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Rehabilitation of A Patient With Ocular Defect-A Case Report

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Abstract: Eyes *are organs of the visual system. They provide organisms with vision, the ability to receive and process visual detail, as well as enabling several photo response functions that are independent of vision. Eyes detect light and convert it into electro-chemical impulses in neurons. The loss or absences of an eye which are caused by a congenital defect, irreparable trauma, tumor, a painful blind eye, and sympathetic ophthalmia evaluate the need for histologic confirmation of a suspected diagnosis. There may be several cases of accidents which cause loss of single eye. Loss of eye leads to severe physical and psychological trauma to the patient. Ocular prosthesis is the only mode of rehabilitation for the missing eye. There are different materials and techniques used for the fabrication of the same. Resin proved to be the better among the available materials. Physical defects that compromise appearance or function prevent an individual from leading a normal life. The loss of eye is a visible facial defect and often undermines the patient's confidence. Prosthetic rehabilitation of ocular defect should be done as soon as possible for physical as well as psychological healing. This paper describes case reports detailing alternative procedures for prosthetic rehabilitation of ocular defects. The article describes the fabrication of a custom ocular prosthesis and discusses the most economical and effective esthetic treatment available for ocular defects as applicable in the Indian scenario.*

Keywords: *eye prosthesis, ocular prosthesis, customized eye, eye defect*

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I. Introduction

Loss or absence of a part of the face especially eye can cause severe physical and emotional problems.[1] Loss of eye could be because of malignancies, congenital defect, irreparable trauma, painful blind eye or sympathetic ophthalmia.[2] Depending on the severity of the involvement, the surgical management may include one of three approaches: evisceration, enucleation or exenteration.[3] Evisceration is the surgical procedure involving the excision of the intraocular contents of the globe, leaving the sclera, and sometimes the cornea. Enucleation is the surgical removal of the entire globe and a portion of the optic nerve from the orbit. Exenteration is the en bloc removal of the entire contents of the orbit including the extraocular muscles.[3]

Psychological distress associated with the loss of eye can be significantly improved by an ocular prosthesis, simulating the natural eye. First evidence for the replacement of missing eye was obtained from the Egypt dynasty, who used precious stones, earthenware, copper, and gold. Materials such as vulcanite and celluloid were used during 19th century. In the early part of 20th century, Muller-Uri family fabricated glass eye using sand with low iron oxide content. In 1944, by the combined efforts of the individuals of the armed forces of the United States, methyl-methacrylate resin was successfully used for the fabrication of the ocular prosthesis.[4,5] Since then usage of resin gained popularity because of its light weight, translucency, better fracture resistance, ease of fabrication, easy adjustability, and its capability for intrinsic and extrinsic coloring.[6]

There are several techniques documented in the literature for fitting and fabricating the artificial eye. It includes fitting a stock eye, modifying a stock eye on the positive replica of the ocular defect and the fabrication of the custom eye prosthesis. In custom ocular prosthesis, both sclera and iris are custom made. First two techniques are less time-consuming but often have the disadvantages like compromised esthetics and unreliable fit. Custom ocular prosthesis provides improved esthetics, and fit but usually more time-consuming and complicated.[4-8] This clinical report demonstrates a technique for fabricating ocular prosthesis with stock iris and custom made sclera to provide functionally and esthetically satisfactory result. The loss of an eye impairs the

patient's visual function and also results in a noticeable deformity. Orbital defects may be associated with congenital deformities, tumors, or acquired traumatic lesions. The minimal surgical procedure is "Evisceration" is the removal of the contents of the globe, leaving the sclera and/or cornea intact. "Enucleation" is the removal of the entire eyeball and "Exenteration" is the removal of the entire contents of the orbit.[1] The rehabilitation of a patient who has suffered the psychological trauma of an ocular loss requires a prosthesis that will provide the optimum cosmetic and functional results. Patients with evisceration defects or ocular atrophy can be treated with custom-made ocular prostheses or modified stock eyes. The shell prosthesis covers the entire surface of the eye, restoring it to a natural appearance. The prosthesis is commonly made of polymethyl methacrylate resin which is superior to other ocular prosthetic materials in terms of tissue compatibility, esthetic capabilities, durability, and color permanence, adaptability of form, cost, and availability. In the Indian scenario, patients may not be able to afford surgical reconstruction or major cosmetic treatments. However, the scleral shell prosthesis as described below gives the patient a much more cost-effective treatment whilst achieving satisfactory esthetics. Presented below are two case reports describing fabrication of a custom ocular prosthesis and modified stock ocular prosthesis and the differences in their methods of fabrication and outcomes. Indications for ocular prosthesis: After enucleation and evisceration with or without implant. Over phthisical eyes. Blind eye with scarred corneas. Congenital anophthalmia/microphthalmia.[2- 8]

