

CASE REPORT

Custom made ocular prosthesis using customized tray and a grid for iris positioning: A case report

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ABSTRACT:

Aim: To fabricate a custom made ocular prosthesis using customized grid for iris positioning. **Materials and Methods:** In this article, a simple and effective method for fabrication of a custom ocular prosthesis using a customized grid has been described. A clear, self-cured resin external tray for final impression making and characterization of the custom eye enhanced the details and longevity of the prosthesis. **Results:** Excellent results were obtained using this technique taking into account patients esthetics, comfort and satisfaction. Although the ocular prosthesis fabricated didn't help patient in restoring visual function but definitely increased patient's self-confidence by enhancing esthetics. **Conclusion:** In patients with advanced age and poor economic factors, ocular implant placement seems difficult. Method mentioned here gives good and effective results in a simple way.

Key words: Ocular prosthesis, Customized tray

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INTRODUCTION

Eyes are generally the first thing to be noticed on a person's face. They play a vital role, not just in vision but also in facial expression. Eye loss has a long lasting psychological and emotional effect on the patient. Therefore, the need for artificial substitutes to replace missing body parts has probably existed as long as man existed¹. The unfortunate loss or absence of an eye may be a congenital defect, trauma, tumor, sympathetic ophthalmia or an untreatable painful glaucoma.

Depending on the severity of the situation, the surgical management may include one of 3 approaches: evisceration, enucleation, or exenteration.

Evisceration is the surgical removal of the intraocular contents of the globe, leaving undisturbed the sclera, Tenon's capsule, conjunctiva, extraocular muscles, and the optic nerve. The cornea may be retained or excised.

Enucleation is the surgical removal of the eye globe after severing the optic muscles and optic nerve. Exenteration is the 'in toto' removal of the entire orbit, usually involving partial or complete removal of the eyelids.²

The literature is filled with various methods to fabricate artificial ocular prosthesis which includes fitting a stock eye, modifying a stock eye on the positive replica of the ocular defect and fabrication of the custom ocular prosthesis. Both

sclera and iris are custom made in custom ocular prosthesis. First two techniques are less time-consuming but often have the disadvantages like compromised esthetics and unreliable fit. Implant eye prosthesis has a superior outcome but due to economic factors it may not be advisable in all patients. Custom ocular prosthesis provides improved esthetics, and fit but usually more time-consuming and complicated. Therefore, a custom-made ocular prosthesis is an excellent alternative.⁶ Here, we present a case of a custom-made ocular prosthesis characterised by resin veined fibers and pigments for an enucleated ocular socket which showed excellent fit, retention and esthetics.

CASE REPORT

A 70 year old female patient reported to the department of Prosthodontics, H. P. Government dental college and hospital, Shimla with the chief complaint of missing right eye since birth. The patient had history of anophthalmos since birth and wanted to get it restored for esthetic reasons. Fig. 1(a,b)

The patient was categorized under Class 4 phthisis bulbi, i.e., severe enophthalmos with disfigured sclera and loss of orbital fat based on the treatment based classification system.² Examination of the right anophthalmic socket (Fig 1b) revealed shallow inferior sulcus, lower lid laxity, enophthalmos, ptosis

and overall decrease in socket volume. In comparison the left eye was normal and healthy in condition. To achieve better esthetics a customised ocular prosthesis using stock eye shell was planned to meet the needs of the patient.



Figure 1a: Preoperative photographs



Fig. 1b: Preoperative photographs

Fabrication of custom tray

- It was decided to make a direct impression of right eye socket by using an elastomeric addition silicone (putty). An addition silicone putty was used to make the primary impression of the eye and surrounding structures.^{3,5}
- After the retrieval of primary impression the undercuts were blocked with red modelling wax and an extended special tray for making the final impression was made in clear self-cure acrylic over the set impression material. The impression was detached from the tray by careful teasing. This custom tray with the syringe attached was then adapted over patients right orbit and trimmed it down to the approximate shape of the orbit.⁴
- After finishing and polishing the tray perforations were made in it to make escape holes for the impression material. Fig. 2(a,b,c,d).

