



A SIMPLIFIED APPROACH FOR FABRICATION OF CUSTOMISED OCCULAR PROSTHESIS: A CASE REPORT

Dental Science

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ABSTRACT

Eyes are a person's window to the world. Loss of eye not only leads to loss of eyesight but at the same time it also leads to psychological disablement of the patient. Prosthodontic rehabilitation of such cases includes fabrication of prosthesis using acrylic resin, silicone or by placing implants. However, not all patients are willing to use implants for maxillofacial rehabilitation. Therefore, a custom made orbital prosthesis serves as an affordable and satisfactory alternative. The present case report presents a simple and effective method of fabricating a customised ocular prosthesis.

KEYWORDS

Ocular prosthesis, customised eye prosthesis, esthetic eye, artificial eye.

INTRODUCTION:

It is the God given right of every human being to appear human¹

If we compare the human being with a plant, the face would be its flower. Face is the person's contact with the world and it forms the physical basis for personal recognition. As the father of Indian surgery Sushruta Samhitha said hundreds of years ago, **"The love of face is next only to the love of our life and thus the mutilated cry for help."**¹ Hence in this appearance conscious society of ours, it is virtually mandatory now to have a reasonably pleasant appearance, to be accepted. Thus, people having disfigured or missing parts of the maxillofacial skeleton or the face in particular come to Prosthodontist to get a normal appearance by artificial restorations.¹

Rehabilitation is a complex process of restoration of a previous state following a major change. The change may be a congenital deformity, secondary to trauma, tumor surgery or a result from a disease process and /or its treatment. The defect may be emotional or physical, functional or cosmetic and often a combination. Prosthetics offer the advantage of quick, reversible, and medically uncomplicated rehabilitation. In addition, the restoration may be readily removed to allow evaluation of the health of underlying tissue.

An artificial eye can sometimes be fabricated by making use of stock eye shells that come in standard sizes, shapes and colors.^{2,3,4} These prostheses can be used for interim or postoperative purposes. No special skills or materials are required for fabrication and the pre-fabricated eye shells are not very expensive. At times the shade available in the stock shells do not match with that of the patient or the size doesn't fit properly or many a times the size and position of pupil creates a problem even though the shade may match and hence at times there is a need for the fabrication of a custom ocular prosthesis. Advantages of the custom made prosthesis include improved adaptation to underlying tissues, increased mobility of the prosthesis, improved facial contours, and enhanced aesthetics gained from control over the size of the iris and pupil and color of the iris and sclera.

Case Report:

A 50 year old male patient reported with a missing left eye. The patient had in the past used a prefabricated stock ocular prosthesis but the shade and contour of that prosthesis did not match that of his right eye and hence he wanted a custom prosthesis made. Since the patient had

an unsatisfactory experience with prefabricated stock ocular prosthesis the decision to fabricate the new prosthesis by customising it in all aspects was made.

Technique:

1. The patient was seated in an upright position with head supported by the headrest. This position allowed the natural positioning of the palpebrae and surrounding tissues relative to the force of gravity. The socket was assessed clinically and then the eyebrow and eyelashes were lightly lubricated.
2. Primary alginate impression was made. The alginate was mixed to a runny consistency (water powder ratio-52ml: 25gm; one-third times more water quantity). It was injected slowly till some of it came out through inner canthus of eye. (Fig 1)
3. Beading and boxing of the impression was done and cast poured using die stone. The cast obtained (Fig 2) was used for the fabrication of a clear acrylic custom tray for the final impression. (Fig 3)
4. The final impression was made using A-silicone light body. The light body was flown through the custom tray till it oozed out from the holes present on the custom tray. (Fig 3)
5. The impression obtained was poured by the double pour technique using dental stone and die stone in a manner that facilitated separation of the two casts. The right, left, upper and lower extents were labelled on the cast. (Fig 3)
6. Melted modelling wax was flown into the impression space while both the casts were held together by orienting the grooves.
7. The wax pattern obtained was smoothened and polished in order to make it ready for trial in the eye socket. In order to insert the wax pattern, the upper lid was lifted and the superior edge of the pattern was placed behind the lid and gently pushed upward. The inferior border of the pattern was seated in the inferior fornix by drawing the lower lid down and the lower lid was released. The eye contours on both sides were checked for aesthetics and comfort.
8. Once satisfied with the contour and fit of the wax pattern the position of the iris was marked with the help of a transparent graph paper and vernier calliper. The markings were done taking into account the right eye. (Fig 4) This was done by asking the patient to look at a fixed point in front of him in a straight line at a distance of 4feet.
9. After finalising the iris position the diameter of the iris was measured and a marking was made on the wax pattern with a similar diameter.

