

## An Ocular Prosthesis : A Case Report

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### Abstract

*Normal facial appearance is one of the inherent human traits. When it is altered or lost, it challenges the patient's physical and psychological well being. The agony over the loss of an eye has a crippling effect on the psychology of the patient. Rehabilitation in the form an ocular prosthesis is the only alternative in such cases.*

**Key words:** Ocular prosthesis, Ocular defect, Eye shell

### Introduction

Eyes are generally the first features of the face to be noted.<sup>[1]</sup> The unfortunate loss or absence of an eye may be caused by a congenital defect or secondary to a malignant disease or trauma.<sup>[2]</sup> The disfigurement associated with loss of an eye can cause significant physical and emotional problems.<sup>[3]</sup> This is primarily due to adjusting to the functional disability caused by the loss and also to social reaction to the facial impairment.<sup>[4]</sup> Replacement of the lost eye, as soon as possible, is necessary to promote physical and physiological healing for the patient and also to improve social acceptance.<sup>[5]</sup>

An ocular prosthesis is one of the most difficult to construct. This is mainly because an attempt is made to replace moving eyes with a static prosthesis. Ocular prostheses are available either ready-made or can be custom-made.<sup>[6]</sup> Presently three types of acrylic resin prosthesis are used. Stock eyes, stock eyes modified by various methods and custom fitted eyes made from an impression of the socket. Fabrication of a customized

ocular prosthesis allows infinite variations during construction. The close adaptation of the prosthesis to the tissue bed can produce desired movements. The flush fitting shell of such a prosthesis can provide a more natural surface for normal lacrimal tear function.<sup>[7]</sup>

The optimum cosmetic and functional results of a custom made ocular prosthesis enables the patient's rehabilitation to an almost normal life style. Presented below is the case report of an ocular prosthesis that helped a young man overcome the mental trauma of the loss of an eye.

### Case Report

A 22 years old man reported to prosthodontic clinic with features of loss of the left eye due to trauma about 12 years back. Following the traumatic injury, an abscess developed at the site and the left eye ball was enucleated(fig.1).



**Figure 1:** Patients with left-side ocular defect.

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Examination on presentation showed that the left eye bed was able to perform and co-ordinate all possible movements in unison with right eye. This indicated that the socket had adequate musculature to perform various eye movements and that the mucosa surrounding the eye was healthy without any infection. It was therefore decided that a properly fitting prosthesis would ensure normal eye movement on the left side.

The materials used in the construction of the eye prosthesis were:

1. Alginate.
2. Dental stone.
3. Eye shell.
4. Modeling wax.
5. Functional wax.
6. Heat cure acrylic resin.
7. Vaseline.

The following clinical and laboratory steps were carried out in constructing a successful ocular prosthesis:

### (1) Ocular impression

A separating medium (Vaseline) was applied to the area around the ocular defect. A special impression tray in the shape of the ocular cavity was used.<sup>[6,12,13]</sup> The impression was made with the help of irreversible hydrocolloid (alginate). Throughout this procedure the patient was instructed to sit straight, looking in front at the level of the eyes. The alginate was mixed with enough water, so that it flowed easily and was injected into the socket with a syringe. The impression tray loaded with alginate was placed over this. The operator stabilized the tray throughout the impression procedure. This allowed the impression material to flow over the underlying muscle bed and the anatomic details to be recorded accurately. Once the impression material was set, the patient was instructed to blink the eyes to break the air seal and the impression was carefully removed from the socket and visualized for any void or other defects. Trimming of the excess impression material was done with fine scissors.

### (2) Stone mould fabrication

After obtaining the impression, it was poured with the dental stone. Once the stone was set, it was used

in the construction of a wax pattern. The stone mould was lubricated with a separating media and a medium hard wax was used to prepare the wax pattern.

