Content available at: https://www.ipinnovative.com/open-access-journals

IP International Journal of Ocular Oncology and Oculoplasty

Journal homepage: https://ijooo.org/

Case Report

Eyes of empowerment: A case study on the impact of custom ocular prosthesis in restoring quality of life

Aishwarya Bisen[1]*, Swapnil Parlani[1], Shreyans Damade[1], Mineshor Samom[2], Palak Telang[1]

[1]*Dept. of Prosthodontics & Crown and Bridge, Peoples College of Dental Sciences and Research Centre, Bhopal, Madhya Pradesh, India*
[2]*Private Practitioner, India*

ARTICLE INFO

Article history:
Received 15-03-2024
Accepted 07-04-2024
Available online 03-05-2024

Keywords:
Stock ocular prosthesis
Ocular defect
Ocular rehabilitation
Functional outcomes
Aesthetic outcomes

ABSTRACT

Ocular prostheses serve as invaluable tools in restoring both visual symmetry and psychological well-being for individuals who have experienced ocular defects. This article presents a comprehensive overview of the fabrication and placement of custom acrylic ocular prosthesis in a 39-year-old male patient who suffered left eye loss following a traumatic accident. The patient's history underscores the profound impact of ocular trauma on self-image and quality of life, highlighting the importance of prosthetic rehabilitation. Meticulous attention was paid to every step of the fabrication process, including impression taking, color matching, and fitting, to ensure optimal aesthetic outcome and functionality. The successful placement of the prosthesis resulted in significant improvements in the patient's confidence and overall well-being. This case report emphasizes the approach required for successful ocular prosthetic rehabilitation and underscores the transformative impact of custom ocular prostheses in restoring quality of life for individuals with ocular defects.

1. Introduction

The eyes, often referred to as the windows to the soul, hold a profound significance in human life. They are not merely organs of vision but conduits of expression, conveying emotions, intentions, and connections.[1] The loss of an eye, whether through injury, illness, or congenital anomaly, disrupts not only the visual landscape but also the very essence of one's identity and interaction with the world.[2]

In the realm of medical advancements, ocular prosthesis stands as a beacon of hope and restoration for individuals grappling with ocular defects. The loss of an eye, whether due to injury, disease, or congenital conditions, can profoundly impact one's physical appearance and psychological well-being. Ocular prostheses, also known as artificial eyes or glass eyes, serve as not just replacements for lost eyes but as instruments of rejuvenation, reinstating not only visual symmetry but also confidence and self-assurance.[3]

Understanding the nuances of ocular defects is crucial for appreciating the significance of ocular prostheses.[4] Ocular defects can arise from various causes, ranging from traumatic injuries and tumors to congenital anomalies and surgical removal due to diseases like cancer or severe infection. These defects can manifest in different forms, including complete eye loss (enucleation), partial eye loss (evisceration), or disfigurement of the eye due to injury or disease.[5–7]

It's essential to distinguish between ocular prostheses and orbital prostheses. While both serve to restore facial

* *Corresponding author*.
E-mail address: aishwaryabisen1502@gmail.com (A. Bisen).

https://doi.org/10.18231/j.ijooo.2024.010

symmetry and aid in the rehabilitation of patients with orbital defects, they differ in their scope and function. Ocular prostheses specifically replace the missing eye, mimicking its size, shape, and color to blend seamlessly with the natural eye. In contrast, orbital prostheses cover larger areas, including the eyelids and surrounding tissues, and are typically employed when extensive tissue loss or disfigurement occurs beyond just the eye itself.[4,6–8]

The creation of custom ocular prostheses is a meticulous process that requires a blend of artistic skill and medical expertise. These prostheses are crafted from a variety of materials, each chosen for its suitability in terms of biocompatibility, durability, and aesthetic appeal. Common materials used include medical-grade acrylic, silicone, and polymethylmethacrylate (PMMA), among others. The choice of material depends on factors such as the patient's anatomy, comfort, and desired cosmetic outcome. This article describes a simple, cost-friendly technique to fabricate acrylic ocular prostheses.

2. Case Presentation

A 39-year-old male patient visited the department for ocular prosthesis manufacture. He went through an accident eight years ago that caused him to lose his left eye [Figure 1]. Examination revealed no irritation in the socket and adequate depth and mobility between upper and lower eyelids. After discussing treatment options with the patient, a custom acrylic ocular prosthesis was created to ensure a comfortable fit and natural appearance.

Figure 1: Pretreatment

2.1. Preparation

To begin the process of fabricating the ocular prosthesis, the patient's eye was first prepared. The eye was carefully irrigated with saline water to ensure cleanliness, and a thin layer of vaseline was applied to the surrounding tissues to facilitate easy removal of the impression material and minimize discomfort during the procedure.

2.2. Primary impression

The next step involved taking an impression of the eye socket to capture its shape and dimensions accurately. A putty silicone impression material was used for this purpose. The patient was instructed to maintain a straight gaze at a faraway object to ensure proper alignment of the impression tray with the eye socket. The impression material was then carefully injected into the socket and allowed to set, ensuring a detailed impression of the socket contours [Figure 2].