10. The next step involved the incorporation of the iris disc into the wax pattern. The plate was trimmed to the required diameter and inserted into the wax pattern as per the marked position of the iris.
11. The position and size of the disc was verified using the graph paper and vernier calliper. (Fig 4)
12. The patient was asked to do eye movements (side to side, up and down) in order to make sure the iris disc was properly oriented.
13. The disc was painted using acrylic colors. (Fig 5) Shade matching was done with the right eye from time to time to achieve the most optimal shade matching.
14. The iris button was placed on the painted iris using a drop of glycerine.
15. The iris button was sealed onto the disc with modelling wax.
16. Flasking was carried out using dental plaster. Putty was used around the wax pattern in order to maintain the accuracy of the tissue surface details.
17. Dewaxing was carried and tooth colored heat cure acrylic was used to fabricate the sclera. Acrylic stains were incorporated in IT to match the shade of the right eye's sclera. Curing was done for 20mins. Once the flasks cooled down deflasking was done taking care not to break the flasking.
18. The obtained acrylic sclera with the iris in it was finished and polished.
19. It was painted using acrylic colors to give it a more natural appearance.
20. The veins which were made from red wool were added onto the surface of the sclera by using monomer. (Fig 5)
21. Try in of the prosthesis was done at this stage to make sure the color of sclera, the pattern of veins was similar to that of the right eye.
22. The final step included painting a thin layer of heat cure clear acrylic onto the sclera part and replacing the assembly back into the flasks in their previous orientation and curing for 20mins.
23. Lastly, after retrieving the prosthesis the stem of the iris button was carefully trimmed off.
24. The final prosthesis was finished and polished. (Fig 5)
25. Final insertion of the prosthesis was done. The position and shade of the iris were evaluated along with the evaluation of ease of movement of the prosthesis within the socket.
26. Follow-up was done after three days to eliminate immediate irritation or any pressure points.
27. The patient was given instructions for wearing the prosthesis and also about the home care as follows:
 - (a) Prosthesis should be handled with care and with clean hands.
 - (b) Removal of acrylic prosthesis during night is recommended to avoid any accidental displacement and injury to the underlying tissues.
 - (c) It should be soaked in an antibacterial solution to destroy the surface bacteria upon removal from the socket.
 - (d) Routine cleaning and polishing of prosthesis should be done every year to prevent deposition of protein and bacteria.

DISCUSSION:

The customised ocular prosthesis though is not functional but it fulfils the aesthetic needs of the patient in a very satisfying way if carefully and precisely fabricated. It rebuilds the self-confidence of the patients. The materials used are easily available. Fabrication of custom tray is a better option than using the readily available ocular trays as the custom tray adapts well to the confines of the socket and needs little or no modifications before making the final impression. The position of the iris disc is the most important determinant in the success or failure of the ocular prosthesis. The part pertaining to the aesthetics of the prosthesis is also achievable beautifully by paying attention to details. Colors were used in a variety of ways till satisfactory results were obtained. The fine lines within the natural eye were also tried to be incorporated in the iris with the help of paints. The wool was used for incorporation of veins instead of painting them as it gave depth to the overall appearance of the prosthesis and also it is a very easy, non-irritating and cost effective method. The procedure may be a little tedious and time consuming but it is totally worth the patience once the final work is ready.

The most critical steps of fabricating the custom ocular prosthesis are:

- 1) Impression making
- 2) Determining the iris size and position
- 3) Shade matching and characterisation of the sclera

Advantages of a custom ocular prosthesis:

- 1) Improved fit, mobility, and aesthetics.
- 2) Retains the shape of socket.
- 3) Prevents collapse of the lids.
- 4) Prevents accumulation of fluid in the cavity.
- 5) Maintains palpebral opening similar to natural eye.

Disadvantages of a custom ocular prosthesis:

- 1) Increased fabrication time
- 2) Overall cost is more than prefabricated stock shells
- 3) Making an impression of the orbital area with an accurate record of surface details can be a difficult procedure.

McArthur⁵ described methods for positioning the artificial eye in the orbital prosthesis using an ocular locator and fixed caliper. This determined the placement of the prosthetic eye in the medioletral and supero-inferior planes. Benson⁶ suggested a method for fabricating a custom made acrylic resin ocular prosthesis in which he determined the size and position of iris by visual judgement. According to Beumer et al.⁷ intimate contact between the ocular prosthesis and the tissue bed is needed to distribute even pressure, therefore a prefabricated prosthesis should be avoided. Voids and discrepancies of fit in the prefabricated prosthesis may lead to easy displacement and dislodgement of the prosthesis.

CONCLUSION:

For an ocular prosthesis to be successful it is very important that the prosthesis appears as natural as possible. The symmetry of the other eye with the orientation of the prosthesis is a factor that should be lead stress on. The technique described in this article covers the aspects of symmetry, proper positioning and size of the iris by using the graph sheet and digital vernier calliper. The aspects related to the shade matching and natural appearance have also been discussed wherein the use of acrylic colors and wool has been done. This article provides an overall easy and satisfactory technique of fabricating a customised ocular prosthesis.

Figures:



Fig 1: Pre and post ocular prosthesis insertion



Fig 2: Alginate impression and primary cast



Fig 3: A-silicone final impression, custom tray and final cast



Fig 4: Determination of the size and position of the iris on wax pattern

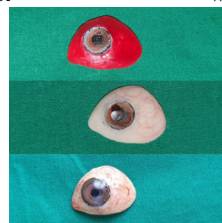


Fig 5: Wax pattern with painted iris, Characterisation of the sclera by adding veins and the final prosthesis

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