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Prosthetic rehabilitation of an ocular defect: A case report

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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 and time saving laboratory method of fabricating an ocular prosthesis by using conventional materials for accurate fit and esthetic treatment outcome.

Keywords: Ocular prosthesis, Evisceration, Iris button, ocular impression, palpebral surface, tissue surface, sclera blank

1. Introduction
The rehabilitation of a missing eyeball with an ocular prosthesis is a technique that has a significant place in the field of oral and maxillofacial prosthetics. 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 surgical intervention [1].

The surgical procedures in the removal of an eye are classified into three categories viz. evisceration, enucleation, and excenteration. Prosthetic rehabilitation can be done either with stock eye prosthesis (prefabricated) or custom made ocular prosthesis [2, 3]

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 [6, 7] The need for an artificial eye can sometimes be satisfied by stock prostheses that are available in standard sizes, shapes, and colours. But both the techniques are having certain advantages and disadvantages.

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

Fig 1: Patient with left ocular defect

Fig 2: Primary impression with alginate

Fig 3: Special tray and Secondary impression

Fig 4: Wax trial

Fig 5: Iris positioning and final wax pattern with iris button in two piece dental cast

Fig 6: Investment of wax pattern followed by dewaxing.

Fig 7: Characterization of prosthesis.

Fig 8: Final prosthesis.

Fig 9: Before and after Ocular prosthesis insertion

2. Case Report

A 56 year-old male patient reported to department of prosthodontics, Tamil Nadu government dental college, Chennai 1, with a defect in the left eye Fig 1. On clinical examination ocular defect as an end result of left evisceration was found. The patient revealed a history of infection of the left eye leading to surgical evisceration as a part of treatment. Formal permission was from the Tamil Nadu government dental college ethical committee and informed consent was obtained from the patient.

On examination the ocular defect was healed properly with good mobility of the posterior wall of the ocular defect during full excursive movement. The palpebral fissure was examined in both open and closed position to rule out any anatomical as well as physiological abnormality. Conjunctiva, depth of fornices, and presence of cul de sac was also examined. It was planned to rehabilitate the patient with an ocular prosthesis fabricated by combination of custom and stock ocular prosthesis.

Petroleum jelly was applied to the eyebrows and skin to prevent impression material from sticking to eyelashes. Primary impression was made with irreversible hydrocolloid material (Alginate, Prime Dental Products Pvt. Ltd., Mumbai, India) Fig, 2 A cast was made from type II gypsum on which a special tray was fabricated using self-cure acrylic (Dental Products of India, Mumbai, India) with numerous perforations for escape of the impression material.

A syringe was attached to the special tray through a perforation made at the centre of it fig 3. Impression of the defect was recorded using polyvinyl siloxane light Viscosity material (DENTSPLY, Germany). Material was injected into the socket. The patient was instructed to make various eye movements as the material was injected so that the impression

was recorded in the functional form. After the material had set, impression was retrieved from the socket and checked to ensure that all the surfaces were recorded Fig 3. A two-piece dental stone cast was poured to immerse the lower part of the impression

After the stone had set, separating media was applied on the surface. Then a second layer was poured. Marking was made on all the four sides of cast for proper reorientation of the cast.

Next, the wax pattern was fabricated by pouring the molten wax into the impression. The wax was properly contoured and carved to give it a simulation of the lost eye. The wax pattern was tried in patient's socket and checked for size, comfort, support, fullness, and retention by performing the functional movements. Iris position was determined by contra lateral iris as a reference using modified eye glass with makings Fig 5

Patient was made to sit upright and look straight with head erect. The size and color of iris portion were selected using prefabricated stock eye. Iris portion was trimmed from the stock eye selected. A second try in was done using wax pattern with selected iris button The wax pattern with iris button fig 5 was flasked, dewaxed, and packed with tooth colored heat cure acrylic resin (Dental products of India, Mumbai), the shade of which was initially matched with the scleral portion of contralateral eye. Curing and polishing of scleral with iris botton is done. Fine red embroidery threads fig 7 are placed on the scleral painting 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 blood-vessel fibers in place and allowed to set.

Then a thin layer of wax was placed over the surface of scleral shell to create a space for clear acrylic, which gave a lifelike effect. Flasking, dewaxing, packing, and curing of scleral shell were done using heat cure clear acrylic resin (Dental products of India, Mumbai). After curing, the prosthesis was finished and polished and was inserted in patient's eye. Instructions given for maintenence of ocular prosthesis.

2.1 Prosthetic Eye Handling Instructions

1. Never clean or soak your artificial eye in rubbing alcohol because it will crack and destroy the ocular prosthesis.
2. Remove the ocular prosthesis only as necessary. Too much handling can cause socket irritation and result in excessive secretions.
3. If you remove your ocular prosthesis, be sure to store it in water or soft contact lens saline solution. This will keep deposits from drying on the surface.
4. To clean your prosthesis, use an antibacterial soap. Wash the eye between your fingertips.
5. If you wish to or need to rinse out the socket, use sterile saline with bulb syringe.
6. Any eye drops can be used with the artificial eye in place.
7. Visit at least once a year or more often to have your ocular prosthesis checked, cleaned and polished.

3. Discussion

The ocular prosthesis is an artificial replacement for the bulb of the eye. After the surgeon eviscerates or enucleates the eye, prosthodontist is a person who comes into an act of providing the patient with an artificial eye to overcome the agony of losing an eye. A well-made and properly made ocular prosthesis maintains its orientation when patient performs various movements [8] Now with the advent of newer materials like heat cure acrylic resin (DPI) as used here, it is possible to fabricate prosthesis with a life-like appearance.

A custom-made ocular prosthesis has various benefits first, esthetics could be customized. Second, a relatively large supply of manufactured eyes would not have to be kept in stock. Third, the sclera curvature of the prosthesis could be decreased provides better results functionally as well as aesthetically. It retains shape of defective socket, prevents collapse of lids, provides muscular functions of the lids, maintains palpebral opening, and gives a gaze similar to that of natural eye [8]. The technique of fabrication used here was very simple with minimal equipment and needs less artistic work.

4. Conclusion

The aesthetic outcome of the custom-made ocular prosthesis was far better than the stock ocular prosthesis. The technique described in this report represents a straight forward, simple and cost-effective method and results in a more esthetically pleasing and accurate prosthetic outcome. Although the patient cannot see by this prosthesis, this prosthesis will increase the self-confidence of the patient to face the world.

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