Case Report

# Prosthetic rehabilitation of anophthalmic ocular sinistra and phthisis bulbi ocular dextra: a case report

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## ABSTRACT

**Introduction**: Loss of an eyeball due to enucleation or phthisis bulbi results in functional deficiency and facial deformities. This condition can cause significant psychological distress, especially if it results from unexpected infections or trauma. The aim of this case report is to present the clinical steps and outcomes of prosthetic rehabilitation in a patient with an anophthalmic left eye and phthisis bulbi in the right eye, using custom-made ocular prostheses to restore esthetics, improve comfort, and enhance the patient's quality of life. **Case Report**: A 30-year-old male patient presented to the Prosthodontic Clinic at Universitas Padjadjaran's Dental Hospital with complaints of low self-confidence due to his eye condition. The patient lost his left eye in childhood due to trauma and subsequently underwent surgical removal. Examination revealed a healthy conjunctiva with no signs of infection. Meanwhile, the right eye had experienced an infection six years ago but had not been removed. Examination showed a shrunken eyeball with vision loss. Bilateral custom ocular prostheses were fabricated for aesthetic purposes. **Conclusion**: Precisely crafted ocular prostheses offer advantages in retention, stability, aesthetics, and comfort for patients with anophthalmic sockets following enucleation and phthisis bulbi.

## KEYWORDS

Anophthalmic, ocular enucleation, phthisis bulbi, ocular prostheses

## INTRODUCTION

Based on the severity of the patient's eye condition, three types of surgical management can be performed: evisceration, enucleation, and exenteration. Following evisceration or enucleation, anatomical and physiological changes occur within the orbital cavity. An anophthalmic socket refers to a cavity resulting from the removal of the eyeball or contents of the eyeball. Several reasons for the loss of an eyeball include trauma, tumors, injuries, infections, malignancies, sympathetic ophthalmia, congenital defects.[1,2]

The resulting anatomical and physiological changes include enophthalmos, deep superior sulcus, laxity of the lower eyelid, ptosis, and malposition.[1,3] Phthisis bulbi represents an advanced stage of ocular pathology, denoting a progressive shrinkage of the eyeball due to halted aqueous humor production, with 'phthisis' connoting 'wasting away' in clinical terminology. This condition is marked by the atrophy, shrinkage, and disorganization of the eyeball and its internal structures, leading to compromised vision and aesthetic distortion. The cause of phthisis is often uveitis, either long-term or following trauma, surgery, or end-stage, heavily treated glaucoma.[4]

Loss of an eyeball due to enucleation and phthisis bulbi procedures results in functional deficiency and facial deformities. Such cases can cause significant psychological distress, especially if they result from unexpected infections or

trauma. The eye is a vital component of a person's facial expression that influences non-verbal interpersonal communication in everyday social life.[5]

Maintaining a healthy socket condition, proper eye muscles for blinking, normal eyelash positioning, the absence of superior or inferior eyelid malposition, and ensuring normal eyelid closure post-enucleation or phthisis bulbi is crucial to enable the creation of an ideal ocular prosthesis.[3,6–9]

Nowadays, in the United States, ocular prostheses are made from polymethylmethacrylate (PMMA), commonly known as acrylic.[1,10] Similarly, in Indonesia, PMMA is widely used for ocular prostheses due to its durability, biocompatibility, and ability to closely mimic the appearance of natural eyes. Studies conducted in Indonesia emphasize the effectiveness of PMMA in creating customized ocular prostheses with superior aesthetics and comfort. [11,12] This case report outlines socket rehabilitation in a patient with anophthalmic ocular sinistra and phtisis bulbi ocular dextra, focusing on preserving socket shape and support from muscles.

This case is particularly notable as it involves bilateral ocular prostheses and highlights the approach to achieving stabilization in a socket that still contains the eyeball. The aim of this case report is To present the clinical steps and outcomes of prosthetic rehabilitation in a patient with an anophthalmic left eye and phthisis bulbi in the right eye, using custom-made ocular prostheses to restore esthetics, improve comfort, and enhance the patient's quality of life.

## Case Report

A 30-year-old male patient presented at the Prosthodontic Clinic of Universitas Padjadjaran's Dental Hospital with complaints of lacking confidence due to his eye condition. The patient has been a judo athlete for 5 years. He undergoes medical check-ups every 6 months, and the results have always been good. The patient has never worn an ocular prosthesis before. No family members have encountered a similar experience.

The patient reported that he lost his left eye in childhood due to trauma and underwent surgical removal. Examination of the left eye revealed a healthy conjunctiva with no signs of infection (Figure 1). Meanwhile, the right eye had been affected by an infection six years ago but had not been removed. Examination of right eye showed a shrunken eyeball with vision loss (Figure 2). The diagnosis of anophthalmic ocular sinistra and phthisis bulbi ocular dextra was confirmed (Figure 3). The ICD-10 of this diagnosis is Q11.1 Microphthalmos This case has a good prognosis if the operator can make a stable ocular protesis and also can fungtional as well.

