Case Report

Management of an Anophthalmic Patient by the Fabrication of Custom Made Ocular Prosthesis

Meenakshi Singh[1], Meghanand Nayak[2], Jitender Solanki[3], Sarika Gupta[4], Anjali Singh[4]

Submitted: 22 Jun 2014
Accepted: 10 Sep 2014

[1] *Department of Prosthodontics, Jodhpur Dental College and Hospital, Jodhpur, Plot no. 366, Street no 10, Milkman Colony, Jodhpur–342008, Rajasthan India*

[2] *Oral and Maxillofacial Pathology, Vyas Dental College and Hospital, Kudi Haud, Pali Road, Jodhpur–342011, Rajasthan India*

[3] *Department of Public Health Dentistry, Vyas Dental College and Hospital, Kudi Haud, Pali Road, Jodhpur–342011, Rajasthan India*

[4] *Department of Oral Medicine and Radiology, Vyas Dental College and Hospital, Kudi Haud, Pali Road, Jodhpur–342011, Rajasthan India*

Abstract

The loss or disfigurement of a body parts specially that pertaining to the face has a deep psychological and social impact on the patient. After enucleation, evisceration or exteneration of the eye, the aim of an ocular prosthesis should be to restore the natural appearance, install confidence and a sense social acceptability in the patient. Custom made prosthesis has several advantages over the stock eye prosthesis. This article illustrates rehabilitation of the enucleated right eye of a patient with a custom made ocular prosthesis.

Keywords: *fabrication, ocular prosthesis, orbital implants*

Introduction

Eyes they say are the 'windows to the soul'. The loss of ocular tissue due to congenital, traumatic, malignancy or radical surgery can affect the psyche of patient adversely. An ocular prosthesis can either be stock or custom (1).

Stock eye prosthesis should be given only in the face of time and financial constraints of the patient (2). Custom made ocular prosthesis is preferred over a prefabricated stock eye prosthesis one due to several advantages of the former over the latter such as better adaptation and closer matching with the natural eye and, better movement of the eyeball.

Prosthetic rehabilitation with a custom made ocular prosthesis can yield better and more satisfactory results for the patient both esthetically and psychologically as compared to a stock eye prosthesis (3). This is a case report that illustrates a simple technique for the fabrication of custom made ocular prosthesis.

Case Report

A 25 year-old male arrived with the chief complaint of a defect in the right eye area. Case history revealed that the patient had to undergo enucleation due to traumatic injury three years back. A careful examination of the enucleated socket was made to ensure that the area showed satisfactory healing and absence of infection, and treatment planned to fabricate a custom made ocular prosthesis (Figure 1). The procedure was explained to the patient and a written consent was obtained.

Material and Methods

An ophthalmic topical anesthesia was administered to the patient to promote comfort and gain the co-operation of the patient. An impression of the ocular defect was made using a suitable stock ocular tray with a hollow handle which could accommodate an impression

syringe and irreversible hydrocolloid. During the procedure, the patient was seated in an upright position with head tilted backwards at 45 degrees. This position allows the natural positioning of the palpebrae and surrounding tissue relative to the force of gravity. An impression tray of appropriate size was selected by determining the one that passively fitted the enucleated socket and after comparing the palpebral fissure of the natural eyes (4).

The tray was seated in the defect area. The impression material was loaded in the syringe and sufficient material was injected into the socket through the tray handle until the material began to flow out of the socket and the retention holes. The tray was reinserted and sufficient material was injected to elevate the lid contours similar to the normal side. Once the socket was filled, the patient was directed to rotate his eyes upwards and downwards to make various eye movements and record impression in functional form (Figure 2). Later, the patient was directed to look forward at a distant spot at eye level. After the impression sets, it was ensured that all surfaces of the impression were recorded in a functional form and examined for defects and voids. Any excess impression material is trimmed off. The impression along with the stock tray was pressed against the C-Silicone soft putty material and folded on all the sides of the tray such that only the handle of the tray was visible.

Once the C-Silicone set; a horizontal slit was made on the upper surface of this assembly and the impression assembly was removed from the mould formed by the silicone (Figure 3).

Molten ivory inlay wax was poured through the slit into the cavity formed and wax was allowed to solidify after which the C-Silicone was sectioned off and the wax pattern was retrieved and checked. Wax pattern was smoothened to remove any sharp ridges or undesirable irregularities, properly contoured and then polished. The overextended areas were reduced and pressure points relieved.

The wax pattern was tried and checked for comfort, support, eye contours, retention and lid configurations by performing the functional movements. The eyelids should close completely over the wax pattern. Next the gaze and position of the iris is determined.

Wax pattern was reduced to a depth sufficient enough to incorporate the black ocular discs to be attached to it. The size of the iris of the natural eye is measured using a millimeter measurement gauge or an optical scale. As the corneal prominence will cause slight magnification of the iris disc, the disc of a size 1 mm shorter than the size of the natural eye is selected (5). A prefabricated ocular disc (with a stem in the center) of the selected size is placed on the wax pattern and its position determined by using the contralateral eye as the reference when the patient gazes straight with his head erect (Figure 4). The wax sclera was removed

Figure 1: Pre-operative view.

