ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 8.4
IJAR 2022; 8(4): 248-251
www.allresearchjournal.com
Received: 12-02-2022
Accepted: 16-03-2022

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Customized prosthetic rehabilitation of occular defect: A case report

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DOI: https://doi.org/10.22271/allresearch.2022.v8.i4d.9669

Abstract
Ocular prosthesis is artificial replacement of the eye, for patients who have lost an eye as result of trauma or a carcinoma, accurate replacement with an ocular prosthesis that is symmetrical to the natural eye is essential. The present article describes a simple laboratory method of fabricating an ocular prosthesis by using conventional materials for accurate fit and esthetic treatment outcome by custom made technique.

Keywords: Ocular prosthesis, enucleation, evisceration, exoneration, custom made technique

Introduction
The face is a picture of the mind with the eyes as its interpreter. Eyes are generally the first feature of the face to be noticed. Eye is a vital organ not only in terms of vision but also being an important component of facial expression.

Loss of any facial tissue or organ can have a significant physical, physiological, social, and psychosomatic impact on the affected individual and can arise as a result of a congenital defect, disease, accidental trauma, or removed by enucleation (most common, where the entire eyeball is removed after severing the muscles and the optic nerve), eviscerated (where the contents of the globe are removed leaving the sclera intact), or exenteration (where the entire contents of the orbit including the eyelids and the surrounding tissues are removed) [1, 5, 6, 7, 8]. The replacement of the lost eye is a necessity to enhance physical and psychological healing of the patient and to improve his/her social appearance [5, 6].

Ocular prosthesis have been used for centuries to provide cosmetic replacement for enuclueated and eviscerated eyes. An ideal outcome following enucleation is dependent on proper volume displacement, formation of near normal fornices by the conjunctiva or mucous membrane, a well-fitting prosthesis with reasonable motility and functioning and normal-apperaing eyelids [1].

Prosthetic rehabilitation can be done either with stock eye prosthesis (prefabricated) or custom made ocular prosthesis [3, 4]. Stock ocular prosthesis available in standard sizes, shapes, and colors. They can be used for interim or postoperative purposes. Custom eyes have several advantages compared to stock ocular prosthesis like better movement of eye lids, distribution of pressure enhanced fit, comfortable, and adaptation improved facial contours, and enhanced esthetics gained from the control over the size of the iris, pupil and color of the iris and sclera [1, 9].

Before starting the design of the prosthesis, it is essential to assess the psychological component in order to gain the confidence of the patient,in addition to a detailed medical history that includes the condition that led to the excision and enucleation in order to alert the possibility of recurrence (Cain, 1982).

This article describes a simple method of fabricating an ocular prosthesis by custom occular prosthesis technique for precise fit and improved treatment outcome of ocular prosthesis.

Brief history behind
The art of making artificial eyes has been practiced since ancient times. Egyptian priests made the first ocular prosthesis, called Ectblepharons, as early as the 5th century BC. In those days, artificial eyes were made of enameled metal or painted clay and attached to cloth

and worn outside the socket. The first in-socket artificial eye made in the 15th century was made of gold with coloured enamel. In the latter part of the 16th century, the Venetian glass artisans discovered a formula that could be tolerated inside the eye socket [12]. These early glass eyes were crude, uncomfortable to wear and very fragile. Today the vast majority of patients all around the world wear ocular prosthesis made of acrylic. Several techniques have been used in fitting and fabricating artificial eyes. Empirically fitting a stock eye, modifying a stock eye by making an impression of the ocular defect (Taicher *et al*., 1985), and the custom eye technique (Benson, 1977) are the most commonly used techniques. The fabrication of a custom acrylic resin eye provides more esthetic and gives precise results because an impression establishes the defect contours, and the iris and the sclera are custom fabricated and painted.

Case report

A 14-year-old girl reported to the Department of Prosthodontics Crown & Bridge Dr. R Ahmed Dental College and Hospital Kolkata with a defect in her left eye. Patient was having a history of sturge-weger syndrome followed by acute lymphoblastic leukemia and glaucoma in right eyes and consequently left eye was surgically removed. On inspection, the sclera and iris were not present indicative of a physical eye which left behind only the socket with the eye lids intact. No inflflammation was present. The muscle function of both the upper and lower eyelid seemed normal. Patient was planned for a prosthetic eye. Consent of the patient was taken for the procedure.

