

## Modified impression tray and iris positioning ocular prosthesis of post enucleation socket syndrome: case report

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### ABSTRACT

The cosmetic disfigurements which arise due to loss of orbital volume after enucleation of an eye include enophthalmos, superior sulcus deformity, upper eyelid ptosis, and lower eyelid laxity. The treatment can be either conservative or surgical. For patients who does not want to undergo further surgical procedures, the conservative treatment is simple, non-invasive, and appropriate. This case report describes modified impression tray and iris positioning technique of post enucleation socket syndrome to achieve aesthetics and function. A 65-year-old male patient reported to the Dental Hospital Universitas Sumatera Utara with the chief complaint of facial disfigurement due to loss of the right eye. Patient had enucleation 6 months ago and using conformer after surgery. The diagnosis was post enucleation socket syndrome. Clear acrylic sclera as a tray without handgrip will precisely records of the palpebre convexity and specified socket. The use of eyebrow ruler helps accurately determine the symmetrical iris position compared to only visually determining which is subjective with the possibility of interobserver errors. It was concluded that clear acrylic sclera as a tray and eyebrow ruler to determine the position of iris resulting in patient satisfaction due to aesthetics and function.

**Keywords:** post enucleation socket syndrome, impression tray, iris position, eyebrow ruler

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### INTRODUCTION

The loss of an eye can have physical, social, and psychological impacts on the affected person. Physical flaw due to an ocular defect compromises appearance and function, which prevents an individual from leading a normal life and usually prompt the individual to seek treatment that will reinstate acceptable normalcy. The combined efforts of the ophthalmologist, plastic surgeon, the maxillofacial prosthodontist and dental technicians are needed to provide a satisfactory ocular prosthesis.<sup>1</sup> The enucleation of the eye globe is undertaken by an ophthalmic surgeon only when all other eye treatments are ineffective, inappropriate or undesirable. It is the final measure taken most frequently when a patient has intra-ocular malignancy, trauma, and a blind, painful eye. Following enucleation, the orbital tissues that once supported and protected the natural eye no longer serve a useful purpose and tend to shrink leading to loss of orbital volume. The cosmetic disfigurements which arise due to loss of orbital volume after enucleation of an eye include enophthalmos, ptosis of the upper eyelid, deepening of the superior sulcus, backward tilt of the ocular prosthesis, and drooping of the lower eyelid i.e. ectropion. These symptoms, summarized in 'the postenucleation socket syndrome,'

may arise separately or in combination and vary in severity.<sup>2,3</sup>

Enucleation or evisceration causes constriction of the tissues around the ocular cavity. A temporary conformer to prevent tissue contraction will maintain proper contours. The fabrication of a definitive ocular prosthesis should begin as soon as the socket has healed. An ocular prosthesis is a maxillofacial prosthesis that artificially replaces an eye missing as a result of trauma, surgery, or congenital prosthesis does not replace missing adjacent skin, mucosa or muscle.<sup>4</sup>

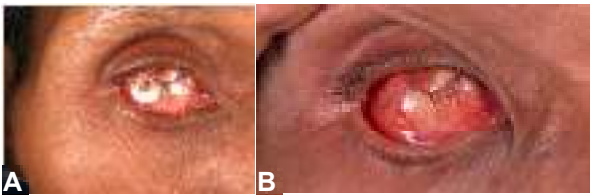
Ocular prosthesis can be classified as stock shell and custom-made prosthesis. The close contact of custom-made ocular prosthesis with the tissue bed improves tissue health by reducing fluid accumulation in tissue-prosthesis interface thereby decreasing the chances of tissue irritation and bacterial growth. Custom ocular prostheses are also known to distribute the pressure more equally and decrease the incidence of conjunctival abrasion as compared to stock ocular prostheses.<sup>4</sup>

This article describes a technique for fabricating a custom-made ocular prosthesis using conventional technique. The technique described in this article provides a cost-effective choice for optimal anophthalmic socket rehabilitation.

## CASE

A 65-year-old male patient was referred by an ophthalmologist at the Sumatra Eye Center Medan to the Dental Hospital Universitas Sumatera Utara for an eye prosthesis. The patient felt discomfort in his right eye because there was an object (hair), then the patient tried to remove it by hand and bleeding occurred in his eye. Enucleation surgery was performed in 2019 and a conformer was attached to the patient's right eye. After six months of using the conformer, the patient felt insecure in his activities and wanted to make an eye prosthesis.

On clinical examination of intraocular tissue, there was a conformer (Fig. 1A) in the eye that had never been removed and cleaned by the patient since postoperative because there were no instructions given by the ophthalmologist. After the conformer was removed and cleaned, the eye condition was good, there were threads and the depth of the eye socket on the superior and inferior eyelids was deep enough, there was eye excretion in it and then cleaned (Fig. 1B). The diagnosis was post enucleation socket syndrome.



