CASE REPORT

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# Prosthetic Rehabilitation of Ocular Defect: A Case Report

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## ABSTRACT

The eye is a vital organ as well as an important component of facial expression. The loss of eye has a debilitating effect on the patient's quality of life. Maxillofacial prostheses are artificial replacements that repair and replace stomatognathic and related facial structures. Disfigurement induced by loss of eyecauses severe physical and psychological anguish. Ocular prosthesis is the sole option for replacement of missing eye. For the manufacturing of the same, several materials and processes are employed. Among the various materials, resin has been proved to be the best. Using a stock eye or a customised ocular prosthesis can have advantages and disadvantages. We created a semi-customized ocular prosthesis with stock iris and customised sclera using our clinical report. This prosthesis combined the benefits of both stock and customized ocular prostheses, resulting in a functionally and cosmetically satisfying outcome.

## KEYWORDS

• Prosthesis • Ocular • Eye • Maxillofacial • Case report • Silicone

## INTRODUCTION

Eyes havelanguage of their own, they tell more than words could ever say. The eye is the jewel of the body."Eyes" areconsidered to be "mirror of the soul". They are a visual organ, the core of facial emotions, and the pinnacle of human aesthetic attractiveness. Anophthalmia can be caused by cancer, trauma, sympathetic ophthalmic disease, painful blind eye, or congenital problems.[1] There are several surgical modes of therapy based on severity, such as exenteration, evisceration, or enucleation. Evisceration is a surgical procedure that involves removal of some of the intraocular

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contents of the globe while keeping the sclera, conjunctiva, extraocular muscles, and optic nerve of the eye intact. Enucleation is the surgical removal of the globe as well as a segment of the optic nerve from the orbit. The Exenteration procedure involves an en bloc removal of the whole orbit, which includes partial or total removal of the eyelids and is used mostly to remove malignant orbital. Ocular prosthesis is indicated in order to repair deformities created by evisceration or enucleation.[2]

A stock prosthesis and a custom made prosthesis are the two forms of ocular prosthesis. Typical stock ocular prosthesis comes in a variety of standard sizes, contours, shapes, and colours. They can be used as a temporary or urgent postoperative measures. Artificial eyes, moulded eyes, cosmetic contact shells, cosmetic contact lenses, and spectacle prostheses are all terminology for ocular prosthesis.[1]

Various ways for fitting and fabricating the artificial eye have been published in the literature. Fitting a stock eye, altering a stock eye on a positive duplicate of the ocular defect, and fabricatingthe customized eye prosthesis are all part of the procedure. Sclera and iris are both custom-made in bespoke ocular prosthesis. The first two approaches are less time-consuming, but they frequently have drawbacks like as degraded aesthetics and inconsistent fit. Custom ocular prosthesis improves aesthetics and fit, but it is typically more time-consuming and complex.[3]

To achieve functionally and aesthetically acceptable results this clinical report describes a technique for making ocular prostheses using stock iris and custom-made sclera.

Based on the evaluation of the various previously described parameters, phthisis bulbi defects were divided into 4 major classes and 2 subclasses of class I and class II as follows:

**Table 1:** Classification[4]

| Class | Condition | Treatment |
|---|---|---|
| I a | Corneal opacity with no enophthalmos and normal sclera without corneal sensitivity | Simple prosthetic and/or cosmetic lens |
| I b | Corneal opacity with no enophthalmos and normal sclera with corneal sensitivity | Simple prosthetic and/or cosmetic lens after reducing the corneal sensitivity |
| II a | Corneal opacity with mild enophthalmos and normal sclera without corneal sensitivity | Clear or transparent acrylic resin or silicone sclera shell |
| II b | Corneal opacity with mild enophthalmos and normal sclera with corneal sensitivity | Clear or transparent acrylic resin or silicone sclera shell after reducing the corneal sensitivity |
| III | Moderate enophthalmos with disfigured sclera | Ocular prosthesis or scleral shell |
| IV | Severe enophthalmos with disfigured sclera and loss of orbital fat | Ocular prosthesis or scleral shell after performing additional procedures such as dermal lid fillers or eyelid surgeries |

## CASE REPORT

A 62 year-old male patient reported to the Department of Prosthodontics and Crown & Bridge, with chief complaint of facial disfigurement due to shrunken eyelids of the right eye. Patient was using a conformer eye and wanted a customized one. Historyrevealedaninjury with instrument while performing cataract surgery which lead to the decision of removal of the eye to prevent further complications; during childhood.On inspection, it was determined that the patient had an evisceration type eye defect and that the intraocular tissue bed was healthy, with appropriate depth under the upper and lower fornices for prosthesis retention (fig 1 a,b).