### (3) Altered scleral wax pattern fabrication

The altered scleral wax pattern was prepared by a modified technique using wax.<sup>[14,15]</sup> Fluid wax was painted over the tissue surface of the wax pattern. The wax pattern was repositioned in the socket and the patient was instructed to keep his head upright while performing eye movements with the normal eye. The patient was instructed to move his normal eye in various directions until the fluid wax had set completely. Once the wax was set, the altered wax pattern was removed from the socket and the excess wax removed. This altered wax pattern was then used to fabricate the final acrylic resin ocular prosthesis.

### (4) Fitting of eye shell on the wax pattern

An appropriate eye shell was selected and necessary adjustments were made. The dimensions of normal eye were measured, the positions of eye lids marked on the wax model and vertical and horizontal axis established.<sup>[16]</sup> The eye shell was positioned over the wax pattern and tried on the patient for further adjustments. It was checked for its accuracy in terms of position and movement, both, supero-inferiorly and mesio-distally, correlating with the other eye. Corrections were carried out till satisfactory results with various eye movements, fullness of eye and opening of palpebral fissure were obtained.

### (5) Converting in acrylic resin

The pattern was flaked and de-waxed in the conventional manner. The mold was packed with heat cure acrylic resin dough. Trial pack was made and then finally the flask was closed and polymerized according to the manufacturer's instruction(fig.2,3). Polymerized ocular prosthesis was retrieved from the mold, finished and polished.



Figure 2: Prosthesis with master cast



**Figure 3: Processed Prosthesis.**

#### **(6) Delivering the ocular prosthesis**

The finished and polished ocular prosthesis was inserted in the eye socket and examined for its aesthetic appearance and the degree of movement by instructing the patient to perform the movements in various directions. Necessary minor adjustment were carried out and the necessary finish was provided to the prosthesis. It was then inserted into the empty eye socket. (fig.4)



**Figure 4: Patient with prosthesis in-situ.**

#### **Review of literature**

Early records indicate that artificial eyes, ears and noses were found on Egyptian mummies. Chinese physicians aided by sculptors and painters have also undertaken facial reconstruction with waxes and resins.<sup>[7]</sup>

Ambroise Pare (1510-1590) was one of the pioneers to use glass and porcelain eyes.<sup>[8]</sup>

Kingsley (1880) described artificial appliances for the restoration of congenital and acquired defects of the palate, nose and orbit.<sup>[9]</sup>

By 1835, artificial glass eyes were produced on a large scale in Germany, but diminished supply due to world war II, initiated research on plastic eyes as a suitable substitute.<sup>[10]</sup>

By the end of the 19<sup>th</sup> century, maxillofacial prostheses were being made in vulcanite, the surface of which was painted to match skin colouring.<sup>[11]</sup>

Today, almost all patients with facial and/or oral defects are referred to the maxillofacial prosthodontist as they possess the knowledge, artistic skills, materials and techniques for the repair of such defects.

#### **Discussion**

Extra-orbital prosthesis are the most difficult ones to construct because in this case an attempt is being made to replace moving eyes with a static prosthesis. However, with adequate improvisation it is possible to construct a prosthesis which is aesthetically and functionally satisfactory.

The method described above provided convenient clinical control and evaluation during prosthetic modification of the stock ocular prosthesis. Careful preparation of the patient for acceptance of the prosthesis may be necessary to prevent psychologic problems and rejection of the prosthesis.

There have been a lot of advances in the materials used for maxillofacial prosthesis today. Acrylic material (commonly used), are being replaced by silicone, which is soft, comfortable and allows a good color match to be achieved.

#### **Conclusion**

In the above case, provision of prosthesis resulted in improvement in esthetics which contributed immensely to the physical and mental well being of the patient. Despite remarkable advances in surgical management of oral and facial defects, many such defects cannot be repaired by plastic surgery alone. The maxillofacial prosthodontist today is part of a team in rehabilitating patients with maxillofacial defects along with the surgeon, radiotherapist, and psychiatrist. Extensive research and development in the field of materials used for these prosthesis permit us to restore large number of such defects.

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