Retentive ocular prosthesis restores post evisceration patients' physical and psychological

[1]Steven Syahputra, [2]Ariyani Dallmer, [2]Putri Welda Utami Ritonga, [2]Haslinda Z Tamin
[1]Postgraduate Program in Prosthodontic
[2]Department of Prosthodontic
Faculty of Dentistry, Universitas Sumatera Utara
Medan, Indonesia
Corresponding: **Steven Syahputra**, e-mail: **steven.syahputra@hotmail.com**

ABSTRACT
Loss of eye does not only affect facial esthetics but also psychological health of the patient and leads to social disability. A custom-made ocular prosthesis is a good alternative to promote physical, psychological and esthetically pleasing appearance that can improve social acceptance of the patient. A 5-years-old female patient and 18-years old male patient were reported to Dental Hospital USU with the chief complaint of loss of an eye, making them often insulted by schoolmates, while the male patient lost confidence on socializing around. In these cases, ocular prostheses with modification of custom tray was made by using a putty index obtained from wax pattern to produce a better fitting ocular prosthesis so it expected to be retentive as to produce comfort and increase patient confidence. Contact between ocular prosthesis and tissue bed is necessary to evenly distribute the pressure obtained with proper impression technique. This technique ensures a good fit of the custom tray thereby produce accurate adaptation to the tissue surface can increase the movement of the prosthesis and provide a good natural esthetic outcome. Post evisceration patients need psychological support to restore confidence and self-esteem in today's cosmetics challenging world. For these cases, patients' self-confidence was restored and socializing as before without any embarrassment.
Keyword: physical and psycological, ocular prosthesis, evisceration, custom tray

This title has been presented in The 12th Biennial Congress of Asian Academy of Prosthodontics, 21 August 2021

INTRODUCTION

Eye is an important component of facial expression and is a vital organ of vision. Loss or absence of the eyeball can be caused by congenital defects, irreparable trauma, tumors, sympathetic ophthalmia, or conditions that require histologic confirmation of the suspected diagnosis. Surgical intervention is performed for the treatment of trauma, infecfection, and tumors that cause eye defects. This surgical procedure can be classified into three categories: enucleation, evisceration, and exenteration. Evisceration involves removing the contents of the eyeball and leaving the sclera intact. Enucleation is the removal of the entire eyeball after cutting the optic nerve and muscle. In contrast, exenteration is a more invasive surgical procedure, which involves removing the entire orbital contents including the eyelid and surrounding tissue.[1,2]

In evisceration, since the extra ocular muscles are intact, mobility of the eviscerated globe implant is good, the prosthesis best suited is the custom ocular prosthesis. A minimum of one mm thickness is required. Most patients remove ocular prostheesis at night since the remaining globe is very sensitive. Ocular prosthesis is a simulation of human anatomy by using a prosthetic material to create the appearance of a healthy eye and the normal surrounding tissue, as well as to maintain the volume of the eye socket.[3,4]

Apart from decreased visual function, eye loss also results in physical deformities that increase the psychological burden of the patient. Early rehabilitation with ocular prosthesis is recommended to ease the mind of the patient.[1] Ocular prosthesis is divided into stock shell and custom prosthesis. Close contact between the custom ocular prosthesis and the underlying tissue can improve tissue health by reducing the accumulation of fluid in the intersurface of the prosthesis-tissue thereby reducing the possibility of tissue irritation and bacterial growth. Custom ocular prostheses are also known to distribute pressure more evenly and reduce the incidence of conjunctival abrasion compared to stock ocular prostheses which are the problem in evisceration case that presence of sensitive eye tissue.[3,5] So, this article is aimed to discuss two cases about rehabilitation ocular defect post evisceration.

CASE

Case-1

An 18-year-old male patient was reported to the dental hospital USU with the chief complaint of missing left eye. From the patient's history it was known that he had a traumatic injury to his left eye 10 years ago, therefore he underwent surgery to remove the eyeball by evisceration procedure. Based on examination the ocular defect had healed well with good mobility of the posterior wall of the ocular defect during a full excursion.

DOI: 10.46934/ijp.v3i2.149

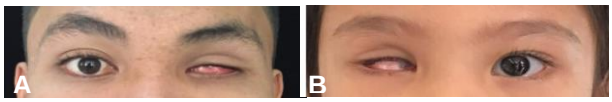

Figure 1 Ocular defect of left eye (patient-1), **B** right eye (patient-2).

The palpebral fissure is examined in the open and closed positions for anatomic and physiological abnormalities. The conjunctiva and sloughing of the inferior fornices were obtained on examination (Fig.1A).

Case-2

A 5-year-old female had an eye injury followed by a subsequent infection, which resulted in evisceration of her right eye a month ago (Fig.1B). Upon examination, the ocular defect had healed well with good mobility of the posterior wall of the ocular defect during full excursion, absence of infection, and sufficient volume to support the prosthesis. The presence of deep superior fornices is recognized by clinical examination.

