A Customised Ocular Prosthesis for an Ocular Defect

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Abstract: The face is the first presentation of human expressions for communication in the society. Disfigurement of any part of the face leads to a crippled life manually, socially as well as psychologically. In recent years, rehabilitation of facial defects has seen a lot of advances in terms of technology and materials. Custom made prostheses have received good acceptance by patients due to improved esthetics and better retention. Ocular defects are being successfully restored by customized acrylic eyes. Prosthetic rehabilitation of the lost eye in a patient by custom made ocular prosthesis is discussed in this case report.

Keywords: Ocular prosthesis, custom-made eye, iris painting.

1. INTRODUCTION

Loss of natural eye can have a significant impact on the psychology of a person [1]. The primary reasons for eye loss are congenital defects, tumors, infection or trauma. The globe of the eye may be removed by enucleation, evisceration, or exenteration [2-4]. The replacement of an eye lost should start as soon as possible after healing because an ocular prosthesis fills the ocular cavity and restores symmetry. [5,6] The use of glass stock eye was a popular method of rehabilitation in the past but the fragility of glass compelled the need to use alternative materials. Acrylic resin ocular prostheses are superior in terms of esthetics, color, durability, light weight, tissue compatibility, cost and ease of manipulation. The main disadvantage of using a stock eye is that requires repeated recontouring of the prosthesis by trial and error.

Custom made ocular prosthesis provides an ideal fit and esthetics [7, 8]. Although the introduction of ocular implants has enhanced retention, volume replacement and movement of artificial eye [1], but in many cases ocular implants may not be feasible. So a custom made ocular prosthesis provides a simpler solution. An ideal ocular prosthesis should be well adapted, allow adequate movement and simulate natural eye as closely as possible [9]. So, fulfilling these criteria for rehabilitating the ocular defect is a challenging task for the maxillofacial prosthetists.

This case report demonstrates the technique to fabricate the custom made ocular prosthesis for the rehabilitation of ocular defect.

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2. CASE REPORT

A 65 year old male patient was referred to the department of prosthodontics to replace missing teeth. On extra oral examination the right eye was found missing. The patient could not tell the time and reason of eye loss. He did not want any invasive treatment like plastic surgery or implants to get his eye replaced. The patient was motivated to get the lost eye replaced with prosthesis.

On examination, the defect site was stable, healed and without any sign of infection (Figure **1**). The socket was contracted and superior eyelid ptosis was present but sufficient opening of the eyelids could be achieved for easy insertion and removal of the prosthesis (Figure **2**).

Figure 1: Preoperative photograph.

The custom made ocular prosthesis was planned and the entire procedure was explained to the patient. Patient's consent was taken for making photographic records. Complete denture treatment was carried out simultaneously.

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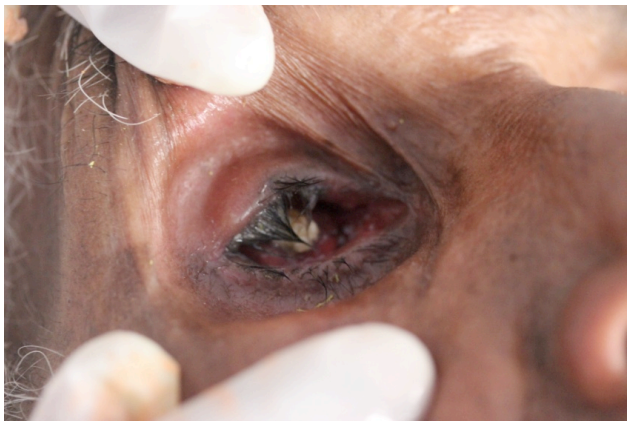

Figure 2: Ocular defect.

3. PROCEDURE

Impression making: The patient was seated upright in dental chair in a relaxed surrounding with head supported. Petroleum jelly was applied to the eyebrows and extra ocular areas for easy retrieval of impression material after setting. Stock ocular trays with hollow handle and light bodied polyvinyl siloxane (Aquasil ultra LV, Dentsply Caulk) were used for impression.

The ocular tray of appropriate size was selected and placed in defect to check the extensions, orientation and support of eyelids. Any overextensions were trimmed and smoothened prior to impression.

Impression material was loaded in a disposable syringe through dispensing gun. Some amount of impression material was placed directly in the defect to avoid air entrapment. The tray was then inserted and oriented in proper location. The loaded syringe was attached to the hollow end of stock tray and the material was injected slowly till the material came out of the socket and retention holes in the stock tray. The eyelid contour was elevated similar to the adjacent natural eye contour. The patient was asked to move his eyes in all directions to allow the material to flow into all areas of the socket.

Figure 3: Impression of ocular defect.

On setting, the impression was removed and inspected for any defects (Figure **3**).

The cast was poured in a cup in two parts. Then molten wax was poured into the cast. The retreived wax pattern was smoothened from the posterior surface that reflected the topography of the tissue bed. Wax pattern was tried in socket (Figure **4**).

Figure 4: Wax try-in socket.

