

# Iris Positioning Using a Grid Attached to a Spring Bow for a Custom Ocular Prosthesis

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## ABSTRACT

Eyes are among the first features of the face to be noticed. Loss of an eye due to congenital, traumatic or pathologic aetiologies causes disfigurement and loss of sensory feedback. It leaves a psychological impact on the patient, thus prosthesis should be provided at the earliest to raise the spirits of the afflicted. Iris positioning is one of the important steps in fabricating customized ocular prosthesis. In facial asymmetry cases, comparison of both irises together can be a major disadvantage. This case report illustrates the use of a unique customized frame spring bow assembly to position the iris disk using the established parallelism between inter pupillary line to the horizontal plane.

**Keywords:** Custom made, Post enucleation deficit, Stock ocular prosthesis

## CASE REPORT

A 20-year-old male patient reported to the Department of Prosthodontics, Goa Dental College and Hospitals, Bambolim, Goa, with the chief complaint of missing right eye due to an automobile injury, 15 years ago. The patient was referred by the Department of Ophthalmology with the matching iris stock eye. On examination, the right eye socket exhibited eyelid constriction, reduced size and depth [Table/Fig-1]. A decision was made to fabricate a customized ocular prosthesis, using the iris from the stock eye.

### Procedure

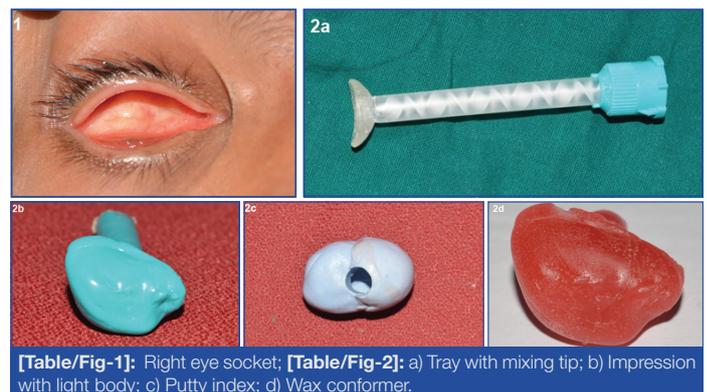
1. The patient was seated in an erect position to allow the tissues involved in the defect to be recorded in their natural drape. An impression of the orbital socket was made with light body addition silicone impression material (Aquasil, DENTSPLY) using a special tray fabricated from the stock eye [Table/Fig-2a,b].
2. The impression was immersed in putty addition silicone impression material (Aquasil, DENTSPLY) to obtain an index [Table/Fig-2c]. A wax conformer was fabricated by flowing molten wax (Modelling Wax, Deepti Dental Products of India Pvt. Ltd.) in the index [Table/Fig-2d], tried in the patient's eye socket and adjusted for desired volume, retention and comfort.
3. A special assembly which consisted of a heat cured acrylic resin (DPI, Mumbai) frame with a graph grid, attached to a Hanau spring bow was used to position the iris accurately [Table/Fig-3]. The frame was made with equal lines of graph grid on either side of the midline of the scale. The innate markings on the graph grid and a scribed scale on the spring bow helped in accurate positioning of the frame on the spring bow. The scale was attached to the spring bow using ball point pen caps.
4. The patient was placed in the aesthetic reference position and an outline of the iris of the left eye was traced on the graph grid [Table/Fig-4].
5. The markings were transferred to the wax conformer by flipping the graph grid on the right side of the patient using the markings on the spring bow to maintain symmetrical distance on either side. The iris disk from the stock eye was cut according to the measured dimensions and placed on the markings [Table/Fig-5].
6. The wax conformer with the stock iris was tried in. After the final adjustments and ascertaining the patient's satisfaction, the wax conformer was processed in the conventional manner.

7. The prosthesis was characterized using Adoro stains [Table/Fig-6a] and cured in the curing unit. The stains were protected using the protective coating (G-Coat Plus, GC America Inc.) [Table/Fig-6b].