**Figure 1. Left eye revealed a healthy conjunctiva**

**Figure 2. Right eye with shrunken eyeball with vision loss**

**Figure 3. Anophthalmic ocular sinistra and phthisis bulbi ocular dextra.**

Bilateral custom ocular prostheses with customized iris and sclera are planned for the patient. Prognosis for this case is favorable with the use of the ocular prosthesis. The entire treatment procedure is explained to the patient before starting, and informed consent is obtained. After a thorough history-taking and examination, the impression process begins with the fabrication of a custom impression tray is cpnstructed to the size of the patient's eye socket. The impression tray is made of self-cured acrylic material with the addition of a straw for inserting the impression material. The patient's eye is first cleaned with sterile sodium chloride solution to remove dirt and debris. Then, the impression tray is tested for fit on the patient.

Ocular impression is taken using polyvinyl siloxane impression material (light body). The patient is instructed to sit upright and relax. Before the impression, the eyebrow area is lubricated with petroleum jelly, then the eye socket is cleaned with a saline solution injection and dried with a cotton pellet (Figure 4).

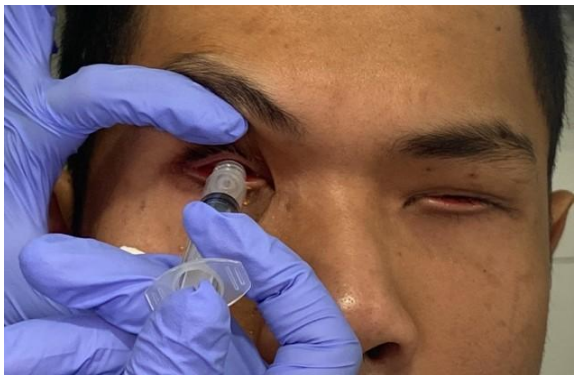

**Figure 4. Cleaning the eye socket with a saline solution injection and drying it.**

Slowly and evenly inject the impression material into the socket until it flows into the orbital and eyelid areas (Figure 5).

**Figure 5. Inject the impression material into the right socket.**

Instruct the patient to keep their eye open while placing the impression tray onto the orbital area, applying light pressure while instructing the patient to perform functional movements. Once the impression material has fully set, carefully remove the tray (Figure 6). Recheck the eye socket to ensure no impression material is left inside. Disinfect the impression with an alcohol spray and pour plaster to create the cast. After all stages are completed, send the impression to the laboratory.

**Figure 6. Impression material has set**

During the second visit, the patient is instructed to sit upright and remain relaxed. The upper eyelid is lifted, and the upper edge of the scleral shell template is inserted. The lower eyelid is pulled down to facilitate insertion of the lower edge of the scleral shell template. The scleral shell template, with wax material, must fit comfortably to prevent irritation (Figure 7). Eyelid movement during opening and closing, along with the shape of the eyeball, are observed from all angles to resemble the contralateral eye. Key considerations at this stage include the alignment of the eyeball shape, convexity, the ability of the eyelids to open and close, aesthetics, stability, and retention. The size, color, and iris configuration are selected based on the natural eye on the contralateral side as a guide.

**Figure 7. Try in Scleral shell template with wax.**

During the second visit, the patient is instructed to sit upright and remain relaxed. The upper eyelid is lifted, and the upper edge of the scleral shell template is inserted. The lower eyelid is pulled down to facilitate the insertion of the lower edge of the scleral shell template. The scleral shell template with wax material must fit comfortably to prevent irritation. Eyelid movement during opening and

closing, along with the shape of the eyeball, is assessed from all angles to ensure it closely resembles the contralateral eye. Key considerations at this stage include the alignment of the eyeball shape, convexity, the ability of the eyelids to open and close, aesthetics, stability, and retention. The size, color, and iris configuration are chosen with conjunctiva using white acrylic, and the pupil color using the handmade of oil color.

During the third visit, the pupil position is determined by aligning the edge of a PD ruler, marked with a point, on the sclera using a pencil or permanent marker. The iris diameter of the natural eye is measured using a sliding caliper (Figure 8).

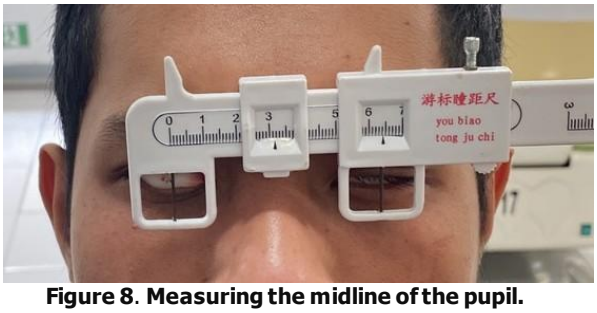


**Figure 8. Measuring the midline of the pupil.**

The scleral shell made of polymethylmethacrylate (PMMA) is then removed from the eye socket, and a circular outline representing the iris is created according to the diameter of the natural eye's iris, using a compass centered on the previously marked pupil point. It is essential to ensure that the scleral shell is symmetrical with the both eyes, has the same convexity as the contralateral eye, and is comfortable with no sharp edges (Figure 9).

