'Occular Prosthesis Using Iris Photo Print'- A Case Report

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INTRODUCTION:

An occular prosthesis or artificial eye (Fig: 1) is a type of craniofacial prosthesis that replaces an absent natural eye following an enucleation, evisceration, or orbital exenteration. The prosthesis fits over an orbital implant and under the eyelids. Often referred to as a glass eye, the ocular prosthesis roughly takes the shape of a convex shell and is made of medical grade plastic acrylic. A few occular prostheses today are made of cryolite glass. A variant of the ocular prosthesis is a very thin hard shell known as a scleral shell which can be worn over a damaged or eviscerated eye. Makers of occular prosthetics are known as occularists. An ocular prosthesis does not provide vision; this would be a visual prosthesis. Someone with an occular prosthesis is totally blind on the affected side and has monocular (one sided) vision[1].

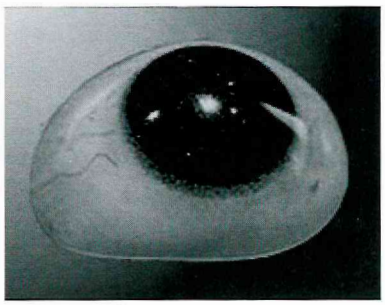

Fig 1: Occular Prosthesis

The disfigurement associated with loss of an eye can cause significant physical and emotional problems[2]. Most patients experience significant stress, due primarily to adjusting to the functional disability caused by the loss and to societal reactions to the facial impairment[3]. Replacement of the lost eye as soon as possible is necessary to promote physical and psychological healing for the patient and to improve social acceptance[3].

Notable people with prosthetic eyes[1]

- Baz Bastien – Canadian ice hockey player, coach (right eye)
- Mokhtar Belmokhtar – Algerian smuggler, kidnapper, weapons dealer, and terrorist; lost his eye mishandling explosives (left eye)
- Sammu Davis, Jr. – American singer (left eye)
- Peter Falk– American actor (right eye)
- Leo Fender – Musical instrument architect; founded what is now known as the Fender Musical Instruments Corporation (left eye).
- Nick Griffin – BNP Member of European Parliament and leader (left eye)
- Jeff Healey – Canadian blues guitarist (both eyes)
- Leo McKern – actor (left eye)
- Carl Ouellet – Canadian professional wrestler (right eye)
- Claus Schenk Graf von Stauffenberg – German career army officer and resistance leader (left eye)
- Dean Shiels – Northern Irish professional footballer who lost his eye during a childhood accident (right eye).
- Robert Turman – writer (left eye)
- Mo Udall – politician (right eye)
- Bob Klapisch – American sportswriter who lost his eye in a charity softball game (right eye).

A multidisciplinary management and team approach are essential in providing accurate and effective rehabilitation and follow-up care for the patient. Therefore, the combined efforts of the ophthalmologist, the plastic surgeon and the maxillofacial prosthodontist are essential to provide a satisfactory ocular prosthesis[7]. Occular prostheses are either ready-made or custommade8. Prosthetic rehabilitation of a patient is greatly enhanced if an implant is placed in the orbit. Fabrication of a custom ocular prosthesis allows infinite variations during construction. However, the use of a 'stock' prosthesis is usually advocated when time is limited and cost is a consideration[9].

The objective of the article is to appreciate an easier technique in obtaining a perfect match for the iris, thereby reducing the errors of an unskilled operator in painting an idealistic iris. The technique was more economical as the amount of stains/tints used decreases and was less time consuming.

Clinical Evaluation

The patient's history included the details of the loss of the eye. Post-surgical oedema may be present for 2–3 months after surgery[7]. During the post-operative period, it was important that the patient wear a conformer as this would aid the preservation of the cul-de-sac of the fornices during healing. The construction of a conformer (Fig: 2) may be indicated when the construction of a definitive ocular prosthesis is delayed because of slow patient recovery, medical complications or patient preference9. The socket was examined for healing to determine any undercuts.

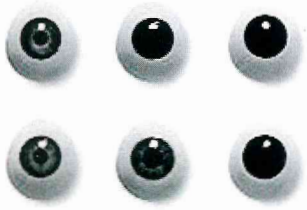

Fig: 2 Conformers to place in eye socket post surgically

Materials and methods for constructing occular prosthesis

The occular prostheses are either ready-made or custom-made and are produced from either glass or methyl methacrylate resin. Glass is not the material of choice as it is subject to damage and surface deterioration from contact with orbital fluids, leading to a usable life expectancy of only 18– 24 months8. Methyl methacrylate resin is superior to other occular prosthetic materials with regard to tissue compatibility, aesthetic compatibilities, durability, permanence or colour, adaptability of form, cost and availability[9].

