

**Fabrication of a custom-built ocular prosthesis- A case report**

<sup>1</sup>Dr.Alok Sharma Professor and Head of the Department of Prosthodontics Crown and Bridges and Implantology.

<sup>2</sup>Dr.Samarth Singhai 3<sup>rd</sup> year PG student Department of Prosthodontics, Crown and Bridges and Implantology.

<sup>3</sup>Dr. Paaras Kotwal, 2<sup>nd</sup> year PG student Department of prosthodontics, Crown and Bridges and Implantology.

**Corresponding Author:** Dr. Paaras Kotwal, 2<sup>nd</sup> year PG student Department of prosthodontics, Crown and Bridges and Implantology.

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**Abstract**

The case centers on fabrication of custom made eye for ocular defects. The prosthesis enhances emotional and psychological concern of the patient, one with eviscerated or exenterated eye. Though various types of prefabricated shell prosthesis are available in the market but the custom made prosthesis proved more advantageous in terms of precise fit, matching color of the iris with the opposing eye and eye movement. Particular attention has been given to the laboratory process in this technique to minimize the residual monomer content in the artificial eye.

**Keywords:** Enucleation, Ocular prosthesis, evisceration.

**Introduction**

Ocular defect may involve complete removal of the entire orbit, evisceration or Enucleation of only the eyeball.

The unpropitious loss of an eye may be caused by congenital defects, irreparable trauma, tumour, a painful blind eye, sympathetic ophthalmia. Causes physical and emotional problems with the loss of an eye is of main concern. Mostly of the stress is caused in the patient due

to social un-acceptance caused by the loss of an eye. Replacement of the lost eye should be done as soon as possible to promote physical and physiological acceptance by the society.

A multidisciplinary approach should be followed for an esthetic and stable outcome that includes maxillofacial prosthodontist, ophthalmologist and a plastic surgeon.

Customized eye is fabricated to fit accurately in the ocular socket of the patient. Prosthesis mainly includes sclera and iris and are colored and polished to make the prosthesis look natural. These prosthesis not only provide esthetics, but also protect the eye cavity from infections.

Techniques for making these ocular prosthesis vary from simple to complicated. Presented here a simple technique of ocular rehabilitation very effective and satisfactory resulting in prosthesis that is almost monomer free.

**Case Report**

A 24 year old male patient reported to the Department of Maxillofacial Prosthodontics NIMS Dental College and Hospital Jaipur with a defect in his left eye. The defect

was caused by the trauma due to projectile injury during his childhood. On inspection no inflammation was seen. The muscle function of both upper and lower eyelid seemed normal, the only option available for the patient was a prosthetic eye. Consent of the patient was taken for the procedure.



Figure 1

### Method of Fabrication of Ocular Prosthesis

#### Impression Tray Selection

A Stock acrylic ocular impression tray was taken for the impression. The patient need to be in a relaxed position in order to get the natural draps of tissue. Modifications were made to achieve the correct countours of the eye by adjusting the extentions. The margins were smoothened with the help of finishing bur (Prisma Finishing Bur #T-6) to prevent any irritation to the tissue.

#### Impression

Patient was made to look straight and kept all the facial muscles relaxed. The impression tray was loaded with Light-Body A-silicon elastomeric impression (GC Flexceed putty) and it was slowly filled into the defect and impression was carried out. A little amount of overflowing of material from the inner canthus shows that the material was sufficient.

The impression was gently removed by massaging the lower eyelid and then the impression was washed and disinfected with Revita lens solution (Ocutec, UK).



Figure 2

#### Making a wax pattern

A silicon putty index was made of the impression. Once it is cut and it was poured with a combination of 3 parts of sticky wax (Pyrax) and 2 parts of carving wax (Pyrax) was flown through it. On setting the wax pattern was gently removed and smoothened with the help of carver and gauze.

The wax pattern was then tried in patient's eye for fit, comfort, bulkiness of the pattern and the movement of the eyelid. Necessary adjustments were made. Corneal adjustments were made by standing behind the patient, retracting his eyelids and making him look downward.