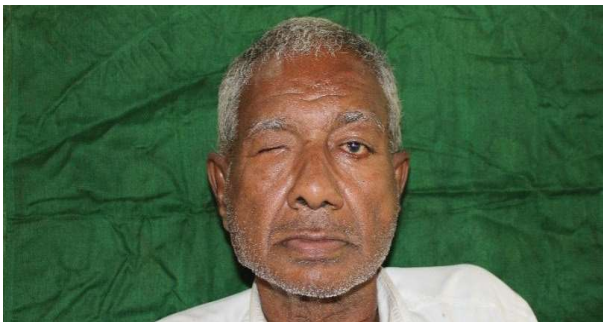

**Fig. 1a:** Pre-operative view

**Fig. 1b:** Pre-operative view

According to the classification system given by Himanshi et al., the patient was categorized under Class IV.[4] The patient would receive a customised acrylic resin ocular prosthesis. Prior to the procedure, the patient gave his written consent. A 2% lignocaine hydrochloride topical gel was administered to the ocular tissues of the right eye to minimise mucosal tissue irritation while making an impression. Irrigation was done using saline and then the socket was cleaned and dried with cotton pellets. Lubrication was done to the brows and eyelashes on the faulty side using petroleum jelly. The patient was made to sit in a semi-reclined position. Primary impression was made using 2ml disposable syringe loaded with monophase impression material (fig. 2). Cast was poured using dental stone onto which custom tray was fabricated for final impression (fig 3). Perforations were made on the tray to add retention to the final impression material A 2ml disposable syringe was then attached to the custom tray fabricated (fig. 4). Syringe was loaded with light body impression material to make final impression (fig. 5). Final impression was poured using 2 pour technique; using dental stone and transparent glass for visibility of level of pour (fig 6). Patient was asked to perform eye movements like looking upwards, downwards, right and left side while making impression.

**Fig. 2**: Primary Impression

**Fig. 3**: Primary Cast

**Fig. 4:** Custom Tray

**Fig. 5:** Secondary Impression

**Fig. 6:** Final Cast

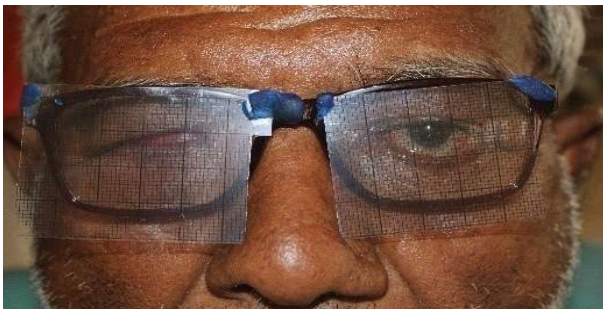

**Fig. 7:** Iris Positioning

**Fig. 8:** Packing for Dewaxing

**Fig. 9:** After Dewaxing

**Fig. 10:** After Processing

**Fig. 11:** Placement of Fibers

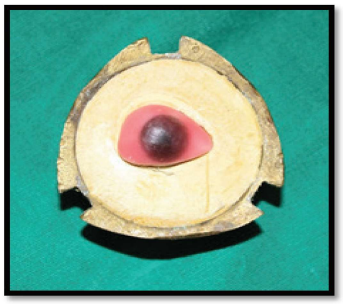

**Fig. 12:** Packing For Dewaxing

**Fig. 13:** Final Prosthesis

After Placement of Fibers

**Fig. 14:** Final Prosthesis With Spectacle

**Fig. 15:** Final Prosthesis Without

Wax pattern was fabricated on the secondary cast and was checked in the patients socket for fullness and proper fit. Iris location was done in the same step. Photocopy of graph paper was made on projector paper. this paper was then spiltedintotwo parts and placed on the spectacle using sticky wax. The upper, lower, medial and lateral points of the left iris was marked using maker and then this paper was shifted onto the inner side of the right glass of the spectacle and points were transferred from paper to glass followed by actual right side projector paper. Stock iris was then placed accordingly on the wax pattern (fig. 7).

This wax pattern was then invested into the flask using type 3 dental stone. Dewaxing was done. Packing was done using white heat cure (DPI) material of C and D shade and processed (fig 8-10).

