

Simplified Approach for Fabricating A Custom Made Ocular Prosthesis-A Case Report.

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ABSTRACT

The deformity associated with the loss of an eye causes significant physical and psychological consequences. Most patients experience significant setback, due primarily to coping with the functional disability caused by the eye removal, and to the social barrier caused due to the facial disfigurement. Therefore ocular prosthesis is essential to promote physical and psychological healing for the patient as well as to improve the social acceptance. Multidisciplinary management and team approach are essential in providing accurate and effective rehabilitation. The present case report describes a simplified technique for the fabrication of a customized ocular prosthesis that does not depend much on artistic ability of the operator and is relatively easy to perform by a prosthodontist along with saving on laboratory time.

Keywords: - Ocular Prosthesis, Custom, Stock – Iris, Rehabilitation, Maxillofacial

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Introduction

The eye is a vital organ of the body not only for vision but also for facial expression and aesthetics. The loss of eye is not an uncommon condition which may occur due to severe trauma, congenital abnormalities or diseases like glaucoma, chickenpox etc.¹ The disfigurement associated with loss of an eye may result in significant physical and emotional problems that require immediate management and rehabilitation intervention. Rehabilitation of such maxillofacial defects is a complex task, requiring an individualized design of the technique for each patient. The role of prosthodontist is to fabricate an ocular prosthesis with acceptable esthetics to restore the facial symmetry and normal appearance of the patient. An ocular prosthesis that is fabricated for accurate replication of natural colour, contour, size and orientation will provide realism and symmetry for patient who requires it.² Multidisciplinary management and team approach are essential in providing accurate and effective rehabilitation. The present case report describes a simplified technique

for making a customized ocular prosthesis that does not depend much on artistic ability of the operator and is relatively easy to accomplish using minimal time and equipment.

Case Report

A male patient with 22-years age reported to the Department of Prosthodontics, Christian Dental College, CMC. & Hospital, Ludhiana, Punjab (India). He was concerned with loss of left eye and the consequent facial disfigurement because of this (Figure 1). Patient history revealed irreparable traumatic injury 4 months back causing loss of left eye. Clinical examination including evaluation of the muscular control of the palpebrae and internal anatomy of the orbital socket in resting position and full excursive movements was done. Condition of conjunctiva, depth of the fornices and presence of cul de sac was also noted. Rehabilitation with custom made ocular prosthesis was planned for the patient.

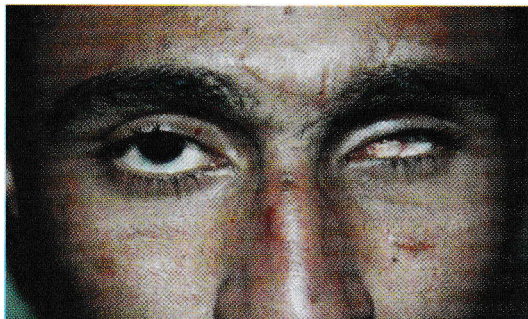


Figure 1: Pre Rehabilitation View.

Fabrication of Ocular Prosthesis

Impression Making

Impression of the an-ophthalmic socket was made using an impression method suggested by Allen and Webster³. A Stock perforated ocular impression tray was selected for the same. An irreversible hydrocolloid impression material (CA37, Cavex, Holland) was mixed using room temperature water. The tray had a hollow stem fastened in the middle through which a runny mix of alginate was injected (Figure 2). Patient was seated in an upright position with head tilted backward at approximately 45-deg while injecting the material and erect while recording the movement. The material was injected until the material ran out of the socket and retention holes in the tray. The excess material came out through the perforations in the tray and allowed only the critical needed volume to remain. The patient was instructed to perform all the movements of the eye, before the material was set. Impression was poured in two sections using dental stone. The special perforated tray of clear acrylic was made from the stone mould (the hollow stem of the special tray was made up from a stalk obtained from a ball point pen). Secondary impression was made with same material and technique as described above (Figure 3).



