Control and Prevention (CDC), an overall all-cause mortality rate of 54% was reported for Mucormycosis. The mortality rate depends upon the underlying condition of the patient, fungus type, and affected site in the body (for example, the mortality rate reported was 46% for patients with sinus infections, 76% for pulmonary infections, and 96% for disseminated mucormycosis).[2] Rhino-Orbito-Cerebral Mucormycosis (ROCM) is the most common form, and it is usually seen in diabetic ketoacidosis or poorly controlled diabetes mellitus. A study from India has estimated that 88% of the patients with ROCM had diabetes mellitus. In susceptible hosts, standard defense mechanisms slows down. Post-COVID 19 patients who are at an increased risk to develop Mucormycosis are those with a history of poorly controlled diabetes mellitus and the patients who are treated with steroids and other drugs to manage COVID-19 that may reduce their ability to fight environmental pathogens. If fungal spores are inhaled from the atmosphere, lungs or sinuses of such individuals may get affected.

The infection in the maxillofacial region can lead to a debilitating condition for the affected patient which may cause facial disfigurement, impaired functions like speech due to hypernasality, rumination, and a significant impact on patient's quality of life. The infection begins in the nose and paranasal sinuses due to the inhalation of fungal spores.[3,4] This infection can spread to the orbital and intracranial structures by direct invasion or through the blood vessels.[5,6] The fungus invades the arteries leading to thrombosis that subsequently causes necrosis of hard and soft tissues. Early diagnosis and treatment can reduce the morbidity and mortality of this lethal fungal infection. Treatment principles may include antifungal agents along

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with surgical debridement or resection. For decades, the mortality rate of mucormycosis has remained ≥40% despite aggressive surgical and polyene antifungal therapy. Lipid formulations of Amphotericin B(LFAB) is considered the primary antifungal therapy. Posaconazole can be useful as salvage therapy in patient's intolerant to LFAB but cannot be recommended as primary therapy.[7] Blood vessel thrombosis and resulting tissue necrosis during mucormycosis can result in poor penetration of antifungal agents to the site of infection. Therefore, debridement of necrotic tissues may be critical for complete eradication of mucormycosis.[8]

This article describes the fabrication of an interim customized hollow bulb obturator with lost salt technique for the rehabilitation of a patient with maxillectomy of the right maxilla due to Post-covid mucormycosis. The role of the prosthodontists in rehabilitating such patients can be challenging as well as rewarding if proper protocols are followed. Prosthodontic rehabilitation by an interim obturator gives the advantage of improving the overall quality of life for the patient before definitive treatment can be provided.

2. Case Report

A 54-year-old Male patient was referred to the Department of Prosthodontics and Crown and Bridge, Dr. R. Ahmed Dental College and Hospital, Kolkata with a complain of difficulty in eating food, nasal regurgitation and speech problem (Figure 1). On taking the medical history, the patient was suspected with Covid-19 infection on the first week May 2021 as the patient had difficulty in breathing. The patient developed symptoms of Mucormycosis like blocked nose, pain in tooth and swelling on the right side of the face. He was diagnosed with Post-Covid Mucormycosis on the last week of May, 2021.

Endoscopic Sinus Surgery with total Maxillectomy of the right maxilla was done at PG hospital, Kolkata on June, 2021. The patient has history of diabetes under insulin therapy, hypertension, hypothyroidism and Chronic Renal disease under medication. The patient was currently undergoing systemic anti-fungal therapy (Tablet Posaconazole 300mg two times a day for 2 months) at the time of presentation.

On radiographic examination, MRI scan reveals mucosal swelling in the ethmoidal air cells in the maxillary antrum, mainly on right side. Involvement of the right orbit and its periorbital region is noted with bony destruction. OPG reveals absence of teeth in the upper right quadrant with involvement of hard palate. Intraoral examination revealed partially healed surgical defect in the right maxilla involving part of the hard palate, alveolar ridge, and maxillary tuberosity creating an oroantral communication. All teeth were missing on the right quadrant of the maxilla. Masticatory and phonetic functions of the patient were affected. After a thorough examination, the defect was classified as Aramany's Class I maxillary defect.(Figure 2) Since the operation time was within 3 months of presentation, an interim obturator prosthesis was planned.

Fig. 1: Patient photo

Fig. 2: Intraoral photo of defect

2.1. Procedure

The defect was blocked with a gauze piece lubricated with petroleum jelly prior to impression making. Primary impression was made using irreversible hydrocolloid (Algitex, DPI) and was poured with dental stone to obtain

a primary cast.