**Figure 1A** Conformer on the right eye; **B** intra-ocular examination



**Figure 2** Customized impression tray

## MANAGEMENT

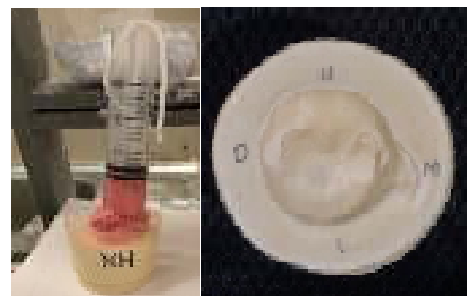
Case management began with anatomical impression performed using a customized impression tray of self-polymerized acrylic resin which was connected to a syringe (Fig. 2) by try in first into the eye socket.

Furthermore, vaseline was applied to the eyelashes to prevent from sticking to the impression material so that they are easy to clean. Alginate impression material was inserted into the syringe, the impression tray was placed into the socket, and then injected. The patient was seated in an upright position and instructed to move the eyeball to the right, to the left, up and down without moving the head to get the proper depth and width of the socket (Fig. 3A). After the material was set, the tray was

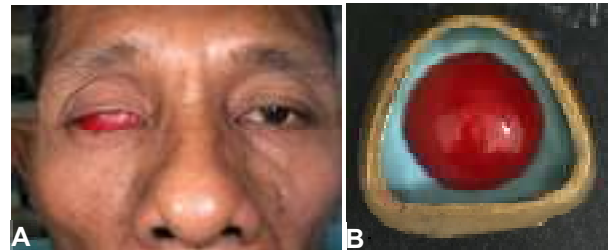
removed and the remaining impression material was cleaned from the socket (Fig. 3B).



**Figure 3A** Anatomical impression with alginate; **B** the anatomical impression



**Figure 4** Mold making



**Figure 5A** Wax sclera try in; **B** mold making for physiological impression tray

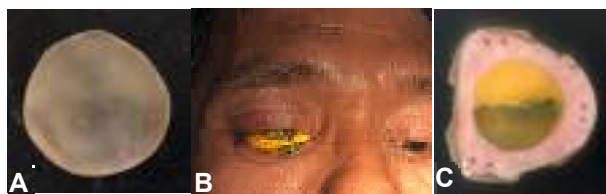
The anatomical intaglio surface was implanted in a small plastic cup containing type III dental stone on the non-anatomical surface and the top (anatomical surface) was filled with type IV plaster (fuji rock) to obtain maximum detail (Fig. 4)

Making a scleral wax pattern by pouring. The surface of the mold was moistened with water and the molten wax was poured into the mold. When the wax begins to set the surface was pressed with a finger to reduce shrinkage of the wax. The wax pattern was shaped by the natural convexity of the eye with the highest part of the convexity located in the pupillary area. Trials on patients to get the shape of the eyeball that best fits the natural eye. After everything was matched, the surface of the wax pattern was smoothed (Fig. 5A).

Making a physiological impression tray by making a mold first, implanted a scleral wax pattern in-

to a cuvette filled with putty with the anterior surface facing up, after the putty was set the surface was given vaseline and then inserts the putty into the opposite cuvette. After the putty was set the cuvette was opened and the wax pattern was removed (Fig.5B). Vaseline was applied to the mold, then the self-polymerized clear acrylic resin was poured on the cuvette and then pressed. After setting, the sclera, was polished and try in into the patient's eye. The intaglio surface and the outer surface were reduced by 1 mm for the physiological impression material (Fig.6A).

Physiological impression was done with light body impression material by first injecting the impression material into the eye socket, then inserting a self-polymerized clear acrylic resin scleral pattern into the eye socket and the patient was instructed to move the eyeball to the right, left, up and down and close the eye socket, to record the depth, width and convexity of the eyes (Fig.6B).



**Figure 6A** Self-polymerized clear acrylic resin scleral pattern as physiological impression tray; **B** physiological impression; **C** physiological mold making



**Figure 7** Trial wax sclera and pupil midpoint determination

The filling of the physiological mold was carried out by implanting it in a cuvette containing type IV dental stone. After setting, vaseline was applied to the entire surface of the dental stone and physiological impressions, then the antagonist of the cuvette was closed and filled with type IV dental stone to obtain a mold (Fig.6C).

Making a scleral wax pattern by pouring. The wax pattern was adjusted and trial in the patient's eyes. After that, the center of the pupil was determined using the eyebrow ruler and marked with a marker and adjusted to the position of the middle point of the pupil of the left eye. In this patient the

distance from the guide point of the eyebrow ruler to the midpoint of the original pupil is 2.5 cm. Determination of the diameter of the iris (11.5 mm) using a compass and then the circle is colored with a marker on the entire iris (Fig.7).