Figure 2: Putty impression

2.3. Final impression

Following the initial impression, a secondary impression using custom tray [Figure 3] and alginate was taken to further refine the details of the socket and capture any subtle nuances in its anatomy. Thin alginate material was mixed and filled into a syringe, which was attached to a custom tray fabricated based on the initial silicone impression. The patient was again instructed to maintain a straight gaze while the alginate was injected into the socket. Additionally, the patient was asked to perform various eye movements, including looking up, down, right, and left, during the impression procedure to ensure that the prosthesis would accommodate natural eye movements post-fabrication [Figure 4].

2.4. Master cast

Once the alginate impression had set, it was carefully removed, and the resulting impression was boxed and poured with type III dental stone to create a master cast of the socket. The two-pour cast technique was employed to ensure accurate reproduction of the socket's dimensions and contours [Figure 5]

2.5. Measurement and shade matching

To achieve a natural appearance for the ocular prosthesis, precise measurements of the contralateral natural eye were taken using a measuring ruler [Figure 7]. The shade of the iris was carefully matched using a stock eye to ensure a seamless blend with the patient's remaining eye [Figure 6]. Digital photography using a DSLR camera was utilized to confirm the accuracy of the shade match and assess the

Figure 3: Custom tray

Figure 4: Final impression with alginate

Figure 5: Boxing of master cast and master cast poured by two poured technique

prosthesis appearance from various angles.

Figure 6: Shade matching using stock eye

Figure 7: To match the gaze from the contralateral side, vertical lines are marked on the middle of the eye, the inner canthous, and the outer canthous.

2.6. Wax pattern

With the master cast in hand, a wax conformer was fabricated to serve as a temporary placeholder for the final prosthesis. Molten modeling wax was poured into the lubricated master cast and allowed to set. The wax conformer was then smoothed out and placed in the patient's enucleated socket to check for proper fit and retention. The patient's ability to make various eye movements was assessed to ensure that the wax conformer maintained stability and mobility within the socket. [Figures 8, 10 and 11]

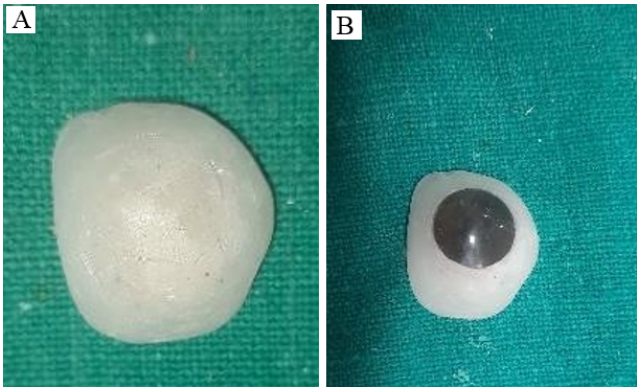

Figure 8: A- Scleral shell, B- Scleral shell with iris

Figure 9: Wax pattern trail

2.7. *Fabrication of ocular prostheis*

Following the successful assessment of the wax conformer, the final ocular prosthesis was fabricated using transparent heat-cured acrylic resin. The wax conformer served as a mold for the acrylic resin, which was carefully poured and cured according to the manufacturer's instructions. Special attention was paid to maintaining the convexity and contour of the prosthesis to ensure a natural appearance and comfortable fit [Figure 10]

2.8. *Polishing and finishing*

Once the acrylic resin had cured, the ocular prosthesis was carefully removed from the mold and underwent final polishing and finishing. Any imperfections were meticulously addressed to achieve a smooth and lifelike surface texture [Figure 11].

Figure 10: After processing

Figure 11: After finishing and polishing

2.9. *Placement and evaluation*

Before final placement, the ocular prosthesis was cleaned and lubricated with an ocular lubricant to maintain a tear film over the prosthesis and assist with eye movements. The prosthesis was then placed in the socket, and the patient's comfort and satisfaction were evaluated. Any necessary adjustments were made to ensure optimal fit and mobility [Figure 12]

Figure 12: Post treatment

3. Discussion

The use of custom-made ocular prostheses has been a significant advancement in the field of ocular rehabilitation,

Figure 13: Follow-up image after 6 months

providing patients with better functional and aesthetic outcomes compared to stock ocular prostheses. The process of fabricating a custom ocular prosthesis involves careful examination and digital imaging to create a precise fit and enhance the patient's comfort and self-confidence.[9,10]

In a case report by Somkuwar et al., a patient with an ocular defect was successfully rehabilitated with a custom-made ocular prosthesis. The process involved taking an impression of the socket, creating a custom acrylic prosthesis, and polishing it annually to prevent the deposition of protein and bacteria. The use of custom-made ocular prostheses has been shown to maintain their orientation during various movements and coordinate with the natural eye, although this may not always be possible or feasible.[11]

The use of stock ocular prostheses of appropriate size and color cannot be neglected, as they can provide better results functionally and aesthetically compared to custom-made ocular prostheses. However, custom-made ocular prostheses offer several advantages over stock ocular prostheses, including better fit, even pressure distribution, superior eyelid movement, improved aesthetics, and enhanced functionality.[12]

In a study by Cain, custom ocular prostheses were found to provide superior fit and esthetics compared to stock ocular prosthesis.[13] The study also found that custom ocular prosthesis could enhance the patient's self-esteem and improve their quality of life.