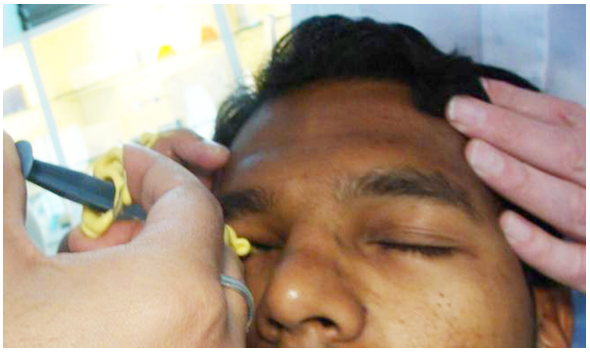

Figure 2: Impression material injected through a syringe attached to the hollow handle of the stock ocular tray.

Figure 3: Cutting off C–Silicone folded around the impression after removal of the impression tray to retrieve the wax pattern.

from the socket and was ready for investment. The lower portion of the ocularist flask was filled with dental stone, the posterior tissue surface of the wax pattern was laid on it and the dental stone was allowed to set.

Separating media were coated over the stone; the upper half of the flask was filled with dental stone and assembled with the lower half (Figure 5). The two halves of the flasks were separated after the stone had set and the wax pattern was lifted out along with the attached ocular button.

Again a coat of separating media was applied on both the halves of the ocular flask. The ocular button was replaced in its respective position in the mold and tooth colored heat cure scleral acrylic resin was packed into the mold using the compression method (after matching the shade of the sclera of contralateral eye) and curing done. Next after cutting off the stem of the button the scleral bank is trimmed to a depth sufficient enough to create space for a thin clear acrylic layer that will eventually impart a life like effect on the prosthesis.

Now many strokes from the center of the iris to the periphery were painted on the corneal button with the help of a thin painting brush and artist's acrylic paint to match the color of the natural iris. The painting was done in layers to give a greater depth and lifelike appearance to the prosthesis. A black spot was painted on the center of the button to represent the pupil (Figure 6). The remainder of the prosthesis was also painted and fine red embroidery threads were placed on the scleral portion to mimic the blood vessels of the patient's natural eye. The entire scleral portion is then coated with monomer polymer syrup to keep the red fibers in place and allowed to dry (Figure 7). Clear ocular acrylic resin was mixed and when the resin was in dough stage a layer was added on the top of the painted button and two halves of the flasks were united and processing done.

Results

The final eye prosthesis was obtained and finishing and polishing was done. The prosthetic eye was washed with soap and water. The fit, iris position, and gaze were evaluated. Once satisfied, the prosthesis was finished using a paste of tin oxide and water.

Prior to insertion of the finished prosthesis, it was disinfected using 70% isopropyl alcohol and 0.5% chlorhexidine solution. The prosthesis is cleaned with saline solution to prevent chemical irritation and inserted into the socket and checked for fit, contour and movement (3) (Figure 8).

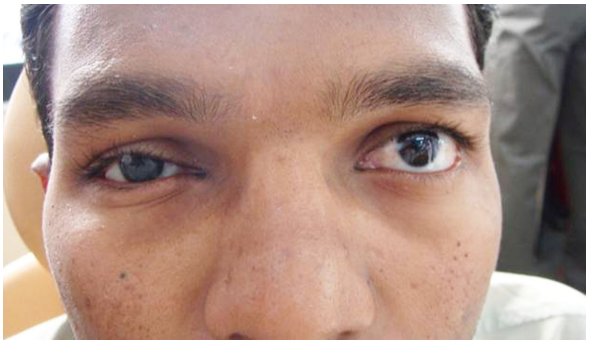

Figure 4: Try in of the wax pattern with ocular disc.

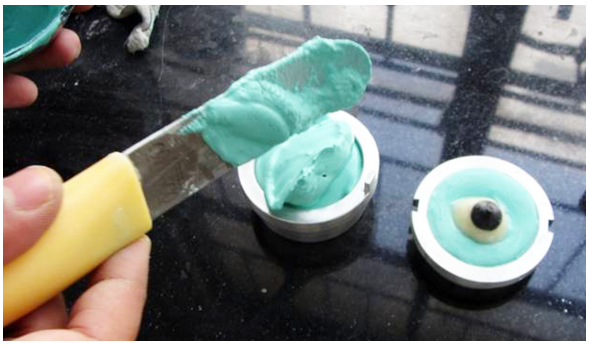

Figure 5: Investing of the wax pattern.

Figure 6: Painting the iris and sclera.

Figure 7: Final custom made ocular prosthesis.

Figure 8: Post-operative view after placement of custom made ocular prosthesis.

