

Magnet Retained Orbital Prosthesis with Intra-oral Obturator in a Patient with Midfacial Continuous Defect: A Case Report

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Abstract

Background: Prosthetic rehabilitation of maxillofacial defects presents a significant challenge for a prosthodontist, as it requires establishing function, esthetics, and patient comfort alongside psychological rehabilitation. This case report details the management and rehabilitation of a mid-facial defect caused by mucormycosis, which affected the right orbit, right maxilla, and right half of the nose, along with their corresponding soft-tissue structures, utilizing an extra-oral orbital prosthesis and an intra-oral obturator. The prostheses for the maxillary and orbital defects (obturator-orbital prosthesis) were secured with rare-earth magnets, aided by an acrylic conformer and die pins. The goal of this rehabilitation was to enhance the patient's confidence and mental well-being while providing acceptable function esthetics.

Keywords: Acrylic conformer, Die pins, Magnets, Obturator, Orbital prosthesis.

INTRODUCTION

The most common etiology of acquired maxillofacial defects is malignant orbital neoplasm or rhino-orbital mucormycosis. Loss of facial structures leads to impairment in function, esthetics, and psychological breakdown. Marunick *et al.* classified midfacial defects into two major categories: Midline midfacial defects, which include the nose and/or upper lip, and lateral defects, which include the cheek and orbital contents.^[1] Orbital exenteration is the *en bloc* removal of the entire orbit, usually involving partial or total removal of the eyelids.^[2]

The aim of rehabilitating maxillofacial defects should be restoring the patient's emotional status, function, esthetics, and comfort. Replacement of the same can be done prosthetically or surgically. Surgical reconstruction is not feasible in all cases and rehabilitation with silicone or acrylic prostheses provides better esthetic results and patient satisfaction.^[3-6] Rehabilitation of such large defects is challenging because of their size, weight of prosthesis, scar tissue/mobility of soft tissue, and lack of bony support/anatomic undercuts.

This case report presents a novel method of prosthetically restoring a combined orbital and maxillary defect with orbital prosthesis and obturator retained with magnets.

CASE REPORT

A 56-year-old female patient presented to the Department of Prosthodontics at the Government Dental College and Hospital in Hyderabad, with a primary complaint of a missing right eye. Her medical history indicated COVID-associated rhino-orbital mucormycosis, for which an exenteration of the right eye and a right partial maxillectomy was performed. An extra-oral examination showed the mucosal lining of the orbital cavity and the left nasal turbinates, with a thorough communication between the orbital, oral, and pharyngeal cavities (Figure 1a). An intra-oral examination revealed an Aramany class II defect (missing teeth in the upper right arch). Due to the absence of hard and soft-tissue undercuts, along with the exposure of sensitive tissues such as the nasal turbinates, the orbital prosthesis was retained magnetically with an intra-oral obturator planned.

The patient was already using a delayed surgical obturator. Before making the impression, the patient's eyebrows and

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eyelashes were lubricated with petroleum jelly (Vaseline, Cool Cosmetics Pvt. Ltd., Alathur, India) for easier removal of the impression material. Lines were marked on the patient's face with an indelible pencil to ensure symmetrical placement of the prosthesis. The primary impression was made using irreversible hydrocolloid (Algitek, DPI, India), supported by plaster (Kaldent; Kalabhai Pvt. Ltd., Mumbai, India), reinforced with gauze, and poured with dental stone (Kaldent; Kalabhai Pvt. Ltd., Mumbai, India). A special tray was fabricated from self-cure resin (DPI cold cure, India) to create a final impression (Figure 1b) of the orbital defect using elastomeric impression material (Elite HD+, Zhermack, Italy). This was followed by a pick-up impression with irreversible hydrocolloid, resulting in a master cast (Figure 1c). The delayed surgical obturator served as an inferior stop for the orbital prosthesis during impression-making.