In addition to the studies mentioned earlier, there are several other studies that support the use of custom-made ocular prosthesis. A study by Kruse et al. found that custom-made ocular prostheses provided better fit, comfort, and aesthetics compared to stock ocular prosthesis.[14] The study also found that custom-made ocular prostheses were more comfortable for patients to wear and provided better eye movement coordination.[15] In a retrospective study by Kashani et al., the authors evaluated the effectiveness of custom-made ocular prostheses in patients with anophthalmia. The study found that custom-made ocular prostheses provided better aesthetic and functional outcomes compared to stock ocular prosthesis.[16]

4. Conclusion

In conclusion, the use of custom-made ocular prostheses has been a boon to patients who cannot afford implant replacements. Although the patient cannot see with the prosthesis, it has definitely restored their self-esteem and allowed them to confidently face the world. The use of custom-made ocular prostheses has been shown to provide better functional and aesthetic outcomes compared to stock ocular prostheses, and their use should be considered in patients with ocular defects.

5. Source of Funding

None.

6. Conflict of Interest

None.

References

1. Taylor T. Clinical Maxillofacial Prosthetics. Chicago, Ill, USA: Quintessence; 2000.
2. Sajjad A. Ocular prosthesis-a simulation of human anatomy: a literature review. *Cureus*. 2012;4(12):e74. doi:10.7759/cureus.74.
3. Perman KI, Baylis HI. Evisceration, enucleation and exenteration. *Otolaryngol Clin North Am*. 1988;21(1):171–82.
4. Basnet BB, Singh RK. Prosthetic rehabilitation of an ocular defect by custom eye prosthesis: a clinical report. *Int J Dent Sci Res*. 2014;2(5):115–9.
5. Mathews MF, Smith RM, Sutton AJ, Hudson R. The ocular impression: a review of the literature and presentation of an alternate technique. *J Prosthodont*. 2000;9(4):210–6.
6. Kohli D, Mehta S, Makwana P, Choudhary S. An ocular prosthesis: a case report. *Pravara Med Rev*. 2011;3(4):27–30.
7. Smith RM. Relining an ocular prosthesis: a case report. *J Prosthodont*. 1995;4(3):160–3.
8. Benson P. The fitting and fabrication of a custom resin artificial eye. *J Prosthet Dent*. 1977;38(5):532–8.
9. Kale E, Meşe A, Izgi AD. A technique for fabrication of an interim ocular prosthesis. *J Prosthodont*. 2008;17(8):654–61.
10. Costa GGD, Aras MA, Chalakkal P, Costa MCD. Ocular prosthesis incorporating IPS e-max press scleral veneer and a literature review on non-integrated ocular prosthesis. *Int J Ophthalmol*. 2011;10(1):148–56.
11. Somkuwar K, Mathai R, Jose P. Ocular prosthesis: Patient rehabilitation - A Case Report People's. *J Scientific Res*. 2009;2(2):21–6.
12. Colvenkar S, Thushara S, Reddy GM, Shamili S, and LV. Custom Ocular Prosthesis: A Case Report. *Cureus*. 2023;15(6):41176. doi:10.7759/cureus.41176.
13. Kamble VB, Kumar M, Panigrahi D. An ocular prosthesis for a geriatric patient: a case report. *J Clin Diagn Res*. 2013;7(6):1236–8.

14. Bhattacherjee S, Barman J, Rahman R. Fabrication of custom-made ocular prosthesis using conventional technique. *Int J Oral Health Dent*. 2020;.
15. Meenakshi A, Shruti TP, Agarwal S. Prosthetic rehabilitation of an ocular defect: A case report. *Int J Appl Dent Sci*. 2019;6(1):88–90.
16. Reinhard J, Urban P, Bell S. Automatic data-driven design and 3D printing of custom ocular prostheses. *Nat Commun*. 2024;15:1360. doi:10.1038/s41467-024-45345-5.

Author biography

Aishwarya Bisen, Post Graduate Student https://orcid.org/0009-0001-0733-9758

Swapnil Parlani, Vice Dean, HOD

Shreyans Damade, Reader

Mineshor Samom, Practitioner

Palak Telang, Post Graduate Resident

Cite this article: Bisen A, Parlani S, Damade S, Samom M, Telang P. Eyes of empowerment: A case study on the impact of custom ocular prosthesis in restoring quality of life. *IP Int J Ocul Oncol Oculoplasty* 2024;10(1):47-52.