Figure 2: Impression making

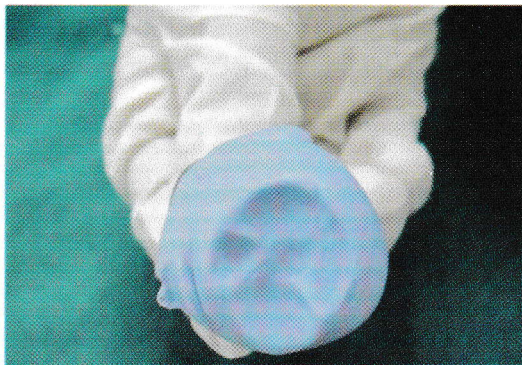


Figure 3: The Recorded impression.

Impression Pouring and Wax Pattern Fabrication

Impression on the tissue surface was poured in the lower half of the round ocularist flask up to the anterior of the posterior edge of the impression and allowed to set. A layer of separating media was applied on set dental stone and second half of the impression was poured. Tray was removed from the flask and molten scleral wax was poured into it. The wax pattern was retrieved after it was solidified. The wax pattern was smoothened to remove any sharp ridges and undesirable irregularities and then polished.

Try-in of Wax Pattern For The Ocular Prosthesis

The wax pattern was inserted. The fit and extension of the wax pattern were checked. The areas of over/under extensions were adjusted. When the patient was comfortable eye contour and lid configurations were viewed and adjusted from different angles both in open and closed position. The scleral shade was also matched with the adjacent eye using tooth colored acrylic shade guide (Vita 16).

Selection of Iris-Pupil Complex and Attachment of a Clear Acrylic Stalk

A stock eye that matched the iris-pupil complex of the companion live eye was selected. It was trimmed precisely to obtain the iris-pupil complex button leaving a margin of only 1mm around it. Clear acrylic stalk of approx 8mm length was attached in the centre of the iris button for pupil positioning and holding (Figure 4). This attached clear acrylic stalk

would also help in maintaining iris button in its predetermined position in the flask during processing.

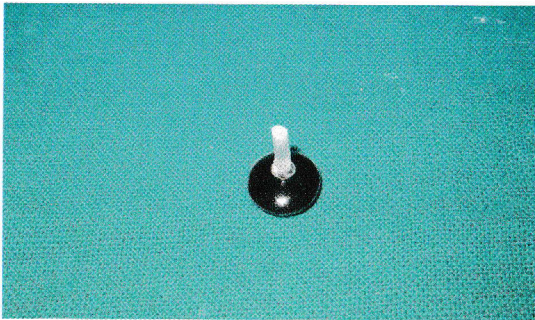


Figure 4: Clear acrylic stalk attached to the iris.

Iris Position: The gaze and position of the iris was determined by instructing the patient to look straight ahead at a distant point. The iris positioning was verified by certain guidelines marked on the patient's face : a vertical midline was marked considering the stable landmarks and prominent points on the face. Similarly the horizontal lines referring to the centre, inferior, and superior limits of the iris were marked⁴. The marking were then transferred onto the sculpted scleral wax pattern and ultimate iris positioning was done in the scleral wax. A final wax trial was carried out for adequate ocular movements, correction of papillary alignment and proper palpebral movements. (Figure 5) The patient's satisfaction was confirmed finally.

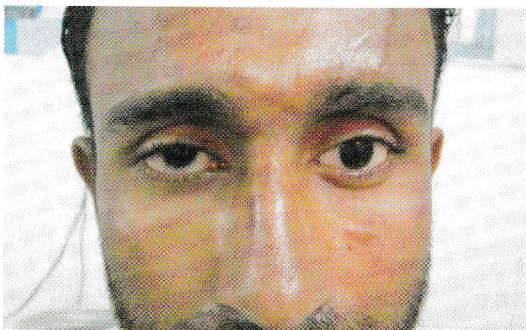


Figure 5: Wax trial with iris button placed in the determined position (acrylic stalk removed for photographic purpose).