For the wax pattern placement, the upper eyelid was gently pushed upward and upper margin of wax pattern was placed behind the lid. Similarly lower eyelid was pulled downward and the lower margin of pattern was adapted in socket. The patient was asked to relax and check for any irritation. Necessary alterations in shape and contour were done in the wax to get the desired results. Pressure points and areas of discomfort were marked and relieved.

The eye contours and support were checked in comparison with adjacent natural eye.

The wax pattern was invested and replicated in heat cure scleral acrylic resin for final try-in. The acrylic resin conformer was smoothened and polished before placing in ocular defect (Figure **5, 6**). The use of heat

Figure 5: The processed sclera.

cure acrylic for conformer minimized any irritation of ocular tissues from the residual monomer as is seen with autopolymerizing acrylic resin.

Figure 6: The acrylic resin conformer in socket.

The position of iris was determined next. The iris was marked in such a way that the upper eyelid covered a portion of its superior half. The artificial iris button or ocular disc along with stalk (Figure **7**) was attached with wax to exact marked position and re-tried in patient's eye to determine the direction of the gaze of patient's natural eye. The patient was asked to look straight at some distant point. The iris position was encircled on acrylic with marking pen and its center which coincided with the point of stalk attachment was marked as pupil. Once its position was ascertained, acrylic was trimmed in the region of iris to create space for its positioning later during packing.

Figure 7: The artificial iris button with stalk.

It was decided to paint the iris and not use the iris from a stock eye due to typical appearance of natural iris in this patient. Circus senilis or old age ring, light grey in color, as commonly seen in elderly patients, was present in this patient. It is a cloudy, milky ring around the edge of cornea.

The color of the iris was painted as seen in patient's natural eye. Acrylic paints (M.P Sai Enterprises, Mumbai) were used for iris painting. The paints used were amber, blue, yellow and deep brown (Figure **8**). The basic color of the body of iris was painted deep brown. The black color of the disc was completely masked. Striations in the iris were painted in black with a fine brush. Then the circular area around the pupil was painted light brown [1]. The peripheral area or limbus was painted light grey that blended with the sclera as seen in patient's natural eye. The painted iris was kept aside for drying (Figure **9**).

Figure 8: Acrylic paints, stock trays, red wool fibres, iris and pupil.

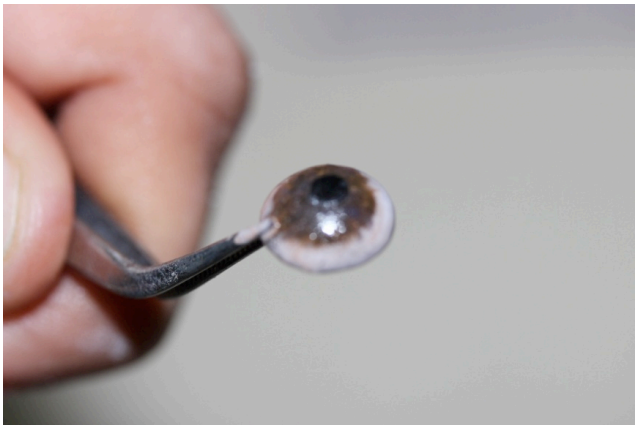

Figure 9: Painted iris.

The acrylic conformer was invested in a small brass flask. On setting of plaster, the trial acrylic sclera was removed (Figure **10**). Fresh heat cure scleral acrylic powder was mixed and packed in mold. After trial closure, sclera was tinted with acrylic stains to match the sclera of adjacent eye. Red wool fibres dampened with monomer were tacked with a brush and monomer in nasal and temporal corners of the eye to simulate small capillaries [10]. The painted iris button was packed in its position. A sheet of modeling wax was

Figure 10: Prepared mould space in brass metal flasks.

then adapted over the surface to allow space for the clear acrylic resin. Flasking and dewaxing were done in the usual manner. A thin mix of heat cure clear acrylic resin was packed over the surface of the sclera and iris and then polymerized. The clear layer gives the eye a very realistic appearance. The prosthesis was retrieved, finished and polished.

The finished eye prosthesis was tried in the patient (Figure **11**). Necessary adjustments were made. Patient was given detailed instructions regarding the insertion, removal and hygiene of the prosthesis. Recall appointment schedule was explained and emphasized to the patient.

Figure 11: Patient with prosthesis.

4. DISCUSSION AND CONCLUSION

Prosthodontic rehabilitation of patients with acquired defects is a satisfying and rewarding job. From the past years, ocular prosthesis fabrication using different materials and techniques have been described. The treatment planning that involves the defect oriented fabrication i.e. customized prosthesis markedly improves the final results as compared to stock fabrication [11]. Custom made ocular prosthesis involves painting of the iris and the final esthetic outcome relies heavily on the painting skills of the operator. A successful prosthesis should possess contours and appearance compatible with the existing eye so as to escape detection by the casual observer. Though it is time consuming and technique-sensitive, the final result with a custom made ocular prosthesis is better than the stock eye and is worth the time and effort.

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