Prosthetic Rehabilitation of an Ocular Defect with customized Iris: A Case Report

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Abstract

Due to trauma or disease, if loss of an eye occurs, then it can be rehabilitated by constructing a satisfactory ocular prosthesis with the combined effects of an ophthalmologist and a maxillofacial prosthetist. In the present case report a simple and effective method of fabricating an ocular prosthesis has been discussed which enhanced Patient's self-esteem and status.

Keywords: *Iris, Custom-made ocular prosthesis, Digital imaging, Enucleation*

Introduction

Loss or absence of eye may be because of congenital defect, irreparable trauma, tumour etc. Depending upon the severity of situation the management can be achieved by 3 surgical approaches i.e. Evisceration, Enucleation and Exenteration. Evisceration is the procedure in which intra ocular content of the globe are removed leaving sclera, tenons capsule, conjunctiva, extra-ocular muscles and optic nerve undisturbed. Whereas Enucleation is the surgical removal of the globe and portion of optic nerve from orbit. It is difficult to choose between Evisceration and Enucleation because the indication for each operation is not always very clear. Extenteration is the an-block removal of entire orbit involving partial or total removal of eyelid and is mainly performed for eradication of malignant orbital tumor.[1]

Anecdotal reports and relics from ancient civilization indicates that restoration of ocular defect have existed for thousands of year. The earliest known example dates to fourth dynasty (2613-2494 B.C) in Egypt. Materials used for rehabilitation were found to be precious stone, earthen ware, bronze, copper and gold. As literature provides, it was the 16th century when Pare fabricated an ocular prosthesis using gold and silver. He also used glass and porcelain for eye. But after the World War II, it became difficult to obtain glass eye from Germany and then acrylic resin became material of choice for fabrication of eye prosthesis.[2]

The advantages of acrylic over glass were many such as light weight, easy to adjust and fit, translucency, inert with socket secretion, intrinsic and extrinsic colouring etc, so the mass production of such stock acrylic eye was started. These stock eyes were basically supplied in three basic shapes i.e. oval, standard and three cornered: three basic sizes i.e. small, medium and large and three basic colors i.e. brown, hazel and blue. Stock prosthesis are relatively inexpensive, can be delivered quickly and no such special skills and material are required for its fabrication.

However a custom made ocular prosthesis has several advantages over the stock prosthesis such as improved adaptation to underlying tissue, increased mobility, better facial contour, enhanced esthetics and control over the size and colour of iris and sclera. Numerous impression and fitting method existed effectiveness and desirability often depends on the patient's preservation, operators experience and material and equipment used. In the present case report a simple and effective method of fabricating an ocular prosthesis has been discussed.

Case report

A 26 yr old male patient reported to the Department of Prosthodontics and crown & bridge, Career Post Graduate Institute of Dental

Sciences, Lucknow with a chief complaint of congenitally missing left eye and a desire of replacing it with artificial substitutes. On examination, it was revealed that the eye lids were unsupported & socket space was reduced. Ocular secretions were present. Due to reduced socket space the ideal treatment modality would be surgical socket expansion by use of progressively increasing the size of conformers and fabrication of definitive ocular prosthesis. The economic condition of the patient and surgical procedure involved made the patient think of alternative treatment. Hence an ocular prosthesis was planned as a non-surgical treatment.

Technique

After disinfecting and lubricating the conformer, it was invested in a fast setting dental stone for the duplication. The conformer was invested using two pour technique. (Fig. 1) when set, the conformer was removed and self-cure acrylic resin was pack into the mould and placed in a pressure pot for 20 min at 25 psi at 50 degree celcius.

Once retrieved, this will act as our custom tray. Several small holes were made with one large hole of about 3-4 mm of diameter in centre approximating the pupil position. With the help of cynoacrylate resin, a 5 ml plastic syringe was wedged into this hole. (Fig. 2)

After cleaning the eye socket, prior to impression making, petroleum jelly was applied to the eyebrows for the easy removal for the impression material after set. Preliminary ocular impression was made using fluid viscosity irreversible hydrocolloid impression material which was injected through plastic syringe into the eye socket. The patient was instructed to make various eye movements so as to get functional impression of the eye.

Once the material was set, impression was carefully removed from the socket holding the ocular tray handle and checked for surface details. Now using ‘two pour technique’ dental stone was poured to immerse the lower part of impression. Once the stone is set, separating medium was applied, markings were made on all side, which will help in reorientation, the second layer was poured. Next, the wax pattern was made by pouring molten wax into the impression. The wax was properly countered and carved to simulate right natural eye. Scleral wax pattern try-in was done. Size, eyelid coverage and support from the tissue stimulation of eye movement were checked. To insert the wax pattern, the upper lid is lifted, and the superior edge of the pattern is placed behind the lid and gently pushed upward. While drawing the lower lid down, the inferior border of the pattern is seated in the inferior fornix, and then the lower lid is released. The eye contours are checked.

