

Ocular Prosthesis: Case Report and Clinical Review

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ABSTRACT

Background: The loss of the facial structures can have a physical, social and psychological impact on those affected. Maxillofacial prostheses which restore and replace stomatognathic and associated facial structures with artificial substitutes, aim to improve the patient aesthetics, restore and maintain health of the remaining structures and consequently provide physical and mental wellbeing. Accurate impressions of these tissues facilitate a close adaptation of the custom prosthesis to the tissue bed resulting in better potential for movement by the patient. Treatment of such cases includes implants and acrylic eye prosthesis. Due to economic factors it may not be advisable in all patients. A custom-made ocular prosthesis is a good alternative. Numerous ocular impression and fitting techniques have been described in the literature. Most can be placed into one of several broad categories: direct impression/external impression, impression with a stock ocular tray or modified stock ocular tray, impression with custom ocular tray, impression using a stock ocular prosthesis, ocular prosthesis modification, and the wax Scleral blank technique. The aim of the article is to review the literature on different Clinical impressions techniques used for the fabrication of an ocular prosthesis.

Keywords: Maxillofacial prosthesis, Impression Techniques, Ocular Prosthesis, stomatognathic, scleral shell prosthesis.

INTRODUCTION

The special sensory organs play significant roles in our daily lives. Not until one of them is totally or partially lost is its real value fully appreciated. The most tragic yet, unfortunately, the most commonly occurring loss of one of these sensory organs is that of an eye. The loss of an eye is a disfiguring and psychologically damaging experience for the patient. A cosmetically acceptable prosthesis will allow the patient to return to an accustomed life-style.¹ The loss of a part of the face, particularly the eye, requires early replacement so that the patient may return to a normal life. The defect is distressing and both psychologic and economic difficulties exist. The combined efforts of an ophthalmologist and the

maxillofacial prosthodontist are needed to provide a satisfactory ocular prosthesis for such patients. The importance of an ocular prosthesis with acceptable esthetics and reasonable motility in restoring normal appearance in patients with anophthalmia has long been recognized, since ancient civilization.²

History

Dating from very early times in Egypt (i.e., the Predynastic Period, before 3000 B.C.), simple inlaid eyes, consisting usually of white shell beads, have been found, and human figures bearing such eyes are to be seen in the Cairo Museum. Predynastic art which still remains all over Egypt shows that, even at this remote period, stone and shell could be worked and that the art of glazing was already in existence. These early artificial eyes were very good

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CASE 1 PHOTOGRAPHS



Fig 1: Pre operative.



Fig 2: Custom tray tried in the defect socket.



Fig 3: Final impression made with elastomer.



Fig 4: Split cast.



Fig 5: Stock eye shell.



Fig 6: Flaking of customized eye shell.



Fig 7: Final prosthesis with characterization.



Fig 8: Final prosthesis placed in the defect socket.



Fig 9: Final prosthesis placed in the defect socket-side view

CASE 2 PHOTOGRAPHS



Fig 1: Patient with the defect.



Fig 2: close view of the defect.



Fig 3: elastomeric impression.



Fig 4: beading and boxing of the final impression.



Fig 5: split cast.



Fig 6: Wax Trial of customized prosthesis.



Fig 7: checking the midline.



Fig 8: Final wax-up of the prosthesis.



Fig 9: Processed prosthesis before finishing and polishing.



Fig 10: Final prosthesis placed in the defect socket – side view.



Fig 11: Final prosthesis placed in the defect socket - frontal view.



Fig 12: Final prosthesis with characterization

imitations of the natural organ, with such essential features as eyelids, sclera, cornea, iris, pupil, and even the caruncle and plica semilunaris. Ambroise Paré (1510-1590), a Frenchman, was the first to use both glass and porcelain eyes.³

The art of making artificial eyes has been practiced since ancient times. Egyptian priests made the first ocular prosthesis, called Ectblepharons, as early as the 5th century BC. In those days, artificial eyes were made of enameled metal or painted clay and attached to cloth and worn outside the socket. The first in-socket artificial eye made in the 15th century was made of gold with coloured enamel. In the latter part of the 16th century, the Venetian glass artisans discovered a formula that could be tolerated inside the eye socket. These early glass eyes were crude, uncomfortable to wear and very fragile. Today the vast majority of patients all around the world wear ocular prosthesis made of acrylic. Several techniques have been used in fitting and fabricating artificial eyes. Empirically fitting a stock eye,

modifying a stock eye by making an impression of the ocular defect (Taicher et al, 1985), and the custom eye technique (Benson, 1977) are the most commonly used techniques. The fabrication of a custom acrylic resin eye provides more esthetic and gives precise results because an impression establishes the defect contours, and the iris and the sclera are custom fabricated and painted.⁴

Types⁵

1. Artificial Eye : - 534 patients who had one of their eyeballs enucleated or had grossly phthisical eyes, have been provided with artificial eyes. These are Snellen type of preformed eyes which vary in thickness from 2-10 mm and in size from 12 x 14 to 28 x 30 mm, the vertical side being the smaller one with a notch on the upper nasal border.

Moulded Eye :-In patients where a satisfactory fitting is not possible with the conventional type of artificial eyes described above, a moulded eye affords better results. Moulded eye is prepared from an impression of the socket or the phthisical eye if present. 94 eyes have been provided with moulded eyes.

