

# A Case Study - Prosthetic Rehabilitation of Traumatic Ocular Defect

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## Abstract:

Enucleation of the eye is often indicated after ocular injury or for the treatment of intraocular tumors, severe ocular infections, and painful blind eyes. A prosthesis is an artificial substitute that is implanted into, or integrated onto a human body part to replace the missing natural organ, for the purpose of restoring a specific function or a group of related functions. The aim of all ocular prosthetic procedure is to enable rehabilitation of the patient in the society with a normal appearance and self esteem. Loss of eye has a crippling effect on the psychology of the patient and severely damages not only the function of vision, but also self-confidence. This article describes a clinical report of rehabilitating loss of patient's left eye due to trauma with custom made artificial prosthesis. Treatment of such cases includes implants and acrylic eye prosthesis. Due to economic factors, a custom-made ocular prosthesis is a good alternative. A case of a custom-made ocular acrylic prosthesis is presented here, which had acceptable fit, retention and esthetics.

Key words: Trauma, Ocular defect, Custom made Ocular prosthesis

## 1 Introduction:

Maxillofacial prosthetics is a branch of dentistry that deals with congenital and acquired defects of the head and neck. Maxillofacial prosthetics integrates parts of multiple disciplines including head and neck oncology, congenital malformation, plastic surgery, speech, and other related disciplines. Correct form and size material must simulates normal healthy tissues with respect to: texture, translucency, weight, and color. The molding material should have approximately the same flexibility as human tissue in order to blend the margins of the prosthesis to adjacent tissues. Prosthetic material should be sufficiently translucent to simulate skin effectively. The color of the prosthesis must appear similar to the surrounding tissue. The loss or absence of an eye may be caused due to congenital defect, irreparable trauma, tumor, painful blind eye, sympathetic ophthalmia, the need for histological confirmation of a suspected diagnosis<sup>1</sup>. The disfigurement resulting from loss of an eye can cause significant psychological as well as social consequences. Artificial eye has been in presence since the times of the Egyptians before 3000 BC. Surgical procedures in the removal of an eye can be broadly classified as: evisceration (where the contents of the globe are removed, leaving the sclera intact), enucleation (most common, where the entire eyeball is removed after severing the muscles and the optic nerve) and exenteration (where the entire contents of the orbit including the eyelids and the surrounding tissues are removed)<sup>2</sup>. After enucleation surgery, the loss of volume and rotation of intraorbital contents can result in superior sulcus deepening, enophthalmos,

ptosis, ectropion, and lower lid laxity, which are known as post-enucleation socket syndrome<sup>3</sup>. Early management of an ophthalmic socket prevents loss of volume in the anterior orbital area and facial asymmetry. The goal of any ocular prosthetic procedure is to present the patient to the society with a normal appearance<sup>4</sup>. A multidisciplinary management and team approach are essential in providing accurate and effective rehabilitation and follow-up care for the patient. Therefore, the combined efforts of the ophthalmologist, the plastic surgeon and the maxillofacial prosthodontist are essential to provide a satisfactory ocular prosthesis<sup>5,6</sup>. An ocular prosthesis can be either ready-made (stock) or custom-made. Stock prosthesis comes in standard sizes, shapes, and colors. They can be used for interim or postoperative purposes<sup>7-10</sup>. Prosthetic rehabilitation is enhanced if an implant can be placed in the orbit to provide an attachment for the Rectus muscles which can impart motion coordinated with the natural eye. However, the placement of an ocular implant is not always possible or feasible<sup>11,12</sup>. Patients in this situation can be treated with custom made ocular prosthesis. Custom eyes have several advantages including better eyelid movements; even distribution of pressure due to equal movement, thereby reducing the incidence of ulceration, improved fit, comfort, 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<sup>13-15</sup>. The ophthalmic surgeon with the help of maxillofacial prosthodontic should insert acrylic conformer to maintain and prevent shrinkage of the

ocular space for custom made prosthesis during the healing period after surgery. A case of a custom-made ocular acrylic prosthesis is presented here ,

which had acceptable fit, retention and esthetics.

## 2 Material and methods:

A 32 year old male patient was referred to the Department of Prosthodontics at Kobry El Kobba Military Hospital, Cairo, Egypt, for the successor of his lost left eye (Fig. 1). After healing found satisfactory, the patient was referred for the prosthetic management. On examination, there were no signs of any adhesion or dehiscence of conjunctiva and tissue bed were free of inflammation to start with the impression procedure for fabrication of ocular prosthesis. Ocular prosthesis can be either ready-made (stock) or custom made. Because of the benefits of the custom made ocular prosthesis it was decided that it would be the best prosthetic option to meet the needs of the patient.

The entire procedure was explained to the patient. An ophthalmic topical anesthesia was given to increase the comfort of the patient. Before making the impression petroleum jelly was applied to the eyebrows for the easy removal of the impression material after it sets. The patient's eye socket was coated with a thin layer of Vaseline. An impression was made of the ocular defect using a perforated ocular tray made from self curing acrylic resin and check it (Fig. 2, 3) . The tray was finished, the borders were smoothed inside the ocular cavity under the eyelids and the tray attached to the nozzle of 10 cm plastic syringe through a perforation made at the center of it. The patient was instructed to tilt the head backward, an impression was made by injecting alginate impression material first into the depth below the upper eyelid and then into the lower (Fig. 4) . This was done so as to record the proper extensions of the defect, the fine details, anatomy and peripheries of the socket. Once filled the head was moved back to the vertical position and the patient was directed to move his normal eye in all directions to allow the material to flow into all areas of the enucleated socket. This will facilitate the flow of the impression material to all aspects of the socket. The patient was asked to look at a distant spot at eye level with his gaze maintained in a forward direction. The impression was recorded in the functional form.

