The Prosthetic Rehabilitation of Phthisis Bulbi Using Semi-customized Ocular Prosthesis: A Technical Note

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Abstract

Mutilation in the facial region may significantly affect the self-image and personality of individuals. Prosthetic rehabilitation of facial defects could increase the quality of life, thereby encouraging the patients to build up their self-confidence to return to normal social life. Acceptable cosmetic results are often obtained through facial prosthesis. Recovery after the loss of an eye requires proper adjustment to monocular vision and the improvement of appearance with an artificial eye, which is meticulously prepared to match the remaining natural eye. The present study aimed to demonstrate a technique for the fabrication of an ocular prosthesis with stock iris and custom-made sclera to provide aesthetically satisfactory results.

Keywords: Ocular Prosthesis, Ocular Defect, Semi-customized Ocular Prosthesis, Phthisis Bulbi.

Introduction

The disfigurement associated with the loss of an eye may cause significant physical and emotional problems. Loss of an eye may occur due to malignancies, congenital defects, irreparable traumas, the presence of a painful blind eye, and sympathetic ophthalmia (1). Depending on the severity of the involvement, the surgical operation in these patients may involve evisceration, enucleation, and exenteration (2). The psychological distress associated with the loss of an eye could be remarkably improved through ocular prosthesis, which is defined as the stimulation of the natural eye (3, 4).

The art of making an artificial eye has been practiced since ancient times. Materials such as precious stones, earthenware, copper, gold vulcanite, and celluloid were applied for this purpose in the past. Methyl-methacrylate resin was successfully used for the first time in 1944 in the armed forces of the United States for the fabrication of ocular prosthesis and gained popularity owing to its light weight, translucency, high fracture resistance, ease of fabrication, adjustability, and capability for intrinsic and extrinsic coloring (3-5).

Several techniques have been documented in the literature for the fitting and fabricating of artificial eyes, some of which are the fitting of a stock eye, modifying a stock eye on the positive replica of the ocular defect (6), and fabrication of costume-made ocular prosthesis (3).

In ocular prosthesis, both the sclera and iris are custom-made. Although the first two of the mentioned techniques are less time-consuming, they often have such disadvantages as compromised aesthetics and unreliable fitting. Custom-made ocular prosthesis provides

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improved aesthetics and proper fitting, while it is usually more time-consuming and complicated comparatively.

The present study aimed to describe a technique for the fabrication of ocular prosthesis with stock iris and custom-made sclera.

Step-by-step Procedure of Ocular Prosthesis Fabrication

Impression Making

In this technical note, an impression of an ophthalmic socket was made based on the method proposed by Allen and Webster (7). In this method, an impression tray in the form of an ocular prosthesis was used. The eye socket of the patient was coated with a thin layer of Vaseline, and a thin mixture of irreversible hydrocolloid was injected into the socket via the hollow stem of the impression tray in order to obtain the socket impression of the socket (Fig. 1-A). Afterwards, the impression was poured in two sections with a dental stone so as to obtain a two-piece mould (Fig. 1-B).

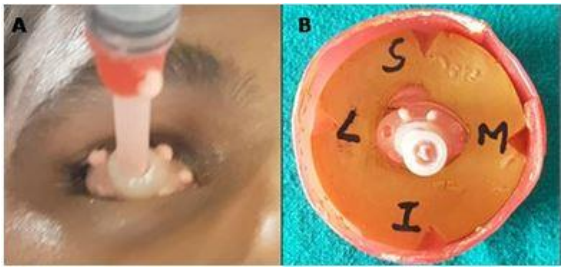

Figure 1. A) An impression of ocular defect made with irreversible hydrocolloid, B) Making of eye mould with split cast Technique

Trial of Wax Conformer (Scleral Try-in)

Using a base plate wax, a wax conformer was fabricated on the two-piece mould. Following that, it was retrieved from the mould, inserted into the ocular cavity, and examined in terms of stability and aesthetics. Additionally, the required sculpting of the anterior surface of the conformer was performed in order to mimic the features of the contralateral natural eye. To further improve the stability and aesthetics of the conformer, a light-body polyvinyl siloxane impression material was mixed and applied onto the tissue surface of the wax conformer.

The wax conformer was inserted into the socket again, and the patient was instructed to simultaneously move the conformer and natural eye in various directions with an upright head. This functional impression recording allows the artificial eye to move in coordination with the natural eye without dislodging from the socket. At the nest stage, the altered wax conformer was used to fabricate the final acrylic resin ocular prosthesis (Fig. 2).

Figure 2. Trial of wax conformer

Matching the Color Shade of the Sclera

The size, shade, and configuration of the iris were selected based on the contralateral natural eye, and the most matching iris was selected from the stock eye. The sclera of the stock eye was trimmed off using an acrylic trimmer (Fig. 3-A). Moreover, the shade of the sclera was matched in natural daylight by mixing two parts tooth color and one part heat-treated clear acrylic (Fig. 3-B).