Processing of Ocular Prosthesis

The wax pattern along with iris pupil complex button was invested in a round ocularist flask using dental stone. Dewaxing was done. The acrylic stalk previously attached will maintain iris button position. (Figure.6) Tooth coloured acrylic was packed in the mold, using compression molding technique and processed. The processed eye was finished and 1mm of acrylic was removed from the anterior curvature of the prosthesis to accommodate a layer of clear acrylic. Scleral characterization was done with red silk fibers to replicate the vasculature by monomer polymer syrup method.⁵ (Figure. 7) This modified prosthesis was packed with clear acrylic in the previous mold and processed.(Figure 8).

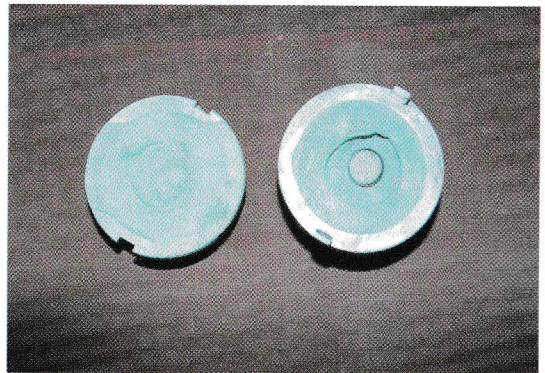


Figure 6: Iris pupil complex button in its predetermining position in the flask (acrylic stalk is embedded in the stone which maintains iris position).

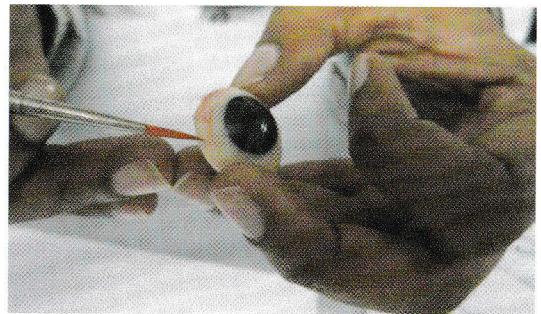


Figure 7: Sclera characterization done with red silk fibers.

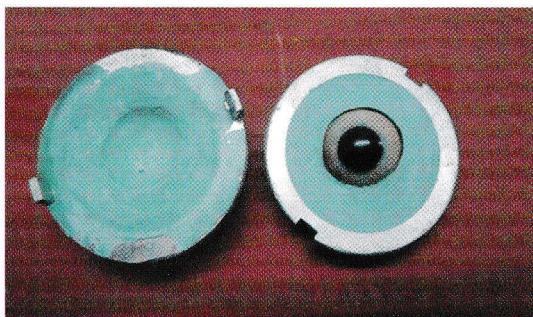


Figure 8: Prosthesis replaced in the previous mould for processing with clear acrylic.

Placement and Maintenance: The finished and polished prosthesis was washed with soap and water and placed in the socket (Figure 9). Patient was taught the proper placement and removal of the prosthesis. Necessary instructions for cleaning and importance of recall visit were explained.



Figure 9: Post rehabilitation view.

Discussion

Two options are available for the artificial eye prosthesis, one is a pre fabricated ocular prosthesis and the other is custom made. 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.⁵ Prefabricated prosthesis carries potential disadvantage of poor fit, poor esthetics, poor eye movements and risk of granuloma formation. Modification of a pre fabricated eye prosthesis can solve the problems of poor fit to some extent but esthetics and comfort are still compromised, moreover iris positioning as that of natural companion eye cannot be done precisely as compared to the custom made prosthesis.⁶

The custom made ocular prosthesis conforms accurately to the socket as the prosthesis fabrication is based on the existing anatomy of patient, thus giving benefits of increased adaption, movement of the eye ball, and the exact match of the iris position as that of the adjacent natural eye^{7,8}

On the other hand, custom made prosthetic eye fabrication involves complex painting procedure (iris pupil complex painting) that is quite difficult and based purely on painting skills of the operator. The technique described in this case report uses a stock iris matching as that of natural eye to overcome the complex painting procedure involved in making a custom made ocular prosthesis with minimal equipment and time. The custom made prosthesis also overcomes the disadvantages of a prefabricated prosthesis and modified pre fabricated prosthesis. Limitation of the technique is that the clinician is dependent on the availability of a prefabricated eye with properly matching iris and papillary part.

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