After processing; approximately 0.5 to 1 mm of acrylic around the iris was trimmed using carbide bur. Using acrylic paint the colour of sclera was matched and wool fibers to simulate blood vessels were placed using polymoly (fig 11). Over this wax-up was done and again it was packed, dewaxed and cured again using clear acrylic (fig. 12). The prosthesis was the trimmed finished polished and was checked in patients socket and the delivered. The patient felt at ease and pleased with the prosthesis (fig. 13-15). The patient was shown the simple methods for placing and removing the prosthesis. The patient was given instructions for regular removal and cleaning of the prosthesis as well as the tissue bed. After one week and one month, there was a follow-up.

## DISCUSSIN

Prior to the introduction of methyl methacrylate ocular prostheses, most ocular prostheses were made of glass. Glass prostheses, while initially effective for aesthetic restoration, were limited by their inability to be customized in size, shape, or dimension, leading to functional and aesthetic challenges.[5,22] Resin-based prostheses revolutionized ocular rehabilitation by offering improved durability, adaptability, and customization options. Despite these advantages, many clinicians consider prefabricated methyl methacrylate prostheses rigid and less modifiable compared to fully customized solutions.[11,23]

Studies comparing prefabricated and custom ocular prostheses indicate that custom prostheses result in significantly better aesthetic outcomes due to their superior fit and the ability to replicate patient-specific anatomical features.[22] Similarly, Patel *et al*. observed that resin-based custom prostheses offer greater strength and durability while improving patient comfort and reducing complications such as irritation and poor mobility.[23] These findings align with our approach, where a semi-customized prosthesis was used to balance the benefits of stock components with the tailored fit of a custom sclera.

When personalized to the patient using an appropriate impression process, resin prostheses offer improved pressure distribution and fit, leading to superior functional and aesthetic outcomes.[4,12] Furthermore, the close fitting of the prosthesis to the tissue surface enhances its natural appearance and boosts mobility. Fernandes et al. emphasized that accurate impressions and meticulous adaptation of the prosthesis to the socket are key factors in ensuring patient satisfaction and functional success.[27]

Matching iris colors has been a notable challenge with prefabricated eyes. Aydin *et al.* demonstrated the efficacy of digital imaging techniques for iris customization, achieving high levels of patient satisfaction.[24] In our case, the use of a pre-made iris button allowed us to achieve an aesthetic result while reducing fabrication time and costs compared to traditional hand-painting techniques. This hybrid approach has also been highlighted by Kumar *et al.,* who found that combining stock and custom components reduces manufacturing complexity without compromising aesthetic quality.[28]

Our study's findings on the importance of volume restoration and prosthetic mobility align with earlier reports. Aggarwal et al. stated that ocular implants typically restore 65%–70% of the lost orbital volume, while the ocular prosthesis contributes the remaining 30%–35%, ensuring a balanced and functional outcome.[7,17] In addition, Fernandes et al. showed that CAD/CAM technologies can improve the precision of iris positioning and scleral adaptation, thereby enhancing the mobility of custom prostheses.[27]

Recent advancements in fabrication techniques, such as CAD/CAM technology and digital iris replication, have significantly reduced the time and cost associated with custom prostheses while improving their quality and aesthetics.[26,27] Shankar *et al.* reported that integrating digital workflows for prosthesis fabrication minimizes manual errors and improves overall accuracy, which is consistent with the precise fit and satisfactory outcomes observed in our case.[19]

Finally, multidisciplinary approaches have gained attention in ocular rehabilitation. Henry et al. and Fernandes et al. highlighted that collaborative care involving ophthalmologists, maxillofacial prosthodontists, and psychological counselors addresses not only physical restoration but also the psychological well-being of patients with anophthalmia.[21,30] This approach mirrors our efforts to ensure the patient's comfort and satisfaction through comprehensive treatment planning and follow-ups.

These findings underscore the evolving practices in ocular prosthesis fabrication and emphasize the need for tailored, patient centric approaches that combine advanced technologies, traditional techniques, and collaborative care.

## CONCLUSION

Any prosthetic treatment should aim to restore the patient to society with a normal look and appropriate motility of the prosthetic eye. The deformity caused by eye loss can have serious psychological and social effects. However, with advances in ophthalmic surgery and ocular prosthesis, patients can be effectively recovered. The maxillofacial Prosthodontist should give prosthetic therapy to the best of his abilities while also considering psychological concerns and, if required, seeking the assistance of other specialists. Good result was achieved.

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