An acrylic conformer was fabricated using clear self-cure resin (DPI Cold Cure, India) to adapt to the roof of the obturator, the lateral wall, and one-third of the roof of the orbital cavity. Once the adaptation and fit of the conformer were verified, it was then refabricated in clear heat-cure resin (DPI Heat Cure, India) (Figure 2a). With the acrylic conformer as a superior stop, the definitive obturator was fabricated.

A die pin (Di Pins-Metal, Delta Labs, Chennai, India) was stabilized in the medial aspect of the conformer to improve the retention of the silicone prosthesis with the conformer. A stock eye shell (Pal Surgical Works, India) was selected based on the color reference of the patient's right eye. A wax pattern (Modeling Wax, the Hindustan Dental Products, Hyderabad, India) (Figure 2b) was fabricated to evaluate the adaptation and orientation of the pupil, as well as the size and volume of the visible sclera compared to the right eye.

The processing cast was duplicated from the working cast. The wax pattern, along with the processing cast, was flaked, and the anterior indexing method was used to maintain the position/orientation of the eye shell during processing (Figure 2c and d). After dewaxing, shade matching of heat-temperature vulcanized platinum-catalyzed silicone (M511, Technovent Ltd., UK) was performed in natural daylight with the help of intrinsic colors. After curing the silicone, the retrieved prosthesis was finished, polished, and characterized with extrinsic colors (Figure 3a).

Two round rare-earth magnets measuring 8 mm × 2 mm were used to connect both the intra-oral and extra-oral prostheses. One magnet was inserted in the inferior aspect of the conformer, and the other magnet was inserted in the superior aspect of the obturator with the help of articulating paper to accurately position the second magnet (Figure 3b). Both magnets were secured within the prosthesis with the help of self-cure resin.

The patient was given the required instructions and was asked to wear spectacles to camouflage the prosthesis margin (Figure 4). The patient was satisfied and happy as her self-confidence increased improved.

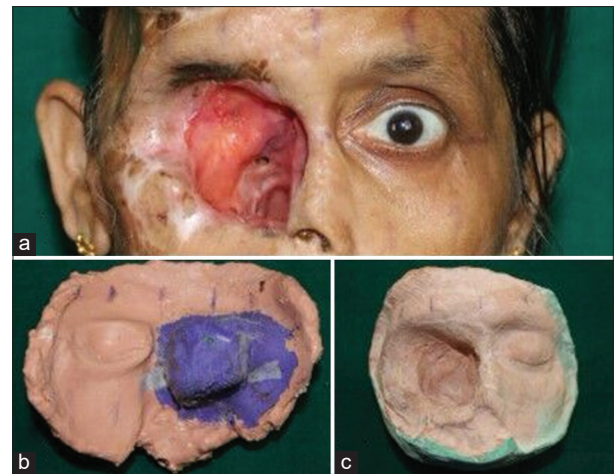


Figure 1: (a) pre-operative image (frontal view), (b) final impression of orbital defect, (c) master cast

