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CASE REPORT

Ocular prosthetic of patient with shallow socket: Different impression technique

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ABSTRACT

The loss of an eyeball can be caused by trauma, surgery, or defects in the ocular area. Missing this part of the body can result in loss of vision and a decrease in self-confidence for the patient. Through our clinical report, a custom-made ocular prosthesis was made using acrylic resin materials which aims to provide rehabilitative care and restore patient self-confidence. A 27-year-old patient came to RSGM Prof. Soedomo for an ocular prosthesis after losing her eyeball due to an infection. Clinical examination revealed that the patient's ocular profile is convex while her eye sockets are shallow. This makes it challenging to create an ocular prosthesis. In this case report, the impression of work model uses two methods to determine the best way to make an impression of shallow eye sockets. Using an individual tray, one impression uses putty and light body, and the other uses light body only. Better results were obtained when the impression was made using the light body only in this case. The patient expressed satisfaction with her new custom-made ocular prosthetic. When compared to manufactured ocular prosthesis, custom-made prostheses offer superior fitting, comfort, and aesthetics, as they closely resemble the contralateral patient's natural eye. (IJP 2025;6(1):21-25)

Introduction

Loss of an eyeball is a condition that can affect the function of surrounding organs, disturb the aesthetics of the face, and even a person's psychological state. Eyeball loss can be caused by congenital eye diseases, eye damage due to blunt and sharp trauma, traffic accidents, sports accidents and severe eye infections.[1] Surgery for eyeball removal is divided into enucleation and evisceration. During an evisceration treatment, the sclera and extraocular muscles are preserved. This procedure is mostly considered cosmetic. In contrast, during an enucleation procedure, the entire eyeball is removed.[2] The orbital tissues that formerly supported and shielded the natural eye become useless after surgery and have a tendency to shrink, resulting in the loss of orbital volume.[3] Ocular defects are a significant maxillofacial weakness that requires replacement of prosthetics. Stock ocular prosthesis, modified stock ocular prosthesis, and customized ocular prosthesis are some of the techniques that have been implemented.[4]

The most common techniques for ocular prostheses are stock ocular prosthesis and customized ocular prosthesis. Stock ocular prosthesis have the advantage of being minimally made since they do not require laboratory manufacturing procedures. There are three sizes and three iris colours available for manufactured ocular prostheses. The ocular prosthesis has a drawback due to the size mismatch between the eyeball and its socket, which can cause pain and infection. This is caused by a water sac that serves as bacterial breeding ground. Additionally, the mismatched iris colours can lead to unsightly issues. On the other hand, the customized ocular prosthesis has an advantage over the contralateral eye in terms of size and colour likeness. By preserving the equilibrium of pressure surrounding the eye socket, this can lessen the probability of lacerations and ulcerations on the conjunctiva. Because the iris and sclera of the personalized ocular prosthesis are made to order and painted, the results are more aesthetically pleasing. The main disadvantage of custom-made ocular prosthetics is that they take longer to make.[3-5]

Ocular impressions are typically made using alginate, silicone, or polyether materials. The choice of material depends on various factors including patient sensitivity, socket condition, and the ocularist's preference. Alginate is a popular choice due to its ease of use, although it must be used immediately due to its rapid setting time and tendency to shrink upon drying. Silicone materials, while more expensive, provide a more accurate and stable impression.[6]

Through our clinical report, a custom-made ocular prosthesis was made using acrylic resin materials, which aims to provide rehabilitative care and restore patient self-confidence. In this case, patient's eye has a shallow socket, which is complicated by the fact that the patient's eye profile tends to be convex. In this case, two types of impression techniques were performed to see which technique was better.

Case Report

A 27-year-old patient came to RSGM Prof. Soedomo UGM, on her . own initiative to have a suitable right ocular prosthesis made to improve her appearance because the patient was not confident.

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Figure 1. Initial patient profile

Figure 2. Initial impression making

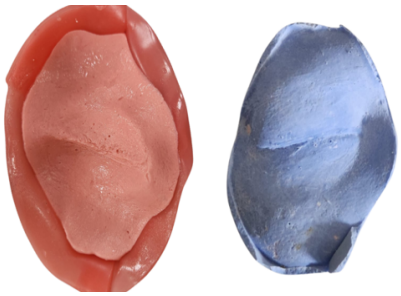

Figure 3. Initial impression and study model

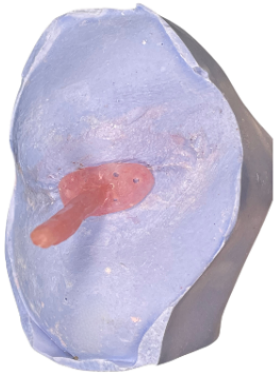

Figure 4. Individual tray

According to her medical history, the patient lost her right eyeball due to an infection of the retina in early 2023. The patient had undergone surgery to remove the eyeball (enucleation). The patient had previously used a fabricated ocular prosthesis after surgery, but the prosthesis didn't fit well and was uncomfortable.

