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Rehabilitation with Custom Ocular Prosthesis Following Traumatic Enucleation: A Case Report

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Abstract: ***The human eye is a vital component of facial esthetics, and its loss can significantly impact a person's physical appearance, social life, psychological health, and overall mental outlook. Eye loss can result from surgical procedures such as enucleation, evisceration, or exenteration, which are performed to treat a range of underlying conditions. Following such interventions, the use of an ocular prosthesis becomes essential for both functional and aesthetic rehabilitation. Various materials and fabrication techniques are available, tailored to the specific needs of each case. This case report describes the successful rehabilitation of a 32 - year - old female patient who underwent enucleation of her left eye due to traumatic injury. A custom - made ocular prosthesis was designed and fitted, achieving excellent cosmetic results and significantly enhancing the patient's psychological well - being. This case highlights the importance of a multidisciplinary approach in ocular prosthetic rehabilitation.***

Keywords: Custom ocular prosthesis, Traumatic enucleation, stock iris shell, custom made sclera

1. Introduction

Loss of an eye due to trauma, disease, or congenital anomalies can have a devastating physical and psychological impact. Ocular prostheses provide aesthetic restoration, preserve orbital anatomy, and support emotional recovery. This report discusses the process and outcomes of fitting a custom - made eye prosthesis in a post - enucleation patient. A customized ocular prosthesis, on the other hand, is custom made to fit a particular patient and have better retention than stock ocular prostheses. A well - designed and accurately fabricated ocular prosthesis retains its proper alignment during various eye and facial movements performed by the patient. Exact color match of the iris and sclera with the adjacent eye can be achieved. In the technique described below a perforated acrylic resin tray for rein forcement with disposable syringe attached is used. The detailed anatomy of the enucleated socket and surrounding tissues is more accurately captured when proper tissue contours are achieved. Thus, the prosthesis obtained will have closed adaptation to the tissues, simulating natural mobility of the eye ball.

2. Case Report

A 51 - year - old female patient presented to the Department of Prosthodontics, Crown and Bridge at ITS Dental College, Ghaziabad, with the chief complaint of a missing left eye for the past two years. The eye loss was the result of a penetrating workplace injury involving a glass fragment, which caused irreversible damage, leading to enucleation three months prior to her visit [Figure 1 - (b)]. During the history - taking, the patient mentioned that she had been using a stock scleral shell for the past four months but was dissatisfied with its fit and comfort. Clinical examination of the ocular socket revealed no signs of infection or inflammation, and the conjunctiva appeared healthy. Ocular movements were found to be satisfactory in lateral, upward, and downward directions. A customized ocular prosthesis was planned, incorporating a stock iris shell along with a custom - fabricated sclera and an individually designed ocular tray. The patient was given a comprehensive explanation of the entire procedure.

3. Procedure

1) A primary impression of the ocular socket was taken using irreversible hydrocolloid material, and the impression was subsequently boxed for accurate cast formation [Figure 2– (a), (b)].
2) The existing stock scleral shell was duplicated to fabricate a custom ocular tray using auto polymerizing acrylic resin (DPI RR Cold Cure, Dental Products of India). A disposable syringe was attached to the tray to aid in injecting the light - body polyvinyl siloxane (PVS) impression material (Aquasil, Dentsply) during the impression procedure [Figure 3].
3) Before impression making, petroleum jelly was applied to the patient’s eyelids to prevent sticking.
4) The light - body PVS material was loaded into a disposable syringe (Dispovan) and injected into the custom ocular tray placed within the socket [Figure 3 - (b)]. The patient was instructed to perform various eye movements during the setting of the material to achieve a functional impression.
5) Once the impression material had set, it was carefully removed and examined for air bubbles or surface irregularities [Figure 4]. The impression was then boxed and poured with dental stone (Kalabhai Kalstone, Kalabhai Karson Pvt. Ltd.) to obtain the definitive working cast [Figure 4 - (b)].
6) A suitable stock iris was selected based on the size, shape, and color of the contralateral (right) eye.
7) The selected iris was trimmed as needed and positioned onto a wax pattern using a heated instrument. This assembly was tried in the patient’s socket to verify fit and orientation. The final iris position was determined using a cellophane strip as a guide [Figure 5 - (a)].
8) The shade of the scleral portion of the prosthesis was matched to that of the natural eye.

