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FABRICATION OF OCULAR PROSTHESIS USING PREFORMED ACRYLIC SHELLS – A CLINICAL REPORT

Prosthodontics

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ABSTRACT

Several ocular disorders may require surgical interventions resulting in defect in the corresponding area. The associated physiological effect of these defects on the patient demands immediate intervention, management and rehabilitation by a multi-disciplinary team of specialists. In this procedure of rehabilitation, the role of a prosthodontist in fabricating an ocular prosthesis with acceptable esthetics, to restore facial symmetry and normal appearance for anophthalmic patient is of paramount importance. This article presents a technique for fabricating ocular prosthesis using preformed acrylic shells.

KEYWORDS

Ocular prosthesis, acrylic shells

Introduction

Physical defects that compromise appearance or function, which prevents an individual from leading a normal life, usually prompts them to seek treatment that will re-establish acceptable normalcy .[1] Orbital defects may be associated with congenital deformities, tumors, or acquired traumatic lesions and may affect the soft tissues within the orbital cavity, the surrounding muscles and bones.[2]

History

Artificial eyes are known to have been manufactured as early as the ninth century B.C. The Egyptians used artificial eyes to adorn their mummies. Romans and Greeks frequently decorated statues with artificial eyes of gold and precious stones (Fig. 1).

Fig. 1: Ancient artificial eyes

In 1579 Ambroise Pare (1510-1590), often called the father of modern surgery, gave the first accurate description of an artificial eye made of metal.[3]

It was surfaced with paint and enamel, to replace eyes lost by accidents or diseases (Fig. 2).

Fig. 2: Eyes surfaced with paint and enamel

If an indwelling eye could not be retained in the socket, an eye with eyelids and lashes, called an "ekblepharon", was fixed to a retaining band to encircle the neck (Fig. 3).

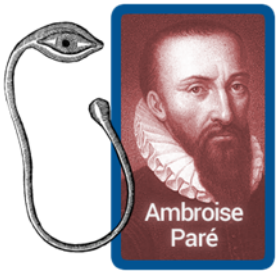

Fig. 3: An Ekblepharon

These were expensive, painful, heavy to wear,and lacked the moist quality of the normal eye. Hazard-Mirault in 1818, claimed these short-comings could be eliminated by the use of glass.

Use of cryolite glass was introduced in 1835 by Ludwig Muller Uri. Arsenic oxide and cryolite form of sodium-aluminium fluoride, produced the whitish gray scleral color. Plastic eyes were introduced during World war II. By 1944, MMA was used to fabricate artificial eyes.[3]

Surgical considerations

Careful preoperative surgical and prosthetic planning, using a team approach can greatly improve the success of a prosthesis. It is important that well-informed specialists prepare their patients surgically, physically, and psychologically for prosthetic rehabilitation.

When removal of an eye is indicated, preservation of as much of orbital contents as possible, should be of the surgeon's concern. Surgical procedures involving removal of the eye, can be laid down into three categories- evisceration, enucleation, and exenteration.[4] Evisceration is removal of the contents of the globe, leaving the sclera in place. A 16-18 mm spherical implant is usually placed within the shell of the remaining sclera (Fig. 4).

Enucleation involves removal of the entire globe after the extraocular muscles and the optic nerve have been transected (Fig. 5). The enucleation patient may present with numerous postsurgical complications, which can be

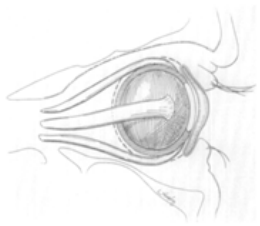

Fig. 4: Sagittal section of an evisceration defect. Spherical implant is placed inside the remaining sclera. The cornea is left intact. Original diameter of globe is indicated by broken lines.

corrected either surgically or prosthetically. A contracted socket can result in various fitting complications. Prosthetic treatment of this problem involves the construction of sequentially larger pressure conformers to expand and shape the contracted socket.

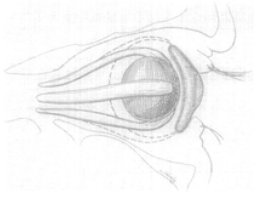

Fig. 5: Sagittal section of enucleation defect. Spherical implant is placed with muscles attached to it.