A CASE REPORT

A 55-year-old male patient was referred to the Department of Prosthodontics from the Department of Ophthalmology, JJMC, Davangere for the replacement of his missing eye. The patient gave an history of enucleation of his left eye because of orbital fat atrophy 4 months previously. On examination, the socket was healed and the surrounding tissues appeared normal (Fig: 3).

Fabrication of a custom resin artificial eye

The conventional sequence of fabricating a custom resin occular prosthesis includes painting the iris disc, packing the iris disc, fitting the wax scleral form, investing the wax model in dental stone,

Fig: 3 Preoperative View

investing the sclera in acrylic resin, modification of sclera with blood vessels, processing the conjunctiva, finishing and polishing[10]. However, in the present case, with the exception of using a photograph for the iris, rest all procedures were the same.

Impression

The impression of the socket was made with a combination of light bodied polyvinyl siloxane and irreversible hydrocolloid. An automixing tip (Fig:4) commonly used with the catridge sytem of PVS impression material was selected and modified with modelling wax to conform to the periphery of the triangular outline of the posterior wall of the socket.

Fig: 4 Automixing Light body PVS tip

The patient was positioned upright in the chair and instructed to maintain a fixed gaze on a point directly in front of him and in a midline position. The patient was cautioned about moving the eye or blinking during the 4–6 min necessary for the setting of the impression material. The impression material is automixed and loaded within the socket with the modified and the conformed automixing tip placed within the socket (Fig:5). When the impression

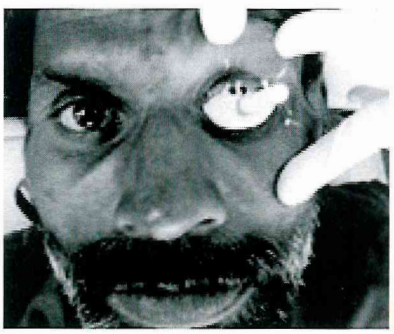

Fig: 5 Intrasocket Impression made

material is set, the intrasocket impression along with the automixing tip conformer is gently removed,

checked for air bubbles and compared with the socket to see that all areas correspond. If discrepancies are noted, such as distortion or undue tissue displacement, the impression material is removed and the procedure repeated. If the impression is found to be accurate, the excess material is trimmed from the anterior portion of the eye to the exact periphery[10]. The intraocular impression is

Fig: 6 Extraoccular Reinforment of the Impression

positioned back within the socket and an extraocular maxillofacial impression (Fig: 6) was made using irreversible hyrocolloid after boxing the required area. The boxed extraoccular area was partially filled with the hydrocolloid material and once set, was reinforced with type II model plaster filling the rest of boxed extraoccular portion of the impression.

Fabrication of Split mould and Wax Pattern

The alginate impression with the light body impression of the socket is boxed and poured so as to obtain a split mould thereby permitting the fabrication of waxpattern conforming the ocular socket. A special yellow high heat wax would be of a good choice to build up a smooth, spherical prosthesis. In the present case, modelling wax served the same purpose. It is extremely important to relieve the wax adequately to compensate for the Whitnall's ligament; when the wax pattern has been trimmed to shape and size as determined by observation of the landmarks, it is then tried in the socket. The center of the iris may then be marked on the wax with a suitable instrument. These markings when transferred onto the acrylized prosthesis, would enable the operator to accurately fix the iris photograph on the same. The pattern was tried in the socket and necessary corrections made to bring the speculated iris position into proper alignment and position with relation to the normal eye; also, the socket was checked for optimal lid form, mobility, and iris line-up. Scleral shade of the normal eye was also selected at the try-in appointment.

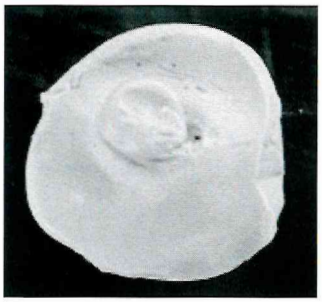

Fig: 7 Alginate impression along with light body impression of socket

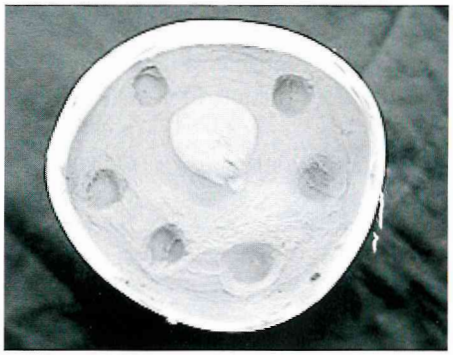

Fig: 8 Split Mould Fabrication

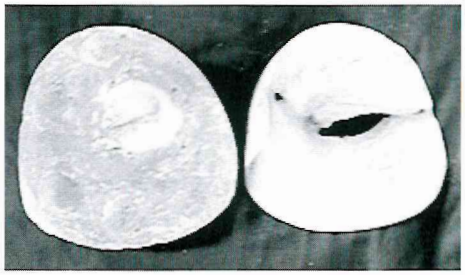

Fig: 9 Split Mould

Fig: 10 Wax Form/ Pattern Tried in the socket

Photograph of the Normal Iris

In the same appointment, a well-defined professional photo-shot of the normal eye was made with adequate lighting. The positive print of the same is made in different sizes and light shades. The individual iris print was cut-out from the photo print

