Rehabilitation of ocular defect with custom made ocular prosthesis – A case report

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Abstract
Artificial replacement of the lost eye is done with an ocular prosthesis. Loss of eye or any other facial structures affect the physical, emotional and psychological well-being of a person. Aim of the maxillofacial prosthesis that will restore and replace stoma to gnathic and associated facial structures with artificial substitutes which improve patient's esthetics, restore and maintain health of these structures. The rehabilitation of a patient who has suffered the psychological trauma of an ocular loss requires a prosthesis that will provide the optimum cosmetic and functional result. A case of a custom-made ocular acrylic prosthesis is presented here, which had acceptable fit, retention and esthetics.

Keywords: Ocular defect, Maxillofacial prosthesis, Custom made ocular prosthesis, Scleral shell prosthesis.

Introduction
Eye is a vital organ not only in terms of vision but also being an important component of facial expression. Surgical procedures adopted for the removal of an eye are classified by Peyman, Saunders and Goldberg (1987) into three general categories: enucleation, evisceration and exenteration. According to Scoll (1982) Enucleation is a surgical procedure in which the globe and the attached portion of the optic nerve are excised from the orbit. Evisceration is removal of the contents of globe while leaving the sclera and extra ocular muscles intact. Exenteration is the most radical of the three procedures and involves removal of the eye, adnexa, and the part of the bony orbit. [(1)] Loss of eye has a psychological effect on patient and their families. Immediate replacement of the lost eye is necessary to promote physical and psychological healing for the patient and to improve social acceptance. Ocular prosthesis is a prosthesis that replaces the lost eye which may be missing due to trauma, tumors or may be congenitally missing. The fabrication of prosthesis is as much an art as it is a science.[(2)] Fabricating a prosthesis that appears to have a realistic appearance while achieving seamless visual integration with the surrounding tissue requires both artistic and technical expertise.

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).[(3)]

A Brief History of Ocular Prosthesis
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 16thcentury, the Venetian glass artisans discovered a formula that could be tolerated inside the eye socket. 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. [(4)] 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.

Case Report
A 32 year old male patient reported to the Department of Prosthodontics for rehabilitation of lost right eye and needed replacement for the same for esthetic concern. Examination of the socket revealed good healing, no signs of inflammation, and eyelids were unaffected (Fig. 1).

Fig. 1: Preoperative view.

PROCEDURE
Clinical Procedure
The patient's eye socket was coated with a thin layer of Vaseline and an impression was made using

medium body addition silicone impression material. A special tray was fabricated with a disposable syringe attach to it on the primary cast. Escape vents were made in the special tray and tray adhesive applied. Impression was made by injecting the material first into the depth below the upper eye lid and then into the lower. This was done so as to record the proper extensions of the defect. After that the whole eye socket was filled with material and the patient was asked to close her eye so that the excess material could flow out. Patient was then asked to move her eye to the right then to the left, then up and down and finally in a circular motion, so that the functional impression of the defect could be obtained. By this the whole extent of the defect was recorded, keeping in mind the various movements as mentioned earlier so as to achieve a functional impression of the tissue bed. The impression was then retrieved when it had completely set. Remove the impression from the lower, shallower eyelid sulcus first, then rotated out from the deeper upper eyelid sulcus to prevent distortion of the impression (Fig. 2 i & ii). Impression was checked to ensure that the defect area was completely recorded.

Fig. 2 (i): Custom made acrylic tray with vent.

Fig. 2 (ii): Impression with addition silicone material made.

Laboratory Procedure

Beading and boxing of the impression was done to preserve the borders for precise fabrication of the prosthesis and poured with type IV dental stone to obtain the cast (Fig. 3 & 4).

Fig. 3: Beading and boxing of impression and obtained cast.

Fig. 4: Cast obtained after Beading and boxing of impression.

Shade Selection and try-in Verification

Using the natural eye as a guide, the shade and size of there is was selected. This was obtained by trimming a commercially available stock eye. The position of the natural iris was determined by asking the patient to look straight ahead to a distant object. The distance of iris of the natural eye was measured using a divider opposing the iris from the inner canthus to the center of iris and same distance was marked and engraved on the scleral wax pattern. Then similarly, distance from the outer canthus to the center of the iris was measured using the divider and transferred to the scleral wax pattern.

The pattern was taken out and the selected iris was placed and adjusted to the horizontal and vertical axis according to the markings engraved on the scleral wax pattern. Scleral wax pattern with the iris was tried in the eye socket and checked for symmetry and function by asking the patient to perform various movements. Patient was asked to move the eyes to the right and left side and look upwards and down (Fig. 5). Scleral wax pattern had movements in harmony with adjacent natural eye.