Case report:-

A 20-year-old female patient reported to the Department of Prosthodontics, career post graduate Institute of Dental Sciences, Ghailla, Lucknow, UttarPradesh, India with a chief complaint of bad facial appearance because of a missing right eye since 10 years (Fig. 1). The history revealed pain and sudden loss of vision in the right eye before 10 years ago due to unknown disease. Right eye was gradually sunken and patient does not able to open it. Examination of the eye socket revealed sunken eye ball with no signs of infection or inflammation and showing synchronous movements. According to the treatment based classification system given by Himanshi *etal*., the patient was categorized under Class 4 phthisis bulbi, i.e., severe enophthalmos with disfigured sclera and loss of orbital fat.[9] (Fig. 1)

Fig. 1 Pretreatment View of Eye

A semi-customized ocular prosthesis with stock iris and custom made sclera was planned for the patient, and the treatment procedure was explained to the patient before the commencement of the same.

Treatment Steps:-

Ocular impression:-

An impression of the right eye was made following the method given by Allen and Webster.[7] In this method, impression tray in the shape of the ocular prosthesis was used. A light viscosity polyvinyl siloxane impression material was mixed and applied onto the tissue surface of the conformer tray attached with syringe. The conformer was placed back in the socket, and the patient was instructed to move both the conformer and the natural eye in various directions with his head upright. This functional impression recording allows the artificial eye to move. Impression was poured with dental stone (Kalastone, Kalabhai Pvt., Ltd., Mumbai, India) in two sections to obtain two piece mold. (Fig. 2, 3, 4, 5)