At the first visit, anamnesis was taken of the patient, the patient's profile was photographed figure 1, and an impression of the study model was made using irreversible hydrocolloid or alginate impression material figure 2. Figure 3 shows the initial impression and study model.

Subsequently, individual tray was made using acrylic resin. Try-in the individual tray on the patient's eye socket, making sure there are absence of sharp parts. The eye impression is taken using a rubber-based impression 'material. The patient is seated upright, looking straight ahead, and is instructed to relax and cover the skin of the impression area with Vaseline. The impression for work model were taken two times with different technique. Polyvinyl siloxane was the material that used in this case. The first one was using putty and light body and the second one using light body only.

On the second visit, a working model is made using 2 different impression methods. Before the impression making, first try-in the individual tray figure 5A. The individual tray should not be sharp as it may cause pain to the patient. The impression was then taken using two methods. The first method was using putty and a light body figure 5B and figure 5C. The putty material is placed on the individual tray first. The light body material was injected into the eye socket until it was full, then the individual tray containing the putty material was inserted back into the eye socket. Wait until it sets. The impression was checked, as are the eye sockets, to ensure that no impression material was left in the eye sockets. In the second impression technique, the impression material used was a light body figure 5D, which is directly injected into the eye socket, and then the individual tray is inserted into the eye socket. Instruct the patient to perform physiological eye movements such as moving the eyes to the right, left, up, down, closing, and opening the eyes. With this technique, an accurate impression of the anatomical part of the defect area and natural eye convexity are obtained figure 6A and figure 6B.[7]

The next stage was making a mould to make the wax model figure 7. The mould was filled in three parts, the first part of the mould was filled with hard gypsum until the widest part of the socket base mould, the excess hard gypsum is smoothed out. Before the setting time ends, two or three indentations are made on the surface of the hard gypsum which will later function as keys. The hard cast was then coated with vaseline and the second and third part was divided by wax and part of the mould was filled with hard gypsum. After the working model hardens, the impression material and individual tray were removed from the working model. The working model can be separated into three parts. Next, the working model was trimmed with a plaster knife.

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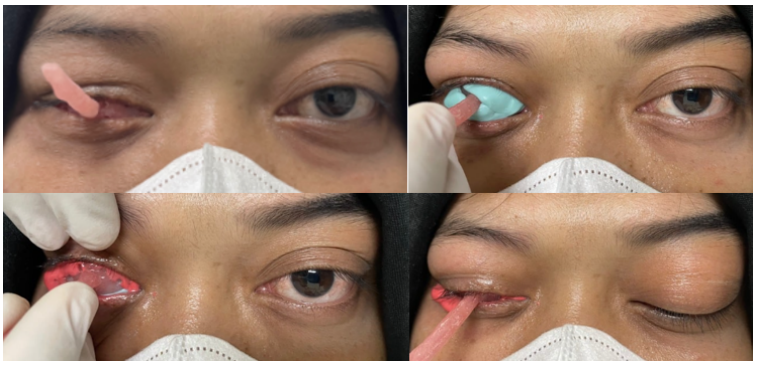

Figure 5. A. Individual tray try-in, B. Putty impression making, C. Lightbody impression making after putty, D. Light body only impression making

Figure 6. A. Putty and light body impression, B. Light body only impression

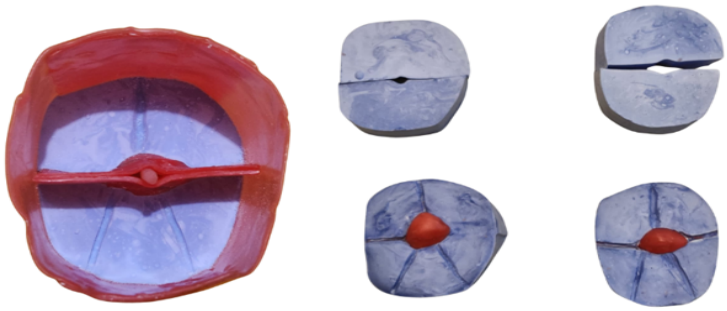

Figure 7. Mould and wax model making

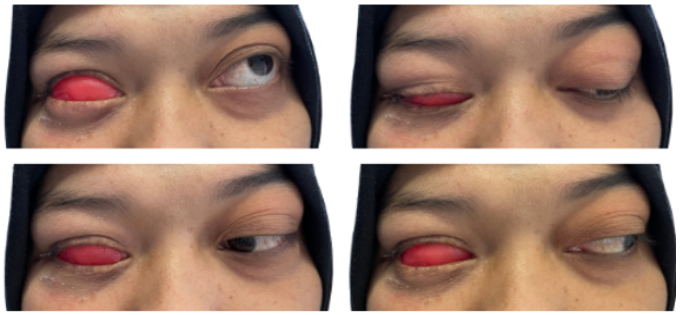

Figure 8. Try-in the wax model by instructing the patient to look up and down, left and right

Using modelling wax and the working model impression as a guide, the sclera model was created. Wax scleral model try-in. After telling the patient to sit up straight and unwind, the scleral model was placed into the socket. The patient was asked to look left and right, and up and down to ensure the model did not fall out of the socket figure 8. Apart from that, check the edge area to see if there are empty gaps or parts that don't fit properly. Since an accurate impression technique may reliably capture the interior tissue surface and fornixes of the socket, most authors concur that a critical step in assessing fit is a wax trial ocular prosthesis try-in.[8] In this third visit, a shade guide was used to determine the scleral colour figure 9. The results of the scleral model and colour determination photograph were sent to the laboratory for the fabrication of the acrylic sclera. Try-in the wax model by instructing the patient to perform physiological eye movements.