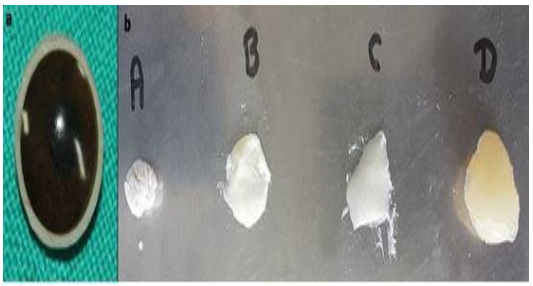

Figure 3. A) Shade matching & trimming of iris B) Shade matching of sclera

Flasking and dewaxing were carried out using conventional methods. The selected shade of the heat-treated acrylic resin was manipulated and packed into the prepared mould. Afterwards, acrylization was performed following a prolonged treatment cycle, and the resin sclera was obtained after deflasking. The acrylic resin extension derived from the iris was trimmed off using an acrylic trimmer, followed by finishing and polishing. Finally, the uncharacterized prosthesis was inserted into the socket, and the stability of the prosthesis and sclera contour were reconfirmed (Fig. 4).

Figure 4. Try in of resin sclera

Positioning of the Iris

The iris was placed during the try-in, so that the symmetry with the other natural iris of the patient would be maintained. To determine the exact location, a microtape was secured on the forehead of the patient, and the facial midline was marked along with the position of the natural iris while patient was looking straight ahead at a distant object. The distance was measured from the midline to the center of the pupil of the natural eye, and the same distance was marked on the right side. The medial and lateral marking of the pupil of the left eye was marked on a micropore tape, and the same marking was transferred on the micropore tape above the right eye in order to locate the pupil of the right eye.

At the next step, the trimmed iris was secured onto the marked position and adjusted to the horizontal and vertical axes. The eye movements are examined in terms of symmetry and function, and the wax try-in could move and be synchronized in harmony with the natural eye movements of the patient, instilling a sense of confidence in the patient (Fig. 5).

Figure 5. Positioning of iris

Eye Prosthesis along with the Incorporation of the Veins

Plain sclera should provide a natural appearance to the prosthesis. Prior to the painting of the sclera, its original contour was maintained through investing the uncharacterized prosthesis in a flask, followed by separating the two compartments of the flask.

The acrylic resin forming the sclera was trimmed uniformly to one-millimeter depth. Painting was carried out over the reduced surface of the sclera using soft yellow and brown tones (acrylic colors) so as to match the sclera of the contralateral natural eye.

Red nylon fibers were placed along the outer periphery to simulate the blood vessels. Once the characterization was satisfactory, all the colors and nylon fibers were stabilized through applying a thin layer of cyanoacrylate adhesive. The trimmed sclera was replaced by packing a clear heat-polymerized acrylic resin, followed by the curing, deflasking, finishing, and polishing of the prosthesis (Fig. 6). The final ocular prosthesis was inserted into the socket and evaluated in terms of fitting, aesthetics, and coordinated movements with the contralateral eye (Fig. 7).

Figure 6. Eye prosthesis along with incorporation of vein

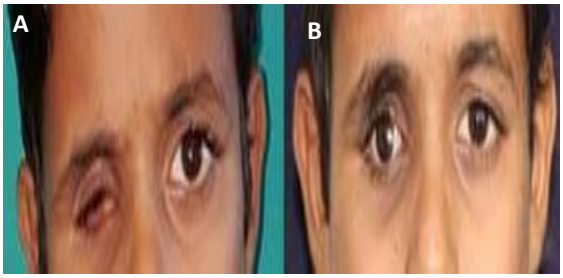

Figure 7. A) Pre-operative view showing right side ocular defect, B) Eye prosthesis in right eye

Discussion

Some of the main advantages of customized ocular prosthesis over stock eyes include better contouring, color matching, and coordinated movements with the contralateral eye. The customizing of the iris requires extensive skills and adequate time on behalf of the operator. However, this could be avoided if the stock iris matching with the contralateral natural eye is available.

On the other hand, the semi-customizing of the prosthesis using the stock iris and customized sclera has

been shown to have the advantages of both stock and custom prosthesis. Semi-customized ocular prosthesis is applied for masking the compromised artistic skills of the operator. This technique reduces laboratory and clinical time, providing satisfactory results in the patients.

Conclusion

Despite the lack of vision in the ocular prosthesis, it could definitely restore self-esteem of the patient, allowing him to confidently return to normal life. Success in ocular prosthesis largely depends on the precise laboratory technique and artistic skills of the operator. Through this technique, the demand for artistic skills and sufficient time could be diminished by using the precisely selected stock iris, while the aesthetic and functional requirements are properly addressed by the customized sclera.

References

1. Raflo GT. Enucleation and psychic trauma. Adv Ophthalmic Plast Reconstr surg. 1990; 8:259-262.
2. Parr GR, Goldman BM, Rahn AO. Surgical considerations in the prosthetic treatment of ocular and orbital defects. J Prosthet Dent. 1983; 49(3): 379-385.
3. Benson P. The fitting and fabrication of a custom resin artificial eye. J Prosthet Dent. 1977; 38(5):532-538.
4. Murphey PI, Schlossberg L. Eye replacement by acrylic maxillofacial prosthesis. Naval Med Bull. 1944; 43: 1085-1099.
5. Dyer NA. The artificial eye. Aust J Ophthalmol 1980; 8(4):325-327.
6. Taicher S, Steinberg HM, Tubiana I, Sela M. Modified stock-eye ocular prosthesis. J Prosthet Dent. 1985; 54(1):95-98.
7. Allen L, Webster HE. Modified impression method of artificial eye fitting. Am J Opthalmol 1969; 67(2):189-218.

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