The iris coloring uses a paper iris disk technique with modifications, the paper material was replaced with a black disk of the doll's eye, using acrylic paint with a mixture of brown and black colors adjusted to the color of the iris of the other eye, then clear acrylic was boiled to get the iris button (Fig.8)



**Figure 8** Iris button making

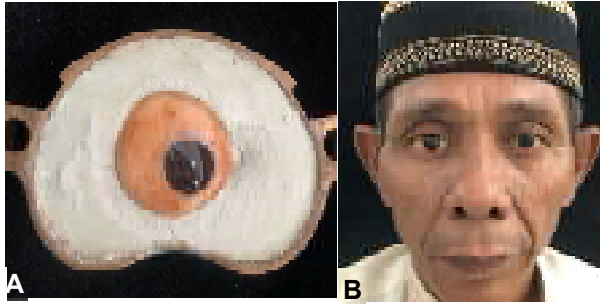
The marked wax sclera was perforated from the front and the iris button was inserted into it adjusted to the convexity of the patient's eyes, then trial on the patient (Fig.9A).

The surface of the mold was applied with cold mold seal (CMS) as a separation medium, before using acrylic resin (Heat cure shade 3). The acrylic was stirred and then filled in the bottom of mold, covered with cellophane plastic. The top cuvette was re-assembled and then slowly pressed, the excess acrylic was removed. Apply pressure again, lock the cuvette in a depressed state, then do the boiling. The sclera was trimmed and polished and trial on the patient's eyes (Fig.9B)



**Figure 9** Trial sclera and iris; **B** 10 Sclera trial

Clear acrylic filling (Meliodent, heat cure denture bases material, color 01, clear) was performed by returning the sclera to the implanted cuvette, the surface of the cuvette was applied with cold mold seal. For clear acrylic applying, boiling, finishing and polishing were carried out (Fig. 10A). The finished prosthesis was fitted with attention to appearance, comfort and function (Fig.10B). The pa-



**Figure 10A** Clear acrylic applying; **B** the patient was wearing a right ocular prosthesis

patient was given instructions on how to put on and remove the prosthesis, care at home should be done with care and clean hands, the prosthesis is removed only when cleaning. Control was carried out on day 7 post-insertion.

The first control after one week of insertion the patient complained of a lot of tears and dirt in the eyes. There is no pain and the eyes do not come off when activity. There was an overextended and pressing edge in the median canthus area and it was reduced with a fine stone bur and re-polished.

## DISCUSSION

The challenge in restoring an ocular defect is replacing a mobile sense organ with a static prosthesis. An ocular prosthesis should maintain its orientation when the patient is looking straight ahead. It should restore the normal opening of the eye, support the eyelids, restore a degree of movement, must be adequately retained and esthetically pleasing. The use of a stock prosthesis is usually advocated when time is limited, and cost is a consideration. Fabrication of a custom ocular prosthesis allows several variations during construction. The close adaptation to tissue bed uses the full potential to produce movement. Voids that collect mucus and debris and irritate mucosa and act as a potential source of infection are minimized. Optimum cosmetic and functional results enhance the patient's rehabilitation to a normal lifestyle.<sup>1,5-7</sup>

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A properly fitted and acceptable custom ocular prosthesis has the following characteristics such as retains the shape of the defect socket, prevents collapse or loss of shape of the lids, provide proper muscular action of the lids, prevents accumulation of fluid in the cavity, maintains palpebral opening similar to the natural eye, mimics the colorations and proportions of the natural eye, and has a gaze similar to the natural eye.<sup>8</sup>

During the postoperative period, it is important for the patient to wear a conformer. The use of a conformer will help maintain the eye socket. Custom conformer fabrication may be indicated when the definitive ocular prosthesis will be delayed due to slow patient recovery, medical complications or patient preference.<sup>9</sup>

The effectiveness of various impression techniques depends on various factors such as the type of patient, space for the prosthesis, available tools and materials, operator experiences and patient psychology.<sup>10</sup> Impression techniques are performed very well and satisfactorily in the rehabilitation of anophthalmic patients. This technique also aids in the proper adaptation of the ocular prosthesis and in close contact with the substructure of the eyeball, and the remaining muscle tissue, which in turn helps reduce the risk of microorganisms and secretions accumulating in the defect.

From this case, it is concluded that clear acrylic sclera as an impression tray without handgrip will precisely record the convexity and support of the eye, make it easier to determine the position of the iris with an eyebrow ruler and result in patient satisfaction because maximum esthetics and function are obtained. Delayed fabrication of an ocular prosthesis after enucleation will require many steps in the fabrication of the prosthesis due to changes in the size and shape of the anophthalmic socket. Although patient cannot see with an ocular prosthesis, it can restore the patient's confidence. The use of ocular prostheses has changed the social life of patients to a significant degree and increased self-confidence.

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