

## Prosthetic Rehabilitation of a Patient with Ocular Defect using Semi-customized Prosthesis: A Case Report

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### Abstract:

Severe physical and psychological distress occurs due to disfigurement caused by loss of eye. Ocular prosthesis is the only mode of rehabilitation for the missing eye. There are different materials and techniques used for the fabrication of the same. Resin proved to be the better among the available materials. Either using the stock eye or using customized ocular prosthesis has their own advantages and disadvantages. Through our clinical report, we have fabricated a semi-customized ocular prosthesis with stock iris and customized sclera. This prosthesis had the advantages of both stock and custom ocular prosthesis providing functionally and esthetically satisfactory result.

**Key Words:** Enucleation ocular prosthesis, rehabilitation, semi-customized

### Introduction

Loss or absence of a part of the face especially eye can cause severe physical and emotional problems.<sup>1</sup> Loss of eye could be because of malignancies, congenital defect, irreparable trauma, painful blind eye or sympathetic ophthalmia.<sup>2</sup> Depending on the severity of the involvement, the surgical management may include one of three approaches: evisceration, enucleation or exenteration.<sup>3</sup> Evisceration is the surgical procedure involving the excision of the intraocular contents of the globe, leaving the sclera, and sometimes the cornea. Enucleation is the surgical removal of the entire globe and a portion of the optic nerve from the orbit. Exenteration is the en bloc removal of the entire contents of the orbit including the extraocular muscles.<sup>3</sup>

Psychological distress associated with the loss of eye can be significantly improved by an ocular prosthesis, simulating the natural eye. First evidence for the replacement of missing eye was obtained from the Egypt dynasty, who used precious stones, earthenware, copper, and gold. Materials such as vulcanite and celluloid were used during 19<sup>th</sup> century. In the early part of 20<sup>th</sup> century, Muller-Uri family fabricated glass eye using sand with a low iron oxide content. In 1944, by the combined efforts of the individuals of the armed forces of the United States, methyl-methacrylate resin was successfully used for the fabrication of the ocular prosthesis.<sup>4,5</sup> Since then usage of resin gained popularity because of its light weight, translucency, better fracture resistance, ease of fabrication, easy adjustability, and its capability for intrinsic and extrinsic coloring.<sup>6</sup>

There are several techniques documented in the literature for fitting and fabricating the artificial eye. It includes fitting a stock eye, modifying a stock eye on the positive replica of the ocular defect and the fabrication of the custom eye prosthesis. In custom ocular prosthesis, both sclera and iris are custom made. First two techniques are less time-consuming but often have the disadvantages like compromised esthetics and unreliable fit. Custom ocular prosthesis provides improved esthetics, and fit but usually more time-consuming and complicated.<sup>4,8</sup>

This clinical report demonstrates a technique for fabricating ocular prosthesis with stock iris and custom made sclera to provide functionally and esthetically satisfactory result.

### Case Report

A 21-year-old male patient reported to the Department of Prosthodontics, KLE VK Institute of Dental Sciences, Belgaum, Karnataka, India with a chief complaint of facial disfigurement because of a missing left eye since 5 years (Figure 1). The history revealed traumatic injury to the left eye followed by the enucleation of the same. Examination of the eye socket revealed a healthy conjunctiva with no signs of infection or inflammation covering the posterior wall of the anophthalmic socket and showing synchronous movements. According to the treatment based classification system given by Himanshi *et al.*, the patient was categorized under Class 4 phtthisis bulbi, i.e., severe enophthalmos with disfigured sclera and loss of orbital fat.<sup>9</sup>

A semi-customized ocular prosthesis with stock iris and custom made sclera was planned for the patient, and the treatment procedure was explained to the patient before the commencement of the same.

### Ocular impression

An impression of the anophthalmic socket was made following the method given by Allen and Webster.<sup>7</sup> In this method, impression tray in the shape of the ocular prosthesis was used. Thin mix of irreversible hydrocolloid (Algitex, dental products of India, Mumbai, India) was injected into the socket through the hollow stem of the impression tray to obtain the impression of the socket (Figure 2). Impression was poured with dental stone (Kalastone, Kalabhai Pvt., Ltd., Mumbai, India) in two sections to obtain two piece mold.