A surgical cover plate was fabricated with autopolymerising acrylic resin and delivered to the patient to temporarily help the patient in eating and getting accustomed to the prosthesis.

An interim obturator fabricated from heat cure acrylic resin with hollow bulb retained by stainless steel retentive clasps on the non- defect side was planned for the patient. Retention of the prosthesis will be attained from the undercut defect region and from the clasps made on the non-defect side- Central incisor, canine, first premolar and first molar teeth. The bulb in the defect was planned to be of hollow-bulb type so as to lighten the weight of the prosthesis which would otherwise impair the retention of the prosthesis.

2.2. Special tray was fabricated with autopolymerising acylic resin on the primary cast

Final impression of the defect was made with admix material which is a combination of impression compound and green stick (low-fusing compound) in the ratio of 3:7. The impression was refined with medium-body elastomeric impression material (Reprosil, DENSPLY). Master cast was poured (BN chemicals,India) and tentative jaw relation was taken and mounted.

After try-in of the denture, the obturator was waxed-up for processing.(Figure 3) Flasking and dewaxing was done in the conventional method. After dewaxing, the obturator part of the prosthesis was packed in two sections using the lost-salt technique to fabricate a hollow bulb obturator.(Figure 4) This was done to lighten the weight of the obturator so that retention was not compromised.

Fig. 3: Wax try-in

After curing, the salt was flushed out with a syringe by making a small escape hole from the side of the prosthesis. The obturator was finished and polished and then delivered to the patient with intraoral adjustments.(Figure 5) The patient was instructed about the maintenance of the prosthesis and periodic recall check-up. The patient on recall reported improved masticatory function and phonetics as well.

Fig. 4: Flasking and packing with lost salt technique

Fig. 5: Final prosthesis with hollow bulb

Fig. 6: Final prosthesis after delivery

3. Discussion

The present case report described the fabrication of a customized interim hollow-bulb obturator prosthesis for a patient with maxillary defect Post-Covid Mucormycosis infection. As the world is currently dealing with the pandemic, increase cases of post-covid mucormycosis requiring rehabilitation of maxillofacial region are reported and the Prosthodontist play an important role in enhancing the quality of life for these patients. Oral rehabilitation after hemimaxillectomy presents diverse clinical and technical problems. The usual treatment sequence includes placement of a surgical obturator during the intervention; then 5–10 days later this obturator is removed, and a removable interim obturator is constructed and placed for the duration of the wound healing period; finally, the definitive obturator is constructed and placed about 3–6 months post-surgery, when major changes in tissue conformation are no longer expected.[9] An interim Obturator provides the patient with a comfortable and functional prosthesis until healing is complete. The interim obturator phase begins when the surgical and packing are removed. When rehabilitating a patient with maxillary defect, the goal is to seal the defect with the bulb of the prosthesis to provide the retention as well as to provide resonance during speech. An obturator can be made hollow or solid. An interim hollow bulb obturator has advantage of being less weight to provide better retention and comfort to the patient.[10] The different techniques for fabricating the hollow bulb by using alum, sugar, salt during packing the defect area have been described by various authors. El Mahdy et al.(1969)[11] described the two-flask technique to process the obturator and the tooth portion separately Matalon and LaFuente(1976)[12] used sugar during the processing of the obturator, which was removed by drilling a hole and then flushed out.

Mc Andrew et al.(1998)[13] fabricated the prosthesis in two halves and sealed them using autopolymerizing resin. Asher et al.(2001)[14] used plaster index as a matrix to fabricate a hollow obturator. Iramaneerat et al.(2004)[15] fabricated a hollow bulb obturator by injecting argon gas into the obturator bulb. Buzayan et al.(2013)[16] used a rigid thermoforming splint to fabricate a hollow bulb obturator.Few authors suggested the use of acrylic resin shim and polyurethane foam while packing (Patil PG, Patil SP,2012).[17] Use of attachment for hollow bulb obturators have also been suggested. However, the cost may be high (Elangovan S, 2011).[18]

4. Conclusion

Fabrication of an interim hollow bulb obturator is an economic and advantageous method which helps the patient in improving his/her quality of life. The hollow bulb obturator not only reduces the weight of the prosthesis but also aids in achieving retentive seal around the defect. It also helps to improve the resonance during speech. It is an easy and conventional method of prosthodontic rehabilitation of a patient with acquired maxillary defect by which the prosthodontist can help improve the quality of life for the patient.

5. Source of Funding

None.

6. Conflict of Interest

The authors declare no conflict of interest.

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