Impression procedure

- It was decided to make final impression of the right anophthalmic socket with elastomeric impression material (light body over heavy body).
- A total 2% of lignocaine hydrocolloid topical gel was applied on the tissue inside the right eye socket to reduce the tissue irritability while making the impression.
- Elastomeric impression material (medium body) was mixed properly and loaded into the tray and impression made. The impression was lightly scrapped and the light body was extruded into the right eye impression in and out between eyelids using mixing gun. The impression was removed and slightly scrapped with a sharp B.P. blade. Light body was extruded into the eye socket and the set impression placed over it to get the final impression (Fig 3a). The patient was asked to perform functional

movements of the right eye (Fig 3b) to record the external surface details of right orbit and eyelids (Fig 3c).⁶



Fig. 2 a, b, c, d, Custom made external ocular tray

- Alginate was mixed in a thin consistency and filled up in the cup till brim under light tapping to avoid air entrapment. The impression was then centred in the alginate cup using a stainless steel (21 gauge) wire through the tray.(Fig. 4)
- As the alginate sets it is sectioned carefully with a B.P. blade and the elastomeric impression is removed carefully without breakage. (Fig. 5)
- A mix of carving wax and ivory wax in the ratio (1:1) was melted in a crucible and poured into the space under vibration to avoid bubbles

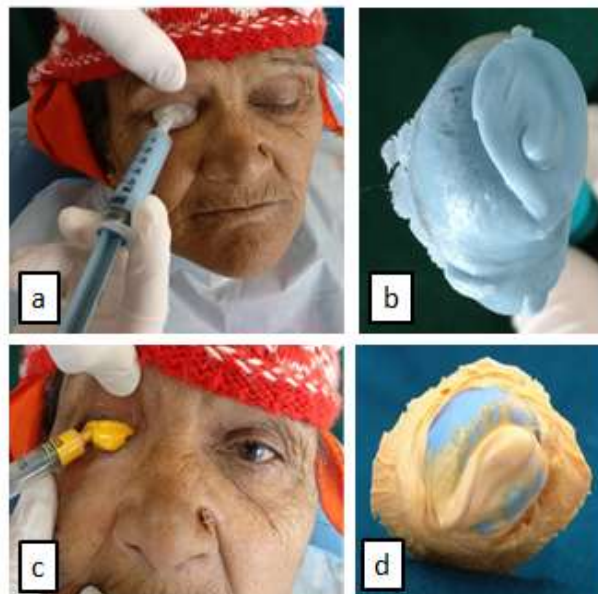


Fig. 3. a) Injecting addition silicone impression material (medium body) into eye socket via 5 cc syringe, b) Set impression c) Light body extruded in between the eyelids and around for final impression d) Final impression. After the elastomeric impression material was set, it was removed from the socket. Fig. 3d. Impression of the right eye socket



Fig. 4: Final impression centered on the cup filled with alginate.

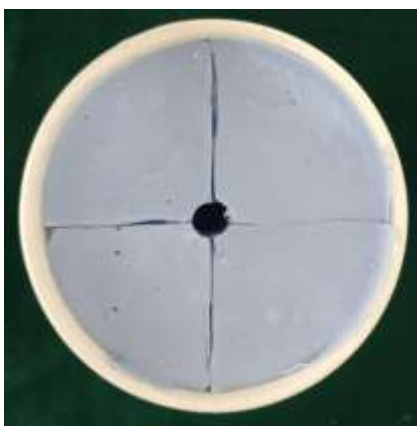


Fig. 5 Carefully sectioned alginate to remove impression

Scleral form contouring

The wax pattern once set is removed from the cup and chiselled according to patient’s right eye socket.⁶ Fig. 6.



Fig. 6: Wax pattern after removal from alginate cup.