Fig 1: Showing defect in the right eye

Procedure

1. Patient was asked to tilt the head backward on the dental chair. Irreversible hydrocolloid (Algitex, DPI) material was injected into the left eye socket with help 30 ml disposable syringe. Patient was asked to do the functional movements. (Fig-2)
2. After the setting of the material, impression was retrieved. After obtaining a primary impression of the eye socket, it was boxed and invested in Type-II dental stone to get the primary mould.
3. Special tray (Fig-3) with clear acrylic was made on the cast.The tray was designed with retention holes and a hollow handle extension, to accommodate the impression syringe tip. The tray was adjusted to fit in the enucleated socket, and various eye movements were performed to ensure passivity.
4. Light body polyvinyl siloxane (PVS) (GC Exaflflex regular; GC America, Alsip, IL) was injected into the socket through the hollow tray handle. and the patient was instructed to perform different eye movements to mold the impression during setting.(Fig-4)
5. The final impression obtained was boxed and poured in two pieces to make the final mould
6. The mold in the mater cast (Fig-5) was filled with melted wax and carving was done on margin so that wax trial can be done easily. All the movements of eye were checked.
7. The size, shade, and configuration of the iris were selected by taking the contralateral natural eye as a guide.
8. Photograph of the contralateral eye was taken with DSLR camera. The size of the right iris was measured with digital caliper (Fig-6). Wax pattern was reduced to a depth sufficient enough to incorporate the black ocular disc which was attached to it.
9. Wax pattern trial was done (Fig-7) and its position determined by using the contralateral eye as the reference when the patient gazes straight with his head erect.
10. Flasking and dewaxing of the wax pattern was done.
11. The shade of the heat cure acrylic resin (DPI-Heat cure, Dental Products of India Ltd.) was matched according to the contralateral natural eye and was manipulated and packed into the prepared mould. Flask was kept for acrylization following a long curing cycle.
12. The photograph taken in camera was printed out in glossy paper according to the measured size and pasted into the customized eye.
13. After curing the prosthesis was obtained, trimmed, finished & polished.
14. Final corrections were made and the final processing was done with the application of a layer of clear acrylic resin.(Fig-8)
15. Final ocular prosthesis(Fig-9) was placed into the patient's socket and was checked for retention, esthetics, and the coordinated movements with the contralateral eye. Patient was instructed regarding the usage, limitation, and the maintenance of the prosthesis.

Fig 2: Showing primary Impression

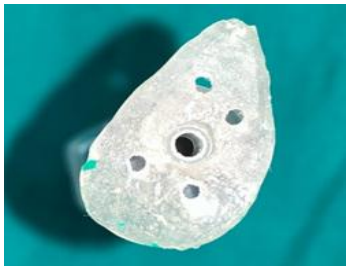

Fig 3: special tray with clear acrylic

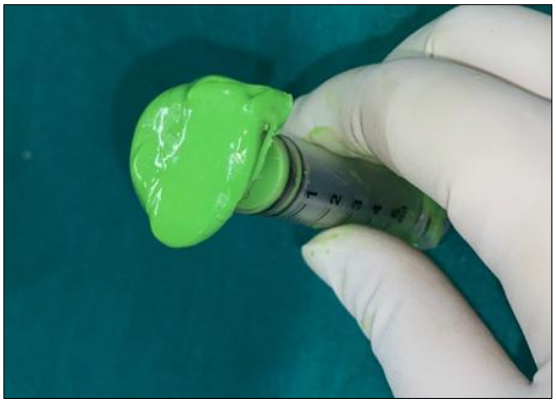

Fig 4: Final impression using light body

Fig 5: Master cast

Fig 6: Try-in of wax pattern

Fig 7: Size of the right iris measurement with digital caliper

Fig 8: Final prosthesis with clear acrylic resin

Fig 9: Final Ocular prosthesis

Discussion

Several techniques and materials have been introduced throughout the years to fabricate ocular prostheses, including custommade and modified stock ocular prostheses, made from glass or MMA. [2], Prelimnary impression of the socket was made using alginate which was in accordance with the impression technique used by Ravi Shankar Y *et al*. and Adarsh N *et al*. [10]. Various techniques of iris painting have been introduced: paper iris disc technique, black iris disc technique, and monopoly with dry earth pigment. Recently, digital imaging has been used to replicate irises. [10]. The use of digital imaging for iris replication in the construction of ocular prostheses has the advantage of acceptable esthetics with reduced treatment time compared to the conventional oil paint and monopoly iris painting technique. A well-made and properly planned ocular prosthesis maintains its orientation when patient performs various movements. With the development of newer materials the socket can be finely recorded on which custom made ocular acrylic prosthesis (Sykes, 1996) can be fabricated with exact fit and esthetics although the prosthetic rehabilitation may be enhanced with the use of implants, can coordinate the movements with natural eye, as they are not always possible or feasible [11]. More, over the use of stock ocular prosthesis of appropriate size and colour cannot be neglected, a custom made ocular prosthesis provide better

results functionally as well as aesthetically (Doshi & Aruna, 2005). 10 However, the simplified custom made technique described here is easy, economical and adjustable. This technique provides better results functionally as well as aesthetically. The ocular prosthesis fabrication technique described in this article is uncomplicated, reduces treatment time, and requires less artistic skill, unlike the iris painting technique, in which artistic skill is a must [8].

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