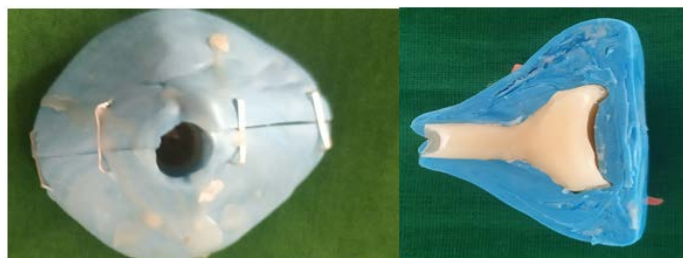


Figure 3

#### Attaching the Iris

As iris coinciding with the size of the adjacent eye(12mm) was attached to the wax pattern to replicate the normal gaze of the person. The position of the iris can be checked and verified by observing the point of the iris by standing behind the patient.



Figure 4

### **Fabricating the Base Sclera Shell**

The wax pattern was then flaked using dental plaster. Once it is set wax pattern was removed and it was packed with scleral polymer (Pyrex Heat cure acrylic resin mixed with monomer). A separating medium (Pyrex Cold Mould Seal) was used for easily removal.

Curing protocol: A modified curing protocol, referred to as 'reverse curing' as has been reported by Jorge and co-workers was followed to minimize monomer content from the acrylic eye. In this technique, the flask is placed in water at 95°C for 20 minutes and thereafter in boiling water for an additional 20 minutes. The flask was then held under running water to cool it. The acrylic was retrieved and about 1mm of the acrylic surface was trimmed down and the black iris was reduced to make it almost flat corresponding to the level of the iris plane of the natural eye. The margins of the acrylic prosthesis were rounded off and the entire prosthesis was smoothed out.



Figure 5

### **Coloring of the Sclera Shell**

The iris was colored using pigments or acrylic paints and red fibers of silk. It was done right in front of the patient so that the matching of the color is done right without any mistake and it was all done in the natural daylight.

The color of the sclera was matched with the adjacent eye and veins (red silk fiber) were added replicating blood vessels to give it a natural look. These fibers were secured in place with monopoly syrup.

The syrup was made by combining 10 parts of type 1 – class 1 (heat cure acrylic) resin monomer to 1 part of type-1 class-1 clear acrylic resin polymer by weight. The monomer was poured into a beaker and placed in a pan of boiling water. When the monomer was warm, the polymer was added slowly into the monomer along with stirring continuously with a glass rod. After 10 minutes, the solution obtained the viscosity of light oil. After it cooled down to room temperature, it was poured in dark bottle and refrigerated.

The characterization was made by taking the left normal eye as the standard option and guide. First, the basic color of the sclera and the characterization around the iris with the acrylic paint mixed with monopoly syrup was attained. The following step was done in the presence of the patient and final try-in was done. After the final approval by the patient, a thin sheet of double pink-colored spacer wax –0.2 mm was adapted over the final try-in prosthesis. It was further flaked and dewaxing was done followed by application of clear heat-cure acrylic over it and finally curing was done with short curing cycle (74°C for 1½ h followed by 100°C for 1 h).

The final prosthesis was properly finished and polished and inserted in the socket after being disinfected and lubricated with an ophthalmic lubricant (Ecotears, Intas Pharmaceuticals Ltd, Ahmedabad, India) to maintain a tear film over the prosthesis and to improve eye movements. Minor adjustments were made at the time of delivery as per the patient's comfort and esthetics. Necessary instructions for cleaning, placement, and removal of the prosthesis were given and the need for regular recall appointments was emphasized.



Figure 6

### Discussion

The prosthesis is not functional but is the most esthetic option for such patients. It prevents social embarrassment and restores self-confidence in the patient. This technique describes the fabrication of a prosthesis with materials that are easy available and regularly used by Maxillofacial Prosthetic personnel and Ocularists. The procedure ensures a good fit of the artificial eye and a good natural esthetic outcome. The `reverse curing` protocol ensures elimination of the residual monomer by curing at an increased temperature. According to Beumer et al., 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 mucosa and act as a potential source of infection, which are minimized in the custom-made prosthesis. Hence, we decided to fabricate a custom-made eye prosthesis.

The monopoly syrup is an alternative to cyanoacrylate for characterization and more eco-friendly, economical, and self-laboratory made. The authors advocate that it has a better manipulative quality for veined characterization of used silk fibers.

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