Try in and iris positioning using customized grid

- A grid was printed on a transparent projector sheet with known markings. The grid was positioned over the patients face to check for symmetry and positioning of pupil. In addition, an imaginary vertical line was drawn on the left side of the face which passes through the pupil of the right eye when patient is looking straight forward. Similarly a second vertical line was drawn the right side of the face keeping the equal horizontal distance from the

midline. Fig. 7. Thereafter, the position of pupil and diameter of the iris was marked in the scleral wax pattern.⁷



Fig. 7. Scleral pattern try-in

Iris selection and adjustment from stock eye shell

The size, shade, and configuration of the iris were selected by taking the contralateral natural eye as a guide. Scleral part of the stock eye (American Optical Corp., Southbridge, Mass) was trimmed off using an acrylic trimmer. (Fig. 8). This stock iris was positioned on the scleral wax pattern, and the border was sealed using a hot instrument. Scleral wax pattern was then tried in the patients right eye socket and desired additions and deletions was made until satisfactory contours of the eyelids were achieved in open and closed positions.



Fig. 8 Scleral pattern with iris-pupil assembly from stock eye shell

Heat cured tooth colour acrylic shade was selected according to the colour of sclera of the healthy left eye.

Processing

- The finished and polished wax pattern was invested in flasks using dental plaster.
- Dewaxing was carried out and the mold was cleaned with soap solution to remove residues of wax. Then cold mould seal was then applied as a separating media. Fig. 9.
- Veined fibers (Fig. 10) was placed on the surface of the scleral mold and set by using transparent self cure acrylic resin to simulate blood capillaries. Also reddish-brown acrylic resin pigments was placed with transparent self

cure acrylic resin to simulate lacrimal caruncle at the medial corner of eye.



Fig 9. After dewaxing of mold



Fig. 10 Veined fibers.

- The mold packing was done by using selected shade of tooth coloured heat cure acrylic resin and curing was carried out in conventional manner.
- After recovering cured eye from the mold, finishing and polishing was carried out in conventional manner.^{8,9}

Insertion

- Finished custom made eye was placed in right eye socket and function and esthetics verified as adjusted at try in stage (Fig 11).
- The patient was instructed on the aspects of insertion and easy removal of the prosthesis.



Fig 11a) Final custom ocular prosthesis



Figure 11b) Patient after insertion of custom made right eye prosthesis

Post insertion instructions

- The follow-ups were done at 1, 2 and 7 days after the prosthetic insertion

Over time, the surface of the prosthesis collects protein and debris so the patient was advised proper cleaning of the prosthesis daily as under –

- Perform a thorough hand scrub including the fingertips.
- To use a warm wet face cloth with a neutral pH baby shampoo to be applied to the eyelids as they will normally be crusted with secretion then wash thoroughly.
- To use a pocket pack of tissue and use it when necessary to remove any secretion from the prosthesis or lids.
- To avoid the use of a handkerchief or bare fingers. Following removal, the prosthesis should be cleaned before insertion.
- Not to clean the prosthesis with a cloth, abrasive soap, or toothpaste.
- Dry with soft tissue, polishing very lightly in a circular motion.
- Regular rinsing of the prosthesis with an ophthalmic irrigation solution can usually dislodge any surface deposits.
- There after a 6 months follow-up was done for prosthesis evaluation, adjustment and polishing to avoid any source of irritation.⁹

DISCUSSION

Customized ocular prosthesis compared with stock eyes have better contouring, color matching, and coordinated movements with the contralateral eye. Customizing the iris is technique sensitive and demands skill and time. To avoid this a stock iris matching with the contralateral natural eye should be used if available.⁹ The ocular prosthesis should maintain its orientation when the patient is looking straight ahead. Prosthesis placement is considered correct if it restores the normal eye opening, support the eyelids, restore a degree of movement, be retained adequately and pleasing esthetically. The use of a stock ocular prosthesis of an appropriate size and color, adapted by selective grinding or additions of acrylic resin, has been advocated.^{10,11} The described technique is simple, decreases treatment time, and requires minimal artistic skills and can produce excellent results for most patients,

provided the operator has an adequate selection of prefabricated eyes.^{12,13,14}

CONCLUSION

Success of ocular prosthesis is largely dependent on the precise laboratory technique and the skill of the fabricator. Through this technique, the demand for the artistic skill and consumption of time are reduced by the use of precisely selected stock iris, yet esthetic and functional requirements are met by the customized sclera.

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