MANAGEMENT

Both cases were rehabilitated by fabricating ocular prostheses. The difference is that the younger patient needs to be accompanied while the whole process required more patience from both the operator and the patient family. Petroleum jelly is applied to the eyebrows and skin to prevent the mold material from sticking to the eyelashes. Preliminary impression using a custom made of visible light cure (VLC) acrylic resin with the addition of several holes for excess of impression material (Fig.2). Impression material used irreversible hydrocolloid, injected into the eye socket. After setting, the material was removed from the eye socket to check that all surfaces have been imprinted properly.

Figure 2 Custom tray

Split model was fabricated by pour the bottom of the mold first using gypsum type II. After the bottom model set, apply the separating media to the surface of the mold. Then the second layer is poured back with gypsum type II. Markings are made on all four sides of the model for proper reorientation of the model. Wax pattern was created by pouring liquid wax into the mold. The wax is contoured and sculpted appropriately to provide a simulation of a missing eyeball (Fig.3). The wax pattern then inserted into the patient eye socket and checked for proper size, comfort, support, fullness, and retention with functional movement.

Figure 3 Wax try-in of case 1

Marking on the convex point of the wax pattern that defines the peak of the convexity of the eye and make line that marks the medial-distal canthus (Fig. 4). The wax-up convexity was then implanted into the putty impression material, then a custom tray made using self-curing acrylic resin on the putty index (Fig.5), a hole was made at the centre of custom tray as the entry point of impression material. Escape-holes were added for excess impression material.

Figure 4 Try-in wax patient-1

Figure 5 Custom individual tray

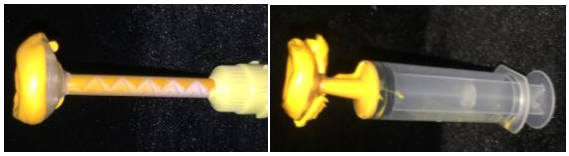

Figure 6 Custom individual tray impression

Final impression was taken using PVS light body, the patient sits upright with his head supported and was instructed to hold his gaze in a straight forward position. The custom tray then placed in the socket following the guide line that has been made to adjust the position of the custom tray in the center of the socket and impression was made by injecting light body material, the patient then instructed to close his and then perform various eye movements to record functional movements. Impression removed from the eye's socket and examined for the result (Fig.6).

The split model technique was generated using gypsum type IV to obtain a working model. Final

DOI: 10.46934/ijp.v3i2.149

wax pattern was made by pouring modeling wax on final cast. The size and color of the iris is determined by the left/right healthy eye. The iris button is then made according to the results of the measurements that have been made. Final wax pattern try in was performed to verify the size and support of the tissue to simulate eye movement and eyelid coverage. Patient was instructed to keep the eye on the object at least 3 feet in front and at eye level. The position of the iris is determined by connecting the inner and outer canthus and the upper and lower lids. The iris button was then implanted in a final wax pattern (Fig.7). During flasking, the iris button position was maintained using an acrylic mount. After the dewaxing procedure, packing and flasking heat cure acrylic resin with a color that has been adjusted to the color of the sclera.

Figure 7 Wax try-in with iris button; **A** patient-1, **B** patient-2

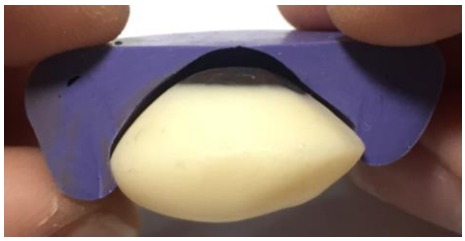

Figure 8 Putty index

The acrylic sclera was then polished continue creating a putty index (Fig.8) as a guide to reduce the convexity of ±2 mm of the sclera and iris botton. Colouring the acrylic sclera according to the patient's eye condition, insert the sclera back into the mold, packing heat cured clear acrylic resin to restore the convexity of the sclera. The prosthesis then removed from the flask, polished, disinfected, and delivery into the patient's eye socket (Fig.9). During insertion, the ocular prosthesis was evaluated in terms of aesthetics, retention, comfort, and ease of performing various eye movements. Post-fitting instructions are provided for the installation and maintenance of the prosthesis.

DISCUSSION

Ocular prosthesis is an artificial replacement for the eyeball. After the surgeon performs surgical

Figure 9 Post ocular prosthesis rehabilitation; left: before and right after; **A** patient-1, **B** patient-2

evisceration or enucleation of the eye, the prosthodontist will make an ocular prothesis to overcome the suffering caused by eye loss. A properly made ocular prosthesis can maintain its orientation when the patient performs various movements.[6]

Anophthalmic socket post evisceration has several advantages: the presence of the scleral, capsule of Tenon, conjunctiva, extraocular muscles, optic nerve which is still intact and leaves the cornea in place. Because the extraocular muscles are intact, this allows the ocular prosthesis to follow the patient's natural eye movements. However, with the cornea and optic nerve left behind, sensitivity to the prosthesis may occur, requiring a more careful procedure. Impression procedures on post-evisceration eye sockets with sensitive tissue remaining should use low-viscosity impression materials such as ophthalmic irreversible hydrocolloids and light body silicone elastomers with suitable, less-pressure impression tray.