The prosthesis was delivered to the patient with post delivery instructions. He was advised to limit the removal of the prosthesis to once in a day for cleaning. The cleaning can be done by hand washing with soap and water. Recall visit was advised annually for polishing to prevent deposition of proteins and bacteria. The patient was happy and satisfied with the prosthesis [Table/Fig-7].

## DISCUSSION

Congenital defects, accidental trauma or pathologies may lead to surgical intervention, hence resulting in removal of eyeball [1]. Defects of the eye can be classified as ocular or orbital. Ocular



[Table/Fig-1]: Right eye socket; [Table/Fig-2]: a) Tray with mixing tip; b) Impression with light body; c) Putty index; d) Wax conformer.



[Table/Fig-3]: Graph grid frame attached to spring bow. [Table/Fig-4]: Iris outline of left eye.



**[Table/Fig-5]:** Transfer of markings on right eye. **[Table/Fig-6]:** a) Adoro stains; b) G Coat Plus. **[Table/Fig-7]:** Patient with the prosthesis.

defects show the involvement only of eyeball whereas orbital defects include periorbital tissue as well [2]. Peyman GA et al., has classified surgical procedures adopted for eye removal into three categories: Evisceration (removal of the eye with sclera intact), Enucleation (removal of the entire eye including globe with orbital contents in place) and extenteration (removal of the contents of the eye socket including the muscles, lacrimal glands, optic nerve) [3]. For the former two procedures, ocular prosthesis is fabricated and for latter, orbital prosthesis is given. Ocular prosthesis can be either prefabricated stock eyes or custom-made [4]. Custom-made ocular prosthesis achieves intimate contact with the tissue bed enabling ideal fit and distributes pressure equally on the tissue bed [5]. The procedures for a custom-made ocular prosthesis include impression of the socket, wax pattern trial, iris positioning and acrylization.

The positioning of iris is an important step in the fabrication of custom-made ocular prosthesis.

Bilateral symmetry is as crucial in iris positioning as it is in dental restorations. For rehabilitating teeth, interpupillary line and horizontal plane are used as a reference line along with a facebow. Horizontal plane is captured by positioning the patient in Natural Head Position (NHP/also called as aesthetic reference position/ERP). NHP is the position of the head most comfortable for a patient gazing at the horizon [6]. The facebow records the orientation of the maxilla while patient sits upright with arms of facebow parallel to horizontal plane and interpupillary line. Keeping the same principle in mind, an innovative technique is devised for rehabilitating eye defects wherein facebow is aligned parallel to horizontal reference plane and customized scale along with graph grid helps in accurate transfer of iris position (by obtaining interpupillary line). The technique described derives advantages of various methods advised previously i.e. using customized scale [7] and graph grid [8], hence ensuring bilateral symmetrical iris positioning along with interpupillary line.

Other advantages of this technique are it is less time consuming, requires minimal skill, no need for assistance, uses established reference plane, allows repeated checking of iris position, can be used for multiple patients and is easy to use in clinical setup. The disadvantage is the limitation in the selection of colour and size of

Techniques for iris positioning	Subjective perception	Infeasibility in clinical set-up	Errors in facial asymmetry
Graph grid [8], mounted graph grid [9]			✓
Standard measurements from midline to pupil [10]			✓
Iris positioning devices like pupillometer [11], ocular locator [12], customized 3-D scale [7]	✓	✓	
Others- visual judgement [13], light reflection [14]	✓		

**[Table/Fig-8]:** Summary of the methods used for iris positioning.

the iris. Various methods proposed for iris positioning along with their disadvantages have been tabulated in [Table/Fig-8] [8-14].

## CONCLUSION

Symmetry is important for the aesthetic appearance of the maxillofacial prosthesis, with ocular and orbital prosthesis being no exception. Accurate orientation of iris disk assembly largely contributes to the success of ocular and orbital prosthesis. The technique described in the article uses the established reference plane which hence gives an accurate registration of position of iris disk assembly.

**Declaration of patient consent:** The authors certify that they have obtained appropriate consent form. In the form the patient has given his consent for his images and other relevant clinical information to be reported in the journal.

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