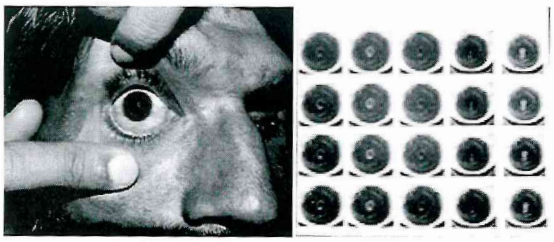

Fig:11 Photograph of Iris

and matched with the patient's normal eye and the same used with the acrylized prosthesis.

Flasking and Packing

Type III stone is recommended for flasking the wax pattern in order to avoid breakage or distortion. The wax form was invested in a HUE-LON flask, with the anterior surface down in the lower half of the flask to the periphery of the wax form. The selected scleral shade acrylic and monomer was mixed in the ratio of 1:3. When of proper consistency, the mix was packed in the lower half of the flask with a sheet of cellophane over this for trial packing. The two halves were placed in a bench press, and slight pressure slowly applied until the flask was closed completely. The flask was then opened, flash removed; closed and placed in a spring clamp. This assembly was placed in a dry heat oven at 100°C for 3 hours. After curing, the prosthesis was removed from the flask. With mounted arbor bands, the excess was removed and the entire prosthesis is carefully smoothened. The area of the limbus was given a soft natural line demarcation. All scratches were removed with pumice, Tripoli and buff wheels and felt cones. A high polish was not necessary at this stage.

Veining Technique

Red rayon threads are used for this purpose. The separated monofils were tacked in place with 5% solution of monomer and polymer. The pattern of natural eye is followed by using the pointed back of the 00 sable brushes and pushing the fibers into the various designs such as straight, tortuous, and sinuous or any combination thereof. Following this procedure, a 0 sable hair artist's brush and a 5% solution of monomer and polymer to which dry pigments have been added are used to produce the characteristic pigmentations on the sclera, such as brown, yellow, green, or blue. The pigments are placed according to their appearance on the natural eye. Three coats solution are painted 'over the veining and pigmented area. Each coat is allowed to dry for 4 or 5 minutes, then is placed in the oven at 72°C for 1 hour.

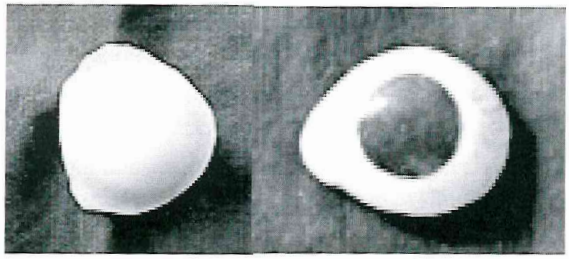

Fig:12 Photograph of Iris positioned over the acrylic sclera

Polishing and Fitting

All rough areas were removed with fine acrylic stones and polished to remove all scratches, as they would be a source of irritation to the delicate mucous membranes of the socket. A high luster is advisable for comfort. A drop of mineral oil was placed on the forefinger and distributed over both sides of the acrylic eye. The patient was then shown how to insert and remove the eye. Instructions were given on the care of the socket and the eye. Usually the restoration should be worn for 24 hours before any alterations are made so that the orbital tissues can adjust themselves.

Instructions to the patient

The patient was educated that the artificial eye does not track with the natural eye of the opposite side. The patient was instructed to turn his head when changing his line of vision. By looking at all objects from a "head-on" view, the most natural appearance can be maintained at all times. The wearing of eye glasses also enhances the natural appearance of such prosthesis by covering the margins of the prosthesis and rendering the discrepancy in the two eyes (natural and artificial) less noticeable.

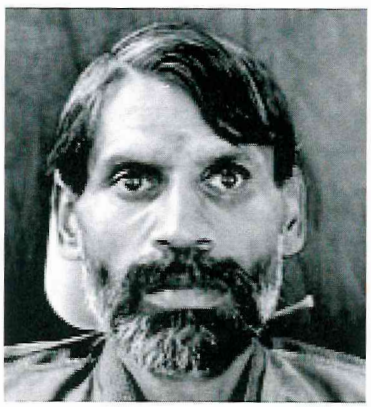

Fig:13 Post-operative View

CONCLUSION

The art of replacing a missing eye with prosthesis has been carried out for many years and these can be stock or custom made[8]. The use of an ocular prosthesis of appropriate size, colour and contour

can prove to be of value functionally as well as aesthetically. It promotes physical and psychological healing for the patient and improves social acceptance[2].

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