3. Cosmetic Contact Shell:-This is an opaque contact lens painted for all the anterior segment details including conjunctiva and sclera. It requires all the fitting techniques and procedure of a scleral contact lens. This is given in cases who have normal or nearly normal shape of the eyeball having total corneal opacity or a disfigured eye where useful vision is not possible. These are extremely thin shells varying in thickness from 0.50-2.50 mm depending upon the contour and shape of the eyeball.

4. Cosmetic Contact Lens: This is akin to a cosmetic shell except that the pupillary area is left clear for visual purposes and is suitably powered to correct the refractive error. The scleral portion in such cases is also transparent. 117 patients were provided with cosmetic contact lenses for various reasons.

5. Spectacle Prosthesis :-It is an ocular prosthesis attached to a spectacle frame and is indicated in cases whose sockets are markedly contracted beyond reasonable repair and cannot retain even the smallest eye or have been subjected to

exentration. 5 spectacle prosthesis have been prepared for different types of patients.

Functions of a Prosthesis

The disfigurement associated with the loss of an eye can cause significant physical and emotional problems (Lubkin & Solan, 1990). 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 result. Refinement in the details of custom made ocular construction has produced a superior restoration delivered more readily. An ocular prosthetic does not provide vision; this would be a visual prosthetic. Someone with an ocular prosthesis is totally blind on the affected side and has monocular (one sided) vision which affects depth perception.⁴

A well-fitting prosthesis is essential for functional integrity of the socket and the eye, rather than being purely cosmetic. It has the following functions.

1. It should retain the shape of the socket and prevent prolapse of the fornices.
2. It should retain the shape of the lids allowing full movements of the lids.
3. It should provide proper muscular action of the lids and thus help in tear flow.
4. It should prevent accumulation of fluids in the socket.

While keeping the above in view, an ocular prosthesis should fulfill the following conditions, as basically they are a cosmetic appliance for the patient and should be acceptable to the patient as such.

1. The palpebral aperture should appear to be the same as in the fellow eye. A large palpebral opening creates a staring effect.
2. The size and shape should be such as to allow full movements of lids and their complete closure.
3. Maximum motility of the prosthesis should be attained.
4. No deviation should be apparent.
5. The pupil and iris should be properly matched with the other eye.
6. The pattern of the conjunctival vessels and the tint of the sclera should be similar.

7. Prosthesis must be comfortable when worn and patient should not become aware of it.
8. Having considered the basic points in the fitting of an ocular prosthesis, we are now in a position to evaluate the suitability of the various types of prosthesis.

Impressions Techniques for Ocular Prosthesis⁶

1. The Direct Impression/External Impression

Several authors have used a technique in which low viscosity alginate or reversible hydrocolloid is injected directly into the enucleated socket.

Impression with Stock Ocular Tray

Perhaps the most common impression technique involves a stock ocular tray to help support the impression material.

2. Stock Ocular Tray Modifications

Variations of the “modified impression method” center on the fabrication or configuration of a stock ocular tray.

3. Impression with Custom Ocular Tray

Miller suggested that a custom ocular tray is necessary in certain situations. For example, the anophthalmic socket could be highly irregular or stock trays may not be available

4. Impression Using Stock Ocular Prosthesis

Several authors have recommended use of a stock ocular prosthesis as a tray to carry impression material.

5. Ocular Prosthesis Modification

Some clinicians have advocated modification of an existing prosthesis to gain acceptable fit.

6. Wax Scleral Blank Technique

The wax scleral blank has been advocated as the starting point in several techniques. Benson created a wax blank by adapting base plate wax around half of an appropriately sized steel ball

CASE REPORT 1 and 2

An ocular prosthesis which gives attention to the accurate duplication of natural color, contour, size, and ocular orientation will provide realism and symmetry for patients who need it.

IMPRESSION METHOD

1. Place the patient in an erect position, either seated or standing, to allow the impression of the tissues involved in the defect to be recorded in their natural drape during active posture.

2. Instruct the patient to gaze straight ahead to minimize muscular movement during the impression-making procedures.

3. Ophthalmic irreversible hydrocolloid mixed in the proportions specified by the manufacturer is extruded into the ocular defect by means of a syringe, displacing the eyelids and registering the entire residual eye chamber.

4. Gently press a perforated tray loaded with additional impression material over the eye region, allowing the material to combine with that of the extruded material. This will facilitate the retrieval of the entire impression.

Disinfection¹⁰

Prior to the insertion of the polished prosthesis, it was disinfected in a solution of 0.5% chlorhexidine and 70% isopropyl alcohol for 5 min. After disinfection, the prosthesis was rinsed in sterile saline solution to avoid chemical irritation and finally the ocular prosthesis was delivered and postdelivery instructions were given.

INSTRUCTIONS TO PATIENT

The prosthesis is inserted in the patient's eye socket, and he is instructed in the use and care of the eye. If this is his first prosthesis, he is given instruction on inserting it. He is told to raise the upper eyelid with his opposite hand, insert the prosthesis, and manipulate the lower lid over it. He is encouraged to practice the insertion and removal before a mirror.

He is told to remove the prosthesis once a day, if necessary, and to wash it under warm water with a soft clean cloth and mild soap. He is cautioned to keep the eye moist by placing it in

water if it is not in the eye socket, and never to allow it to come in contact with alcohol, or solvents of any kind. He is cautioned not to allow the prosthesis to become scratched by carrying it in his pocket or purse, he is also told to have the eye repolished if it becomes scratched in any way.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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