### Wax conformer or the scleral try-in

By using a base plate wax (Modeling wax, Dental products of India Ltd.), wax conformer was fabricated on the two piece mold. It was retrieved from the mold and inserted in the ocular cavity and checked for stability and esthetics. Necessary sculpting of the anterior surface of the conformer

was done to mimic the features of the contra-lateral natural eye. To further improve the stability and esthetics of the conformer, a technique described by Taicher *et al.* was performed.<sup>8</sup> A medium-viscosity polyvinyl siloxane impression material (Aquasil, Dentsply, Detrey GmbH, Germany) was mixed and applied onto the tissue surface of the wax conformer. The wax conformer was placed back in the socket, and the patient was instructed to move both the conformer and the natural eye in various directions with his head upright. This functional impression recording allows the artificial eye to move in coordination with the natural eye without getting dislodged from the socket. This altered wax conformer was used to fabricate the final acrylic resin ocular prosthesis.

### Selecting and positioning iris

The size, shade, and configuration of the iris were selected by taking the contralateral natural eye as a guide. Most closely matching iris was selected from the stock eyes (American Optical Corp., Southbridge, Mass). Scleral part of the stock eye was trimmed off using an acrylic trimmer. This stock iris was positioned on the scleral wax pattern, and the border was sealed using a hot instrument (Figure 3). The position of the iris was finalized in accordance with the contralateral eye using graph grid method.<sup>10</sup> Shade selection for the sclera was done using the natural eye as a guide.

### Fabrication of resin sclera

Scleral wax pattern with the stock iris positioned over it was removed from the socket. It was washed under tap water. To stabilize the stock iris within the mold, an auto polymerizing acrylic resin (DPI-Self cure, Dental products of India Ltd.) extension of a diameter of around 4mm and length of around 6 mm was attached over its center. Flasking and dewaxing were done in a conventional manner. Selected shade of the heat cure acrylic resin (DPI-Heat cure, Dental Products of India Ltd.) was manipulated and packed into the prepared mould. Acrylization was done by following a long curing cycle.



**Figure 1:** Pre-operative view showing ocular defect.



**Figure 2:** Impression of the ocular defect made with irreversible hydrocolloid.



**Figure 3:** Stock iris positioned on the scleral wax pattern.

Resin sclera with the iris attached over it was obtained after deflasking. Acrylic resin extension from the iris was trimmed off using an acrylic trimmer, followed by finishing and polishing was done. Uncharacterized prosthesis was inserted into the socket. Stability of the prosthesis, contour of the sclera, and the position of the iris was reconfirmed (Figure 4).

#### Coloring of resin sclera and fabrication of the final prosthesis

Plane sclera had to be characterized to give life like appearance to the prosthesis. Prior to the painting of sclera, its original contour was maintained by investing the uncharacterized prosthesis in a flask followed by separating the two compartments of the flask. Acrylic resin forming the sclera was trimmed uniformly to a depth of around 1 mm. Over the reduced surface of the sclera painting was done using the soft color tones of brown, pink, blue, and yellow (Favicryl, Pedilite Industries Ltd., Mumbai, India) to match the sclera of the contralateral natural eye. Red nylon fibers were placed along the outer periphery to simulate the blood vessels (Figure 5). Once the characterization was satisfactory, all the colors and nylon fibers were stabilized by applying a thin layer of cyanoacrylate adhesive over it. Trimmed sclera was replaced by packing clear heat polymerizing acrylic resin, followed by curing, deflasking, finishing, and polishing of the prosthesis (Figure 6). Final ocular prosthesis was inserted into the socket and evaluated for fit, esthetics, and the coordinated movements with the contralateral eye (Figure 7). Post insertion instructions were given to the patient, regarding the usage, limitation, and the maintenance of the prosthesis.<sup>11</sup>

#### Discussion

Customized ocular prosthesis has the advantages over stock eyes like, better contouring, color matching, and coordinated movements with the contralateral eye.<sup>4,8</sup> Customizing the iris demands extra skill and time from the operator.<sup>12,13</sup> This can be avoided if stock iris matching with the contralateral natural eye is available. Semi-customizing the prosthesis using the

stock iris and customized sclera will have advantages of both stock and custom prosthesis. This technique is not advised when the color, contour, and configuration of the stock iris is not satisfactorily matching with the contralateral natural eye of the patient.



Figure 5: Painting of the sclera.



Figure 6: Anterior surface of the finished and polished ocular prosthesis.



Figure 4: Try in for the plane sclera with stock iris.



Figure 7: Post-operative view showing the rehabilitation of the ocular defect with semi-customized prosthesis.

**Conclusion**

Success of the ocular prosthesis largely depends on the precise laboratory technique and artistic skills of the operator. Through this technique, the demand for the artistic skill and consumption of time are reduced by the use of precisely selected stock iris, yet esthetic and functional requirements are met by the customized sclera.

**Clinical significance**

Semi-customized ocular prosthesis is of use for masking the compromised artistic skill of the operator. This technique reduces the laboratory and clinical time and provides a satisfactory result in indicated patients.

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