Discussion

The first ocular prosthesis was developed in early fifth century by Romans and Egyptian priests the eye was made of gold with colored enamel. Earlier artificial eyes were made of enamel, metal or painted clay and attached to cloth and worn outside the socket, with the advent of some newer material like heat-polymerised acrylic resin are used and it is possible to fabricate prosthesis with a life-like appearance (6). The ocular prosthesis is an artificial substitute for anophthalmic defect. A carefully fabricated custom made prosthesis confirms accurately and precisely to the socket (1). Maintaining an intimate contact between the ocular prosthesis and tissue bed leading to even distribution of pressure and hence good adaptation thus helping in helps reduced incidence of abrasions or ulceration in the underlying conjunctiva. Two exact matches of the iris position with the contralateral natural eye, thus providing enhanced aesthetics, better eye movements, and possible modification to solve problems like ptosis, proptosis and socket expansion without surgery.

Debnath N et al. (7) have stated few advantages of custom made ocular prosthesis. They prevents accumulation of fluid in the cavity, retains shape of socket, prevents collapse of lips, and maintains palpebral opening similar to natural eye.

Integrated implant supported technique is a technique which involved surgical placement of implant followed by fixed attachment eye prosthesis, however porous nature of integrated implants allows fibro-vascular growth around the implant which causes infection (8,9).

The chances of creating potential stagnant spaces where fluid collection could be a source of irritation and bacterial growth at the interface of prosthesis and tissue bed is markedly decreased hence promoting healthy tissue.

Conclusion

Implants can be used for orbital rehabilitation, but it is not always a feasible option. Custom made eye prosthesis is a relatively simple and affordable procedure which can yield excellent functional, esthetic, and psychological results. As compared to stock eye prosthesis, the custom made ocular prosthesis is a more precise method of fabricating an artificial eye. It allows an equal distribution of pressure on the tissue bed helping in close adaptation, hence enhancing comfort, a proper fit and support of the socket and also because of its optimal functional and cosmetic outcome custom made eye prosthesis achieves the objective of imparting a normal appearance and hence social acceptance of the patient.

Acknowledgement

None.

Conflicts of Interest

None.

Funds

None.

Authors' Contribution

Conception and design: MS
Analysis and interpretation of the data: MS, MN
Drafting of the article: MS, MN, SG, AS
Critical revision of the article for the important intellectual content: MN, SG, AS
Final approval of the article: MS, MN, JS, SG, AS
Statistical expertise, administrative, technical or logistic support: JS
Collection and assembly of data: MS, JS

Correspondence

Dr Meghanand Nayak
BDS (Bangalore University), MDS (RGUHS, Bangalore)
Department of Oral and Maxillofacial Pathology
Rajasthan University of Health Sciences/Vyas Dental College and Hospital,
Kudi Haud, Pali Road
Jodhpur – 342011, Rajasthan
India
Tel: +9129 1272 1011
Fax: +9129 1272 0784
Email: drmeghanand@gmail.com

References

1. Cain JR. Custom ocular prosthetics. *J Prosthet Dent*. 1982;**48(6)**:690–694. doi: 10.1016/S0022-3913(82)80030-9.
2. Taicher S, Steinberg HM, Tubiana I, Sela M. Modified stock eye ocular prosthesis. *J Prosthet Dent*. 1985;**54(1)**:95–98. doi: 10.1016/S0022-3913(85)80079-2.
3. Gunaseelaraj R, Karthikeyan S, Kumar MN, Balamurugan T, Jagadeeshwaran AR. Custom-made ocular prosthesis. *J Pharm Bioallied Sci*. 2012;**4(Suppl 2)**:S177–179. doi: 10.4103/0975-7406.100264.
4. Beumer J, Zlotolow I. Restoration of facial defects. In: Beumer J, editor. *Maxillofacial Rehabilitation—Prosthodontic and Surgical Considerations*. St. Louis, Mo. (USA): Mosby; 1996. p. 417–430.
5. Taylor TD. *Clinical maxillofacial prosthesis*. Chicago (USA): Quintessence Publication; 2000. p. 285–287.
6. Prashanti E, Reddy JM, Vinay Kumar, Mathew X. All about Ocular Prosthesis–A Review. *Indian Dentist Research and Review*. 2008;**63**:53–58.
7. Debnath N, Gupta R, Meenakshi A, Ramkumar K, John J. A Simplified approach to fabricate a custome-made ocular prosthesis. *Int J Prosthodont Restor Dent*. 2013;**3(1)**:25–29. doi: 10.5005/jp-journals-10019-1071.
8. Jethwani J, Jethwani GS, Verma AK. Funtional Impression technique for an ocular. *J Indian Prosthodont Soc*. 2012;**12(1)**:55–58. doi: 10.1007/s13191-011-0099-0.
9. Sharma N, Thakral GK, Mohapatra A, Seth J, Vashisht P. A Simplified Technique for Fabrication of Orbital Prosthesis. *J Clin Diagn Res*. 2014;**8(6)**:ZD10–ZD12. doi: 10.7860/JCDR/2014/9246.4490.