**Figure 9. Try in the scleral shell with polymethylmethacrylate.**

During the fourth visit, the patient is instructed to sit upright and relax. The eye socket is cleaned with a saline solution and dried with cotton pellets. The right and left ocular prostheses are inserted, and the patient is asked to perform functional movements by looking left, right, up, and down (Figure 10 & 11). The comfort and movement of the prostheses within the socket, convexity, and the ability of the eyelids to open and close are evaluated. Aesthetic appearance, retention, and stability are reassessed.

**Figure 10. Ocular Prostheses**

**Figure 11. Insertion bilateral Ocular Prostheses.**

Post-insertion instructions regarding the use, limitations, and care of the prostheses are provided. The patient is instructed on how to remove and insert the prosthesis, such as removing the prosthesis by pulling the lower eyelid downward, looking upward, and pulling the lower margin of the prosthesis with one finger. The prosthesis is recommended to be worn continuously for 24 hours and not removed at night to prevent eyelid folding. Before removal, the prosthesis should be moistened, then washed under running water with hypoallergenic soap, and soaked in a saline solution. Eye drops should be used frequently to prevent dryness. A follow-up appointment is scheduled for one week after insertion.

During the fifth visit, the patient reports experiencing comfort throughout the week of use. Examination of both left and right eye sockets shows no signs of inflammation. The eye socket is cleaned with a saline solution and dried with cotton pellets. The ocular prostheses are inserted, demonstrating good retention, stability, and aesthetics. A follow-up appointment is scheduled two years after insertion.

## DISCUSSION

The loss of one or both eyeballs can lead to significant psychological distress and functional impairments, affecting self-esteem, social acceptance, and the anatomical balance of the face. In addition to aesthetic concerns, it also results in vision impairment. The fabrication of ocular prostheses is an essential step in rehabilitation, helping restore patient confidence, maintain facial symmetry, and prevent eyelid collapse.[11]

Before proceeding with the fabrication of an ocular prosthesis, a thorough patient evaluation is necessary to determine the prognosis.[14] This assessment should include both physical and psychological aspects, ensuring that patient expectations align with achievable outcomes. Factors such as time, cost, and material selection must be discussed to facilitate proper planning, as the fabrication process requires specialized skills.[15,16]

One of the key challenges in ocular prosthesis fabrication is achieving a natural appearance and movement. While prefabricated prostheses are more cost-effective, they may not conform perfectly to the patient's socket, potentially causing discomfort and dissatisfaction. In contrast, customized ocular prostheses offer superior adaptation, better aesthetic integration, and coordinated movement with the contralateral eye.

In this case, involving an anophthalmic socket following enucleation sinistra and phthisis bulbi dextra, a customized ocular prosthesis was recommended. The ability to adjustc the iris position and color to match the contralateral eye is a significant advantage, achievable only with customized prostheses.[17] The use of polymethylmethacrylate material ensures biocompatibility, superior aesthetic outcomes, and enhanced comfort for the patient.[15,18] To ensure functionality, an ocular prosthesis must maintain orientation when the patient looks straight ahead, support normal eye opening, provide adequate eyelid support, and allow some degree of coordinated movement. Additionally, it must be well-retained within the

socket while remaining aesthetically pleasing. Custom-made prostheses, despite requiring a meticulous fabrication process, provide better long-term aesthetic and functional outcomes compared to prefabricated alternatives.[19] While they cannot restore visual function, these prostheses play a crucial role in mitigating psychological trauma associated with eyeball loss and significantly aid in the patient's social reintegration.[20] Ocular prostheses require replacement every 2 to 5 years to maintain an optimal fit within the socket, as changes such as tissue shrinkage, socket modifications, and color fading occur over time.[4,8,20]

A limitation observed in this case is the presence of a shrinking eyeball on the right side, which prevents the ocular prosthesis from completely filling the socket. As a result, the left and right prostheses are not perfectly symmetrical, and movement in the right eye remains somewhat restricted due to the residual shrinking eyeball. Despite these challenges, the patient initially reported discomfort and unfamiliarity with the prosthesis, requiring approximately one week of adjustment. However, over time, the patient became accustomed to wearing the prosthesis, and it no longer interfered with daily activities, including participation in judo.

## CONCLUSION

Precisely customized ocular prostheses offer advantages in retention, stability, aesthetics, and comfort for patients with an anophthalmic socket following enucleation and phthisis bulbi. However, this ocular prosthesis may not be usable indefinitely because there are changes, both in the socket and in the prosthesis itself, necessitating renewal within 2 to 5 years. The implication of this case report is that the ability to create a prosthesis that closely matches the contralateral eye in terms of color, shape, and movement greatly improves patient confidence and restores a more natural appearance.

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