After the material was set; the impression rotated out of the socket (Fig. 5). The impression was checked for accuracy and excess material was trimmed and the impression was checked for air bubbles. After an acceptable impression of the eye

socket has been obtained, the impression was packed inside the putty rubber base (Reprosil, Dentsply, Internationals) to produce rubber base mold (Fig. 6). After setting of rubber base split with scalpel to remove the impression. After that the mold was filled with molten base plate wax to produce a wax pattern (Fig. 7). The sclera wax pattern was fabricated by pouring the molten wax into the cast. 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 from tissue, simulation of eye movement, eyelid coverage fullness, and retention by performing the functional movements (Fig. 8). The position of the iris was located with the help of a millimeter grid placed on the patient's face.

The patient was instructed to fix the gaze of the natural eye on an object at least 3 feet in front and at eye level. The position of the iris-pupil area of the natural eye in relation to the inner and outer canthus and upper and lower lids was marked on the grid. The same markings were transferred to the defect side. The tried wax pattern was flaked taking care that the iris was secured to one counter of the flask and remaining part in the other portion of the flask. Packing was done with the selected heat cure sclera shade colored acrylic resin. Try in of acrylic prosthesis, the position of the iris – pupil area, coloring of the iris and pupil (Fig. 9). Final coloration of sclera and application of blood capillaries (Fig. 10). Red silk fibers to mimic veins were placed in the dough of the determined acrylic shade. A very thin layer of wax was adapted on the acrylic prosthesis to apply the transparent acrylic resin for protection of color and give a beautiful appearance then flaked Fig. 11). The stalk of the ocular button, flash, and irregularities were removed from the surface. The prosthesis was finished and polished (Fig. 12). The properly finished and polished prosthesis was inserted in the socket after being disinfected and lubricated with an ophthalmic lubricant to maintain a tear film over the prosthesis and to improve eye movements Fig. 13). Minor adjustments were made at the placement and removal of the prosthesis were given and the need for regular recall appointments was emphasized.

### 3 Discussion:

Prosthetic rehabilitation should fulfill aesthetic as well as psychological requirements for a patient. A correctly placed prosthesis should restore the normal opening of the eye, support the eyelid, restore a degree of movement, be adequately retained and aesthetically pleasing. Prefabricated prosthesis carries potential disadvantages of poor fit (which endangers the eye to granuloma formation), poor esthetics and poor eye movements<sup>16</sup>. According to Beumer et al<sup>9</sup>, intimate contact between the ocular prosthesis and the tissue bed is needed to distribute even pressure, so a prefabricated prosthesis should be avoided. Moreover, the voids in the prefabricated prosthesis collect mucus and debris, which can irritate mucous and act as a potential source of infection, which are minimized in the custom-made prosthesis.

Custom-made ocular prosthesis has the following characteristics, retains the shape of the defective socket. Prevents collapse or loss of shape of the lids, provides the proper muscular function of the lids, prevents accumulation of fluids in the cavity, maintains palpebral opening similar to the natural eye, mimics the coloration and proportions of the natural eye, has a gaze similar to the natural eye and better movement of the prosthesis mimicking that of the natural eye<sup>17</sup>. Methyl methacrylate resin is superior to other ocular prosthetic materials with regard to tissue compatibility, aesthetic compatibilities, durability and permanence of color, adaptability of form, cost and availability<sup>18</sup>.

### 4 Conclusion:

The use of ocular prosthesis has changed the patient's social life at a significant level and improved the confidence too. Although the patient cannot see with the ocular prosthesis, however, it has definitely restored patient's self-esteem and allowed him to confidently face the world. The esthetic outcome of the custom-made prosthesis was far better than the stock ocular prosthesis. The procedure used here is simple and cost effective. Ocular prosthesis is socially acceptable and comfortable for use in patients with an ocular defect, resulting in improvement of psychological well being and personality of the patient.

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### Figures:

**Fig. 1. The patient with the defected left eye**



**Fig. 2. Impression tray**



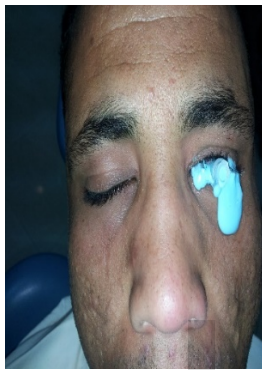
**Fig. 3. Ccheck of the custom made acrylic tray**



**Fig. 4. Injection of the impression material**



**Fig. 5. Impression of the ocular socket**



**Fig. 6. Rubber base mold**



**Fig. 7. Split of the rubber base mold**



**Fig. 8. Wax pattern**



**Fig. 9. Painting the iris**



**Fig. 10. Painting the sclera**



**Fig. 11. Flaking**



**Fig. 12. Finished ocular prosthesis**



**Fig. 13. Delivery**