The ideal socket for insertion of an ocular prosthesis should have 1) a well-placed implant with extraocular muscle is still available, 2) adequate superior and inferior fornix for positive retention of the prosthesis, 3) the palpebral fissure is the same size and shape as the natural eye tissue, 4) adequate anterior-posterior depth for the socket, 5) adequate support of the superior and inferior tarsal plates, 6) minimal scar tissue adhesion in the socket, 7) adequate eyelid mobility, 8) multiple tissue abnormalities in the socket depth for positive adaptation of the prosthesis.

Contracted socket with inadequate superior and inferior fornices, with palpebral fissures of unique size and shape and with inadequate anterior-posterior socket depth leads to impaired retention and cosmetic complications. Prosthetic treatment of a contracted socket involves constructing a conformer that applies gradually greater pressure to widen and shape the eye socket.[3]

In this paper, the discussion is carried out regarding prosthetic rehabilitation due to post evisceration defects. All cases were successfully rehabilitated with custom made ocular prostheses. In case 1, anophthalmic socket post evisceration

DOI: 10.46934/ijp.v3i2.149

occurred over a long period of time causing narrowing of the inferior conjunctival fornices, in contrast to case 2 where premature eye loss provided adequate superior and inferior fornices. Custom tray that has been adjusted to the shape of the patient's eye socket can give good results in both cases. Custom trays are adapted to the patient's extant anatomy thereby accurately fit into the sockets and assisting in obtaining accurate impressions of the patient's eye sockets.[7]

Another important step in creating an accurate impression is the tight adaptation of the intaglio surface of the ocular prosthesis to the posterior wall of the eye socket. Using PVS light body as an impression material can provide an advantage because the impression material can flow easily and record the eye socket clearly in a functional state which will ultimately result in tight adaptation and facilitate functional movement of the ocular prosthesis.

Beumer et al. stated that resin stock shell eyes should not be used in evisceration sockets because contact between the ocular prosthesis and the eye tissue is required to distribute pressure evenly. In addition, close contact between the ocular prosthesis and tissue bed is necessary to evenly distribute the pressure obtained with proper impression technique.

Replacement of the lost eye immediately is necessary to promote not only physical but also psychological healing which can improve patient's social acceptance.[8] An ocular prosthesis installation still during childhood adds an inestimable social contribution to the physical and psychological benefit in global rehabilitation of the patient. The extra effort and time put into fabrication of custom-made ocular prostheses has been a boon to patients who cannot afford other alternatives, including implants, and ensures a better drape of lid tissues, and provides a superior natural appearance to both patient and the observer.[9] This technique ensure a good fit of the custom tray thereby produce accurate adaptation of the custom ocular prosthesis to the tissue surface can increase the movement of the prosthesis and provide a good natural esthetic outcome that lead to increase patient's confidence.

It is concluded that rehabilitation ocular defect post evisceration is challenging and require long-term follow up. Post evisceration patients need psychological support to restore confidence and self-esteem in today's cosmetics challenging world. For these cases, self-confidence was restored and socializing as before without any embarrassment.

REFERENCES

1. Pun SN, Shakya R, Adhikari G, Parajuli PK, Singh RK, Suwal P. Custom ocular prosthesis for enucleated eye: a case report. J Coll Med Sci 2016;12(3).
2. bin Jamayet N, Kirangi JK, Husein A, Alam MK. A comparative assessment of prosthetic outcome on enucleation and evisceration in three different etiological eye defects: A case series. Eur J Dent 2017;11(1).
3. Sajjad A. Ocular prosthesis-a simulation of human anatomy-a literature review. Cureus 2012;
4. Azhar IS, Megantara RWA, Dahlan A. Custom-made ocular prosthesis for rehabilitation of missing parts of the face: a case report. Acta Med Philipp 2021;55(8).
5. Jain A, Rajeev V, Ugrappa S, Gaiklan S. Cost-effective modified technique for custom made ocular prosthesis: a case report. J Reconstr Surg anaplastol 2021;10(4).
6. Meenakshi A, Pradeepa T, Agarwa S. Prosthetic rehabilitation of an ocular defect: A case report. J Appl Dent Sci 2019;5(1).
7. Hallikerimath R, Preethi K, Dhaded S. Simplified technique for fabrication of custom ocular tray and making ocular impression. J Indian Prosthodont Soc 2009;9(3).
8. Jamayet N, Srithavaj T, Alam M. A complete procedure of ocular prosthesis: a case report. Int Med J 2013 16; 20:729–30.
9. Nalawade T, Mallikarjuna R, Anand B, Anand M. Prosthetic rehabilitation of a pediatric patient with an ocular defect. Int J Clin Pediatr Dent 2013;6(1):62-5

DOI: 10.46934/ijp.v3i2.149