9) The patient was asked to perform ocular movements in all directions—upward, downward, and lateral—and any overextensions or areas of discomfort were adjusted accordingly [Figure 5 - (b)].
10) The wax pattern was processed through conventional flasking and dewaxing procedures. It was packed using the selected heat - cured acrylic resin (DPI Heat Cure, DPI Ltd.), and a long curing cycle was followed to ensure strength and durability [Figure 6 - (a), (b)].
11) After deflasking, the prosthesis was trimmed using an acrylic trimmer, then finished and polished. It was then inserted into the patient's ocular socket. The fit, stability, contour, and iris alignment were thoroughly re - evaluated.
12) For final characterization, the scleral portion was reduced by 1 mm in depth to allow placement of red nylon fibers to mimic natural blood vessels. These fibers were fixed in place using cyanoacrylate adhesive [Figure 7], completing the fabrication of the custom ocular prosthesis.

4. Figures

Figure 1: (a) preoperative; (b) ocular defect

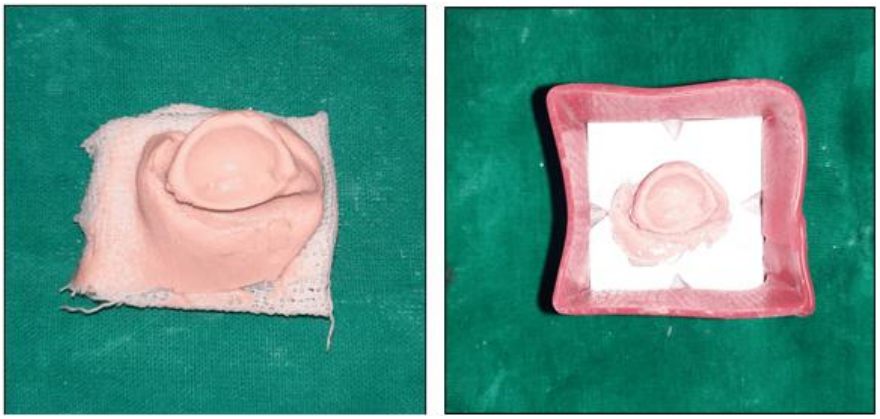

Figure 2: (a) primary impression; (b) boxing of primary impression.

Figure 3: (a) special tray assembly for secondary impression; (b) light body functional impression made

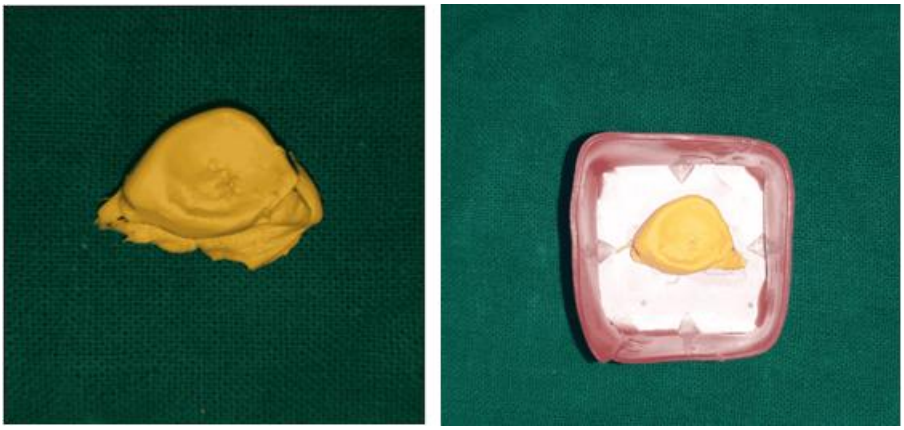

Figure 4: (a) final impression; (b) boxing of final impression

Figure 5: (a) marking the pupil position on eye; (b) wax try in.

