Case Report

Rehabilitation of an Orbital Defect in a Post-COVID Mucormycosis Patient - A Case Report

Rashmi Joshi[1], Chandana Nair[2], Nivedita Dixit[2], Mukesh Kumar Singhal[2], Zahida Nazir[3], Anagha Waghmare[2]

[1]Department of Prosthodontics and Crown and Bridge, Seema Dental College and Hospital, Rishikesh, Uttarakhand, India.
[2]Department of Prosthodontics and Crown and Bridge, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India.
[3]Department of Prosthodontics and Crown and Bridge, Shree Bankey Bihari Dental College and Reasearch Centre, Ghaziabad, Uttar Pradesh India.

Abstract

Mucormycosis or black fungus is caused by mucormycetes and has been reported as a post-COVID complication in immunocompromised patients who are on prolonged use of steroids. This fungus is progressive and invasive in nature involving the nasal and paranasal sinuses and resulting in the surgical exenteration of the involved tissues. Rehabilitation of such defects is a challenge for prosthodontists in terms of esthetics, retention, and mental satisfaction of the patient. This article describes the fabrication of an orbital prosthesis for a 28-year-old patient who had an orbital exenteration of the left eye due to mucormycosis using heat cure acrylic resin. The retention was provided using anatomical undercuts and eye frames. This technique was an economical alternative for patients.

Keywords: Eye frame, Mucormycosis, Orbital exenteration retention, Soft liner.

Introduction

The coronavirus disease 2019 (COVID-19) has been linked to a variety of susceptible bacterial and fungal diseases.[1] Many diseases have complicated the course of COVID-19; however, diabetes has been associated as a risk factor to the incidence of mucormycosis. The use of corticosteroids has also been associated with mucormycosis.[2]

It is caused by saprophytic aerobic fungi of the class Phycomycetes, hence also known as phycomycosis.[3] The spores colonize in the upper respiratory tract, germinate, and develop hyphae which invade blood vessels and surrounding tissues. Once the fungal growth enters the paranasal sinus, it spreads to the orbit through the nasolacrimal duct. Because of the invasive and aggressive nature of the disease, the treatment is limited to surgical resection and leads to large defects affecting the patient's mental and psychological health. The key to management is meticulous planning and design of the prosthesis which focuses to replace the missing tissues with an artificial prosthesis.

The benefit of prosthetic rehabilitation is that it allows for the fabrication of a "realistic-looking" prosthesis with minimal surgical intervention and easy clinical surveillance of the damaged location.[4]

Access this article online

Website: www.jrad.co.in

DOI: https://doi.org/10.53064/jrad.2022.14.4.362

The prosthesis can be made using pigmented polymethyl methacrylate, silicone elastomers, or polyurethane, and utilizing manual or digital procedures.[5] Adhesives, conformers, mechanical undercuts (anatomically present or surgically generated), and osseointegrated implants are used to keep the prosthesis in place.[4,6] Designing of the prosthesis for patients with defects is influenced by a number of factors, including the patient's underlying clinical state, the material used in manufacturing, and the prosthesis's retention mechanism.

This current case report discusses the rehabilitation of an orbital defect in a patient with post-COVID-19 complications by fabricating prosthesis with heat-cured polymethylmethacrylate material.

Case Report

A 28-year-old female patient reported to the department of prosthodontics with loss of complete left orbital contents due to orbital resection done 3 months back (Figure 1). The patient

Address for correspondence: Rashmi Joshi, Seema Dental College and Hospital, Rishikesh - 249 203 Uttarakhand, India.
Email: rashujoshi16@gmail.com

Received: Apr, 02, 2023; **Accepted:** May, 11, 2023; **Published:** May, 28, 2023

How to cite this article: Joshi R, Nair C, Dixit N, Singhal MK, Nazir Z, Waghmare A. Rehabilitation of an Orbital Defect in a Post-COVID Mucormycosis Patient - A Case Report. J Res Adv Dent 2023;14(4):1-3.

had a history of COVID-19, followed by a sudden loss of vision of the left eye, stuffiness, and facial pain for which she reported to the medical college. For confirmation of mucormycosis, the patient's swab was mounted on a slide with KOH and was observed under microscope. Histological examination revealed characteristic broad, branching hyphae of fungus invading the tissues. After laboratory confirmation, the patient underwent exenteration of the left eye. Medication prescribed were tablet posaconazole 300 mg twice daily for 5 days and amphotericin B 250 mg (5 vials) intravenous once daily for 5 days.

The defect was rhomboid in shape, extending 10 mm superioinferiorly and 12 mm mediolaterally. Based on the classification, the defect was classified as Type 1 orbital exenteration. Well-defined bony undercuts were present on the superior and inferior border of the defect which was used for the retention of the prosthesis.

Impression making

The impression of the defect and adjacent tissue were made using irreversible hydrocolloid impression material (Zelgan, Dentsply). Another impression of the face was made to fabricate facial moulage. To provide strength to the material gauze, strips were placed on the impression material before it completely sets and the thin layer of fast-setting impression plaster (Neelkanth, Minechem) was applied over it (Figure 2). During the procedure, the patient was asked to close the remaining eye in a relaxed manner. Impressions were poured in dental stone (Dental Stone Type III, Kalabhai).

Sculpting of wax pattern

A pre-fabricated stock ocular prosthesis that closely approximated the color and size of the iris and sclera of the natural eye was selected. Vertical lines were drawn coinciding with the facial midline, pupil, and inner and outer canthus of the normal eye. This dimension was transferred to the defect side. Horizontal reference for positioning the eye was done on the basis of the positioning of the outer and inner canthus of the eye. The stock ocular prosthesis was positioned in the wax and the contours of orbital rims, mediolateral, anteroposterior, and superior–inferior positioning of the prosthesis were carved to mimic the normal right side. The entire prosthesis was tried onto the patient (Figure 3). The wax was slightly heated, and a sponge was pressed on the softened wax to mimic the texture of the skin.

Shade matching

For shade matching, acrylic color (MP Sai, Mumbai) was mixed into heat cure clear acrylic resin (Trevalon, Dentsply) to form blocks with different skin shades.

These blocks were matched with the patient's skin color and the closest fit was selected to guide the fabrication of the prosthesis.

Laboratory processing

Prosthesis was flasked with three pour technique and an acrylic pointer was placed for proper orientation (Figure 4). The second pour was done with dental stone as the detail reproduction of the stone was better, and the third pour was done in dental plaster to allow easier deflasking of the prosthesis. Dewaxing

Figure 1: Pre-operative view

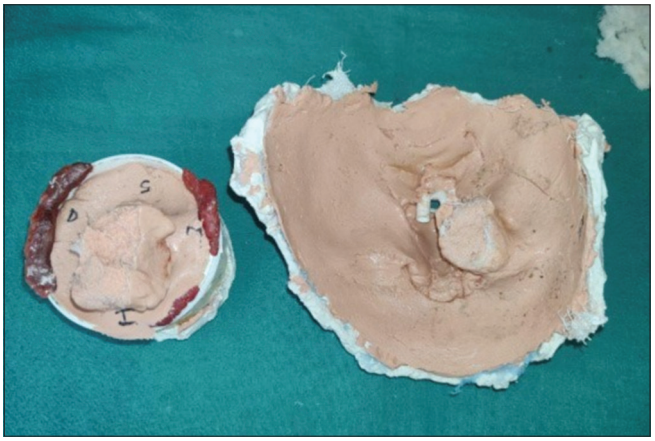

Figure 2: Impression

Figure 3: Wax pattern try-in

was done, and the prosthesis was processed with the selected shade of heat cure polymethylmethacrylate material (Trevalon, Dentsply). The prosthesis was finished and polished. Artificial eyelashes were fixed with cyanoacrylate solution onto the acrylic prosthesis. The prosthesis was lined with soft liner (PermaSoft, Dentsply) on the intaglio surface to minimize the trauma to the underlying tissues (Figure 5a). The prosthesis was attached to the eyeglass frames with clear autopolymerizing

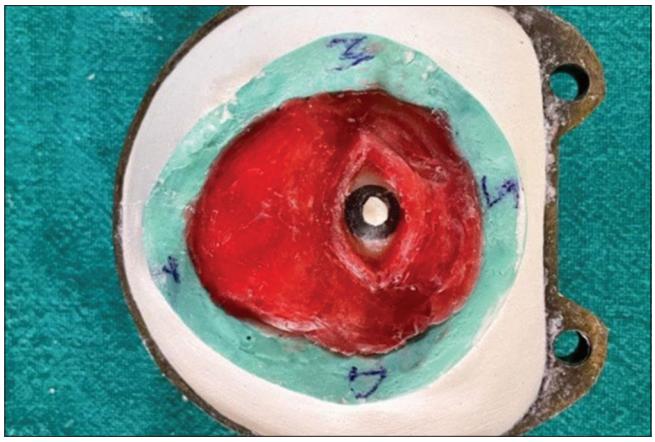

Figure 4: Flasking

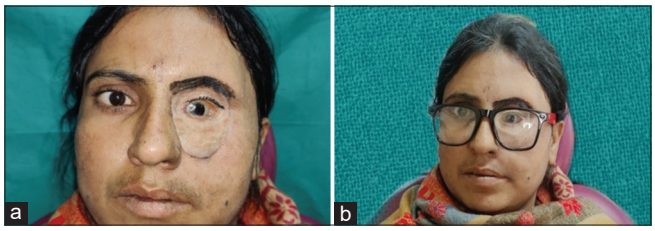

Figure 5: (a) Final prosthesis. (b) Final prosthesis

acrylic resin to provide adequate retention and to mask the margin of the prosthesis (Figure 5b).

Discussion

Mucormycosis (phycomycosis) is an invasive fungal infection caused by prolonged use of steroids, and immunocompromised patients are more prone for the infection.[7] It is a rapidly progressive infection that invades adjacent tissues, muscles, and bones.[4] The treatment option is limited to surgical debridement of all the involved maxillofacial areas, which causes large maxillofacial defects and thus affects the mental status of the patient.[3] Rehabilitation of these defects is a challenge for a prosthodontist in terms of retention and esthetics due to the lack of bone, the presence of scarred soft tissue, and the size of the defect.

Methyl methacrylate and silicones are popular as maxillofacial prosthetic materials as they can be intrinsically and extrinsically colored to match the patient's skin. Methyl methacrylate is easily available and compatible with the skin and is durable, but lacks texture and is hard. It is also economical. Silicones have better texture and feel as compared to acrylic but have low tear and edge strength making it susceptible to tearing at the margins.[8] Anatomic retentive undercuts, magnets, adhesives, and eyeglass frames are frequently used traditional methods of retention to retain orbital prostheses.[9,10]

The eyeglass frame retention is a convenient method as the prosthesis can be placed in an exact and reproducible position.[5] The artificial eyelashes incorporated in the prosthesis provided more pleasing results esthetically. The acrylic orbital prosthesis presented here is cost-effective, affordable, and acceptable which meets the physiological, anatomical, functional, and cosmetic requirements of the patient.

Conclusion

The utilization of custom-fabricated orbital prostheses has proved to be blessing for the patient. This clinical report presents a rehabilitation of an orbital defect caused by mucormycosis secondary to COVID-19. The basic and simple design of the prosthesis can be seen as a step forward toward enhancing the social acceptability of patients with orbital deformities and also provides them with an acceptable quality of life. The prosthesis was fabricated with polymethylmethacrylate as the patient was unable to afford silicone prosthesis. Retention was obtained by utilizing anatomical underlying undercuts and mechanically by the use of eye frames.

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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