Fig. 5: Trial of scleral wax pattern with iris.

Processing

Scleral wax pattern was finished to obtain a smooth surface free from dust and debris. The finished scleral wax pattern was invested in the flask. Base of the flask filled with dental stone and the wax pattern was embed into dental stone to the height of curvature of the pattern (Fig.6). After the stone was set, separating medium was applied and counter-flasking was completed using a mixture of stone and plaster. After it was set, wax was removed by dewaxing. There is and molds were cleaned to remove all the wax residue and

the mold was painted with separating medium. Tooth colored acrylics in polymer and monomer was in the mixed in a ceramic jar in the ratio of 3:1 and packed in the mold in the dough stage. The mold was closed and polymerized for 2 hours by short curing cycle. After curing the mold was allowed to cool down to room temperature. The resulting scleral blank with iris was deflasked carefully. It was trimmed with acrylic trimming burs and polished with Buff and pumice to obtain a smooth surface glossy surface.

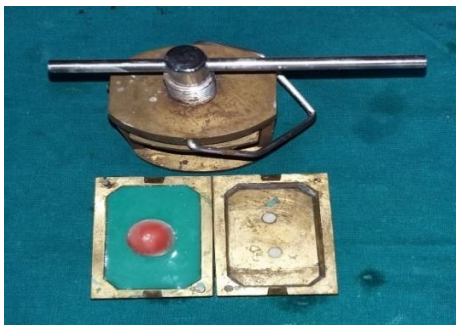

Fig. 6: Flasking procedure.

Placement of final Prosthesis

Before inserting the prosthesis in the socket, it was washed with soap solution and cleaned thoroughly with water before inserting in the eye socket. A drop of ophthalmic eye solution was applied on the surface of the prosthesis to facilitate smooth insertion. The final prosthesis was inserted in the eye socket (Fig. 7). Esthetic appearance of the prosthesis was compared with the natural eye. Harmonious movements of the prosthesis were examined by instructing the patient to perform movements in various directions. Necessary adjustments were made and final finishing and polishing was carried out. The patient was instructed on how to remove and place the prosthesis and was advised to remove the prosthesis during night. Cleaning of prosthesis with soap solution was recommended.

Fig. 7: Post-operative view.

Post Insertion Instructions

Instructions were given to the patient at the time of insertion of the prosthesis:[5]

- Clean the eyelashes daily to keep them from mucous build-up Mucous that dries on eye lashes may flak off to the prosthesis and may irritate the eye socket.
- Clean the prosthesis with sterile water, and rinse it with saline solution.
- Avoid removing the prosthesis unnecessarily.
- Use of lubricant solution, helps the prosthesis to be kept moist and smooth.
- The patient is recalled for follow up after 1 day, 3 days, 1 week, 1 month, 3 months and 6 months.

Discussion

Surgical removal of an eye may be due to trauma, infection, tumor, need for histological confirmation of a suspected diagnosis, possible prevention of sympathetic opthalmial and cosmetic reasons. [5] Loss of eye or any other facial structures affect the physical, emotional and psychological well-being of a person. [6] Ocular prostheses can be option for these patients. Medium body elastomeric impression can be used for impression making[7,8] but using light body as an impression material is advantageous because it flows easily and records the details of the eye socket in the functional form which in turn aids in the proper adaptation and ease of functional movements of the ocular prosthesis. [9]

The most important objectives of maxillo-facial prosthetics and rehabilitation include:

- Restoration of esthetics and cosmetic appearance.
- Restoration of function (where applicable).
- Protection of tissues.
- Therapeutic/healing effect of prosthesis.
- Psychological therapy. [10,11]

The eye prosthesis delivered in this case fulfilled all the above objectives. Merits of custom made prosthesis:

- Retains the shape of the socket.
- Prevent collapse of the lids.
- Provides proper muscular activity of the lids.
- Prevents accumulation of fluid in the cavity.
- Maintains palpebral opening similar to natural eye.
- Has a gaze similar to natural eye.
- Mimics coloration and proportions of natural eye. [12,13]

Conclusion

The use of custom-made ocular prosthesis has been a boon to the patients who cannot afford for the implant replacements. Also, as discussed above, the esthetic and functional outcome of the prosthesis was far better than the stock ocular prosthesis (Cain, 1982). Although the patient cannot see with this prosthesis, it has definitely restored her self-esteem and allowed her to confidently face the world. This gave a sense of self confidence to the patient.

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