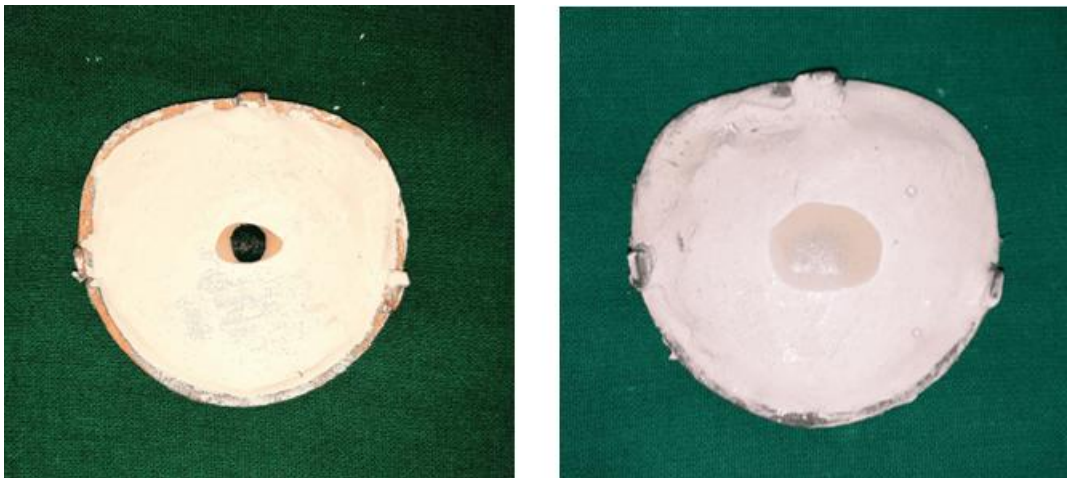

Figure 6: (a) investing the waxed up eye prosthesis; (b) packing the dewaxed eye prosthesis with eye colored acrylic.

Figure 7: Post operative

5. Discussion

The loss of an eye significantly affects a patient's physical appearance, emotional well - being, and social interactions. Ocular prostheses play a vital role in the rehabilitation process by helping to restore facial symmetry, boost self - confidence, and enhance overall quality of life. Custom - made ocular prostheses provide superior aesthetics and comfort compared to prefabricated options, as they are specifically tailored to match the unique anatomy of the anophthalmic socket. In this case, a semi - custom approach was adopted, utilizing a stock iris shell combined with a custom - fabricated sclera. This method offers a practical balance between aesthetic outcomes and procedural efficiency, making it especially useful in resource - limited settings or when fully custom - painted irises are not a viable option. Research indicates that well - designed semi - custom prostheses can deliver satisfactory cosmetic results and high levels of patient acceptance. Accurate impression - taking is fundamental to achieving a precise fit, as a well - adapted prosthesis minimizes socket irritation, enhances eyelid mobility, and improves the movement of the prosthetic eye. Medical - grade polymethyl methacrylate (PMMA) remains the material of choice for ocular prostheses due to its biocompatibility, strength, and ease of customization. Comprehensive rehabilitation also involves psychological support and thorough patient education. A multidisciplinary approach—incorporating prosthodontists, ophthalmologists, and mental health professionals—ensures holistic care. While innovations like digital imaging and 3D printing are emerging, traditional fabrication techniques continue to offer dependable and widely accessible solutions in most clinical environments. This case highlights the significance of a patient - centered strategy in ocular rehabilitation, where careful attention to esthetics, socket anatomy, and individual expectations plays a crucial role in achieving successful outcomes.

6. Conclusion

Rehabilitating patients with ocular defects is crucial not only for restoring facial aesthetics but also for enhancing psychological well - being and social self - confidence. Custom or semi - custom ocular prostheses provide both functional and visually acceptable solutions, tailored to meet each patient's unique requirements. Incorporating elements like a stock iris shell can streamline the fabrication process while still delivering a lifelike appearance. Achieving successful prosthetic outcomes relies on a multidisciplinary approach, thorough case assessment, and meticulous attention to detail. Ongoing advancements in materials and fabrication techniques continue to improve the aesthetic and functional quality of ocular prosthetic rehabilitation.

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