On the fourth visit, try-in the scleral acrylic to the socket. The upper eyelid was lifted and the upper edge of the sclera was inserted. The lower eyelid was then retracted slightly to allow the lower border of the acrylic sclera to be included. The acrylic sclera should be comfortable and there should be no complaints of pain. The sclera must be symmetrical to the opposite eye. The patient was again asked to look left and right, and up and down to ensure the model does not fall out of the socket. At this visit, the location and diameter of the iris as well as the central pupil markings were made based on the opposite eye. The center of the pupil was marked with a pencil or marker. The patient's iris diameter was found to be 11 mm. Iris diameter was confirmed by direct measurement using a sliding calliper figure 10.

The center of the pupil and the diameter of iris were identified and marked on the blank acrylic sclera with the help of sliding calliper. After drawing the outline, the prosthesis was sent to the dental laboratories to draw the iris based on the patient's eye photograph.

The following appointment was for the insertion of the ocular prosthesis figure 11. During the insertion, it is important to check the following: Retention: the ocular prosthesis remains in place when worn and does not detach from the eye socket; Stabilization: when wearing an ocular prosthesis, there should be no pain, and the colour and symmetry should match the existing eye or protrusion of the eyeball; Comfort: the patient reports feeling comfortable while wearing their ocular prosthesis.

The patient was instructed to maintain cleanliness around the eye and to remove the ocular prosthesis at night for cleaning using cotton wool. A follow-up appointment was scheduled for 1 week later to monitor progress. During the appointment, the patient reported experiencing continuous tears at the beginning of use, but eventually adjusted and returned to normal. Apart from that, the patient reports feeling

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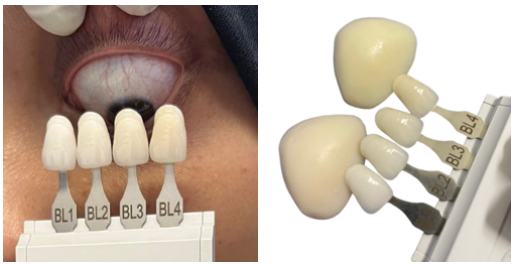

Figure 9. Determination of scleral colour with a dental shade guide

Figure 10. Determination of the central point of the pupil and pupil diameter

Figure 11. Before and after using ocular prosthesis

comfortable with the prosthesis and not experiencing any pain. The patient's appearance was nearly normal following the successful, effective, and aesthetically acceptable rehabilitation of the ocular defect, as evidenced by the results of the post-operative examinations.

Discussion

Eyes are one of the most specialized and developed sensory organs of the body. The loss of an eye has a deep effect on the psyche of a patient. In the present case report, the surgery and the loss of an eye had a significant psychological impact on the patient.[9] When compared to a stock ocular prosthesis, prosthetic rehabilitation with a custom-made ocular prosthesis can result in better and more gratifying outcomes for the patient on both an aesthetic and psychological level.[10] Acrylic is the material most frequently used due to its versatility, which benefits tissue, appearance, durability, resistance to colour fading, capacity to be sculpted to fit a socket, affordability, and ease of manipulation.[11]

Dental putty, which serves as the heavier, more stable base of the impression, is prepared according to the manufacturer's instructions. This putty is then inserted into the eye socket. The putty is chosen for its thicker consistency, which helps to create a stable base for the lighter, more detailed-impression material. Light body silicone impression material is known for its flowable consistency and ability to capture fine details. It is then applied over the putty or directly into the eye socket over the putty. Patients may be asked to close their eyelids or move their eyes in certain directions to ensure that the light body material spreads evenly and captures the intricate details of the socket. The advantages of using putty and light body silicone should be detail accuracy and comfort. The light body silicone captures fine details of the socket, while the putty provides a stable base. Both materials are generally well-tolerated by patients and do not cause discomfort when used correctly.[12-14]

In the impression results, it appears that the method using a light body showed better results compared to using putty and light body. According to Turner "Light body impression materials have good biocompatibility and good dimensional stability so that they are very accurate in eye impression".[15]

The patient's eye was then used to test the fit, comfort, and bulkiness of the wax design. Corneal prominence was checked for by standing behind the patient. This will affect the retention of the ocular prosthesis. When there is too prominence ocular prosthesis in the case of a shallow socket it will reduce retention.[16] Wax model should fit in eye properly and should not come out while moving eye in all directions.[17]

Conclusion

For shallow eye sockets, an impression technique utilizing only light body silicone is recommended. This method's fluid viscosity enables it to cover a larger area and capture finer details, resulting in a more accurate and comfortable fit for the ocular prosthesis.

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