Exenteration is removal of all of the contents of the orbit, including extraocular muscles (Fig. 6). The periosteum may or may not be maintained. Such complete removal is advised if some form of malignant disease, trauma, or infection is present. On the basis of preservation of eyelids, this surgical procedure may be of three types: (1) partial exenteration, in which the eyelids are left intact, (2) preserving, but splitting the eyelids, by the use of eyelid skin to cover the surgical defect at the orbital rim, (3) complete removal of the eyelids.

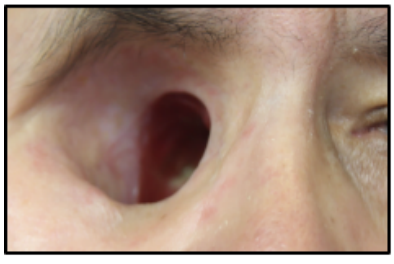

Fig. 6: Patient with an exenteration defect.

Requirements of an ideal socket

An ideal orbital defect should have the following qualities: (1) proper healing,(2) absence of infection,(3) minimum scar tissue adhesions in the socket,(4) adequate antero-posterior depth ,(5) adequate superior and inferior fornices for positive retention of the prosthesis,(6) should be free from muscular flaps.[5]

Impression techniques

Several impression techniques to capture a negative replica of an orbital defect have been illustrated in the literature. These can be enumerated as:(1) Direct impression/ external impression,(2) Impression with stock ocular tray,(3) Stock ocular tray modifications,(4) Impression with custom ocular tray,(5) Impression using stock ocular prosthesis,(6) Ocular prosthesis modification,(7) Wax scleral blank technique.[5]

Case Report

A 62 year-old female patient reported to the dental clinic with a missing eye, and wanted a prosthetic replacement for the same. The patient was unhappy with the present prosthesis because of its poor adaptation at the borders, as well as the unaeshetic appearance (Fig. 7).

Fig. 7: Patient wearing the earlier eye prosthesis.

On removal of the prosthesis, it was seen that there was a loss of eyelid support and poor cosmesis (Fig. 8).

Fig. 8: Pre-operative view. Note the loss of eyelid support and poor cosmesis.

Patient gave a history of an aggressive fungal infection involving the right eye, 8 years back. Uncontrolled diabetes had led to diabetic retinopathy and loss of vision. Subsequently, removal of the involved eye had become a necessity.

A pre-formed acrylic shell was taken and it was circumferentially adjusted to approximate the dimensions of the earlier prosthesis (Fig.9).

Fig. 9: The acrylic shell used for impression-making.

Border molding was then done with low-fusing impression compound to precisely record the extent of the defect (Fig. 10). The patient at this point was asked to perform the physiologic eyeball movements, superoinferiorly and mesiodistally.

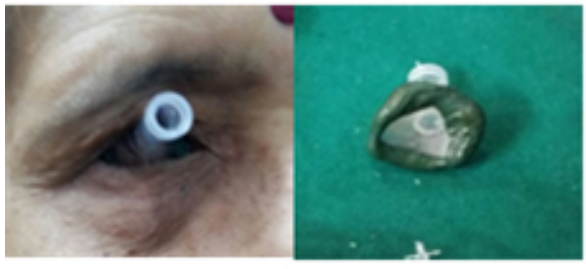

Fig. 10: Border-molding procedure for modified ocular impression making

Definitive impression was made using a light-body polyvinylsiloxane impression material, which was inserted into the defect through a syringe attached to the acrylic shell (Fig. 11).

Fig. 11: The definitive impression

Sectional pouring of the impression is done in dental stone,[6] after beading and boxing procedures (Fig. 12).

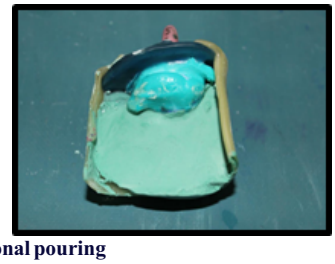

Fig. 12: Sectional pouring

The deinvested shell is characterized, using acrylic paints and silk threads embedded to mimic the capillaries (Fig. 13).

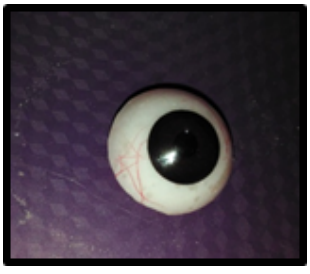

Fig. 13: Characterization of the eye shell

During the try-in appointment, tissue surface is waxed up and re-molded to precisely fit the defect borders (Fig. 14). The centering of the prosthesis is also checked for.