Fig. 2 syringe attached with perforated conformer

Fig. 3 During Impression of Eye

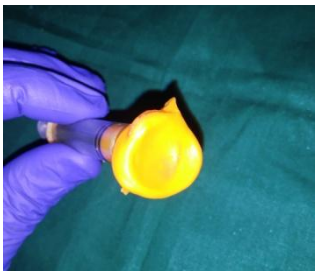

Fig. 4 Final Impression of Eye

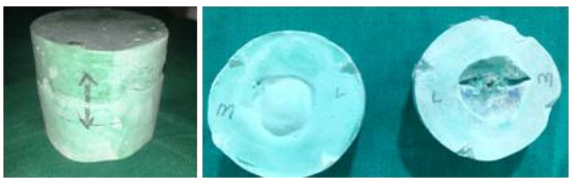

Fig. 5 dental stone models in two sections

Fig. 6 Iris Position Marking on scleral wax pattern

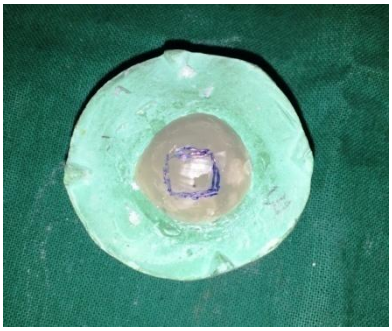

Fig. 7 Marked Iris Position on scleral wax pattern

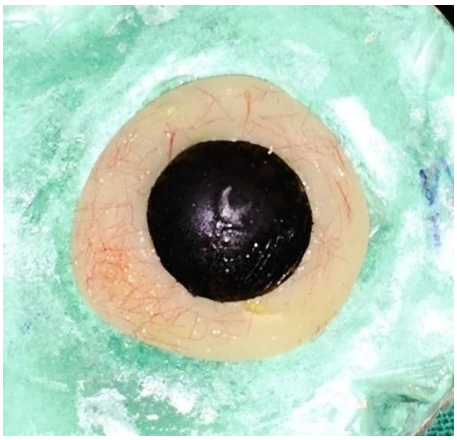

Fig. 8 Final Eye Prosthesis

Fig. 9 Post Treatment Picture after eye prosthesis insertion

Try- in of wax sclera:-

By using a base plate wax (Modeling wax, Dental products of India Ltd.), wax conformer was fabricated on the two piece mold. It was retrieved from the mold and inserted in the ocular cavity and checked for stability and esthetics. Necessary sculpting of the anterior surface of the conformer was done to mimic the features of the contra-lateral natural eye. To further improve the stability and esthetics of the conformer, a technique described by Taicher *et al*. was performed.[8] The wax conformer was placed back in the socket, and the patient was instructed to move both the conformer and the natural eye in various directions with his head upright. This functional impression recording allows the artificial eye to move in coordination with the natural eye without getting dislodged from the socket. This altered wax conformer was used to fabricate the final acrylic resin ocular prosthesis.

Marking the Iris:-

The size, shade, and configuration of the iris were selected by taking the contralateral natural eye as a guide. Most closely matching iris was selected from the stock eyes (American Optical Corp.,Southbridge, Mass). Scleral part of the stock eye was trimmed off using an acrylic trimmer. This stock iris was positioned on the scleral wax pattern, and the border was sealed using a hot instrument (Fig. 6, 7). The position of the iris was finalized in accordance with the contralateral eye using graph grid method.[10] Shade selection for the sclera was done using the natural eye as a guide.

Processing of wax sclera in acrylic:-

Scleral wax pattern with the stock iris positioned over it was removed from the socket. It was washed under tap water. To stabilize the stock iris within the mold, an auto polymerizing acrylic resin (DPISelf cure, Dental products of India Ltd.) extension of a diameter of around 4mm and length of around 6 mm was attached over its center. Flasking and dewaxing were done in a conventional manner. Selected shade of the heat cure acrylic resin (DPI-Heat cure, Dental Products of India Ltd.) was manipulated and packed into the prepared mould. Acrylization was done by following a long curing cycle. Resin sclera with the iris attached over it was obtained after deflasking. Acrylic resin extension from the iris was trimmed off using an acrylic trimmer, followed by finishing and polishing was done. Uncharacterized prosthesis was inserted into the socket. Stability of the prosthesis, contour of the sclera, and the position of the iris was reconfirmed (Fig. 8).

Plane sclera had to be characterized to give life like appearance to the prosthesis. Prior to the painting of sclera, its original contour was maintained by investing the uncharacterized prosthesis in a flask followed by separating the two compartments of the flask. Acrylic resin forming the sclera was trimmed uniformly to a depth

of around 1 mm. Over the reduced surface of the sclera painting was done using the soft color tones of brown, pink, blue, and yellow (Favicryl, Pedilite Industries Ltd., Mumbai, India) 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 by applying a thin layer of cyanoacrylate adhesive over it. Trimmed sclera was replaced by packing clear heat polymerizing acrylic resin, followed by curing, deflasking, finishing, and polishing of the prosthesis (Fig. 8). Final ocular prosthesis was inserted into the socket and evaluated for fit, esthetics, and the coordinated movements with the contralateral eye (Fig. 9). Post insertion instructions were given to the patient, regarding the usage, limitation, and the maintenance of the prosthesis.[11]

II. Discussion

Customized ocular prosthesis has the advantages over stock eyes like, better contouring, color matching, and coordinated movements with the contralateral eye.[4,8] Customizing the iris demands extra skill and time from the operator.[12,13] This can be avoided if stock iris matching with the contralateral natural eye is available. Semi-customizing the prosthesis using the stock iris and customized sclera will have advantages of both stock and custom prosthesis. This technique is not advised when the color, contour, and configuration of the stock iris is not satisfactorily matching with the contralateral natural eye of the patient.

III. Conclusion

Success of the ocular prosthesis largely depends on the precise laboratory technique and artistic skills of the operator. 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.

Clinical significance

Semi-customized ocular prosthesis is of use for masking the compromised artistic skill of the operator. This technique reduces the laboratory and clinical time and provides a satisfactory result in indicated

Footnotes

Conflicts of Interest: None

Source of Support: Nil

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