A prefabricated iris button, whose shade and size matches with the contra lateral eye, was selected. The position of iris was determined with help of landmarks making the patient look straight. Once the iris position is determined, it is placed in wax pattern and final try in was done. After that a low fusing impression compound handle was attached in the center of attached iris. Definitive ocular impression was made by relining the wax pattern using light body elastomeric impression material. Shade of the sclera portion was selected using the tooth colored acrylic shade guide.[3]

Flasking was done taking care that the iris is secured to one counter of the flask and remaining part in the other portion of flask. Packing was done with the selected heat cure tooth colored acrylic with small red color silk thread, which may simulate the blood vessels.[4] Slow curing cycle was carried out for acrylization. After curing the prosthesis was recovered and polished. Next, it was inserted in patient's eye. (Fig. 4)

Instructions were given to the patient at the time of insertion of the prosthesis regarding the use and care of the prosthesis, regarding practice of insertion and removal of the prosthesis before a mirror and then without a mirror, prosthesis should be removed at least once a day and washed properly, prosthesis should be stored in water when not in use to avoid shrinkage, if the prosthesis is scratched in any way it should be repolished and only then worn, the patient is recalled for follow up after 1 day, 3 days, 1 week, 1 month, 3 months and 6 months.

Fig. 1: Preoperative view showing an ocular defect

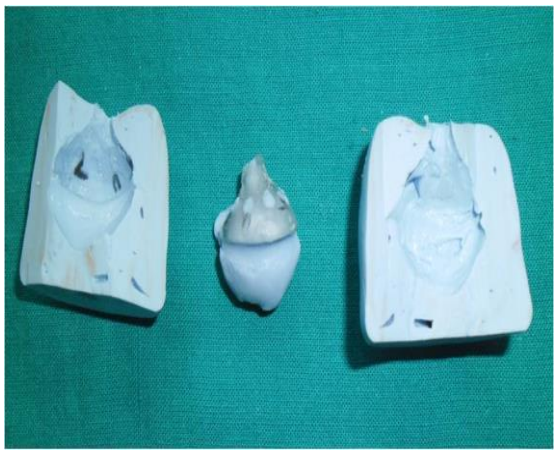

Fig. 2: Primary ocular impression with irreversible hydrocolloid and soft cast

Fig. 3: Iris positioning

Fig. 4: Relined scleral wax pattern with tissue conditioner

Fig. 5: Investment procedure

Fig. 6: Post placement esthetic outcome

Discussion

The art of making artificial eyes has been practiced since ancient times. The first ocular prosthesis was made by Romans and Egyptian priests as early as the fifth century BC.[5] Artificial eyes were made of enamel, metal or painted clay and attached to cloth and worn outside the socket.

In the 15th century, the first in-socket artificial eye was made using gold with colored enamel. Recently with the advent of some newer materials like Heat-polymerized acrylic resin, as being used here, it is possible to fabricate prostheses with a life-like appearance.

By rehabilitating a patient with an ocular defect by a custom-made ocular prosthesis, we are improving the facial appearance and by relining technique, the fit of the prosthesis is also enhanced. More ever the use of stock ocular prosthesis of appropriate size and color cannot be neglected, a custom made ocular prosthesis provide better results functionally as well as esthetically.[6,7]

The literature has suggested many techniques for the fabrication of ocular prosthesis. Stock eye prosthesis was advocated by Laney.[8] Many clinicians have concluded that iris colour of prosthetic eye is the most important consideration for the aesthetic acceptance of the prosthesis. The main disadvantage of a prefabricated ocular prosthesis is its inability to match iris colour.

The common techniques for the fabrication of custom made prosthesis are paper iris disk and black iris disk technique. However, painting the iris disk involves both artistic skills and science of colour. Using digital imaging in the fabrication of the ocular prosthesis presents several advantages as compared to the conventional iris painting technique. The digital image provides acceptable esthetic results as it closely replicates the patient's iris with minimal colour adjustments and modifications. The method is simple, less time consuming, and requires minimal artistic skills, which are necessary in the iris painting technique. Nevertheless, special digital photography equipment and settings, as well as computer software are required for image adjustments.[9]

Conclusion

Prosthetic rehabilitation is advantageous in that it is relatively quick, reversible, medically uncomplicated and allows the surgical site to be closely monitored. The custom-made ocular prosthesis is esthetic. It is socially acceptable and comfortable for use in patients with an ocular defect, resulting in improvement of psychological well being and personality of the patient.

Conflict of Interest: None

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