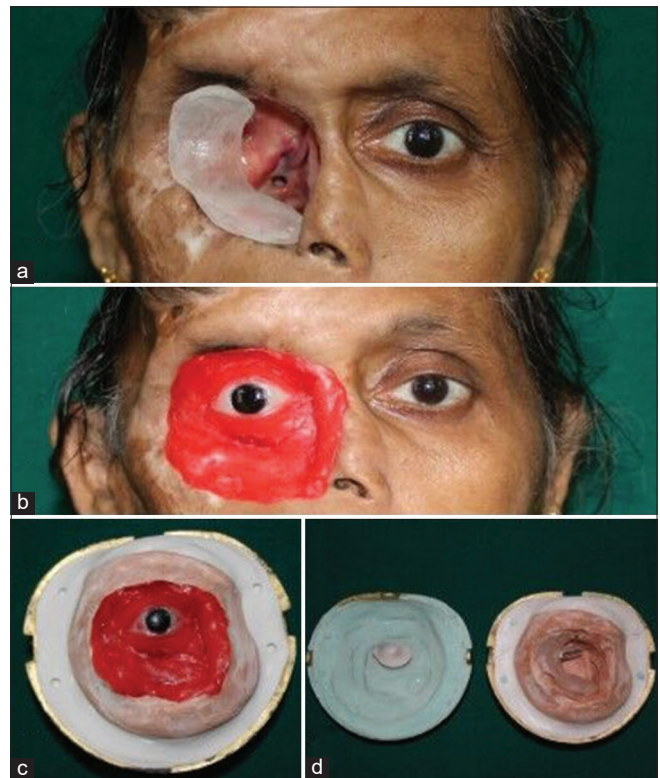


Figure 2: (a) acrylic conformer, (b) Wax pattern try-in, (c) flasking, (d) after dewaxing

DISCUSSION

Surgical procedures for eye removal were classified by Peyman *et al.*^[7] into three general categories: Evisceration (removal of the intraocular contents of the globe), enucleation (removal of the globe and parts of the optic nerve), and exenteration (removal of the entire orbital contents, primarily for eradicating malignant orbital tumors). Loss of orbital volume can be restored either by surgically reconstructing the soft tissues or through prosthetic rehabilitation with an orbital prosthesis.

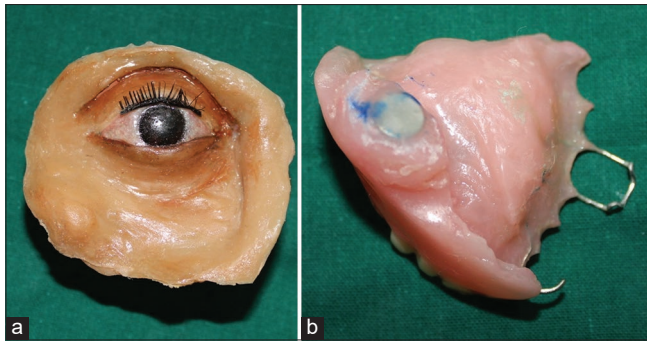


Figure 3: (a) silicone orbital prosthesis, (b) definitive obturator with magnet



Figure 4: Pre- and post-operative image (frontal view)

For facial defects, prosthetic rehabilitation is preferable to surgical reconstruction as it is economical, allows for periodic examination and cleaning, and serves as an alternative to surgery for unsuitable candidates.

This case presents an orbital defect that has thorough communication with the maxillary defect on the same side. Surgical resection of the maxilla results in a communication between the oral and nasal cavities that causes difficulty in swallowing, nasal regurgitation, unintelligible speech, and an unesthetic appearance. The primary aim of rehabilitating both defects was to bridge the communication with prostheses while maintaining function and esthetics.

Medical-grade silicone has been used for the fabrication of orbital prostheses due to its superiority over other maxillofacial prosthetic materials, thanks to its favorable material properties.

There are various methods to retain orbital prostheses, including skin adhesives, hard/soft tissue undercuts, attaching the prosthesis to an eyeglass frame, magnets, or extraoral osseointegrated implants.^[9,10] Since there was a lack of hard/soft tissue undercuts with a continuous defect involving both the orbital and oral cavities, magnets were considered a mode of retention. The use of adhesive was unnecessary as the prosthesis was attached to the conformer with a die pin, which improved retention. In addition, the use of spectacles was optional, as they were used to camouflage the margins rather than serve as a mode of attachment retention.

CONCLUSION

This case report discusses the prosthetic rehabilitation of a patient with an exenterated orbit and hemi-maxillectomy. Rehabilitating such significant facial defects requires an understanding of various techniques to achieve retention, stability, function, and esthetics. Therefore, to enhance the retention of both the orbital prosthesis and obturator, the aforementioned technique can be considered an alternative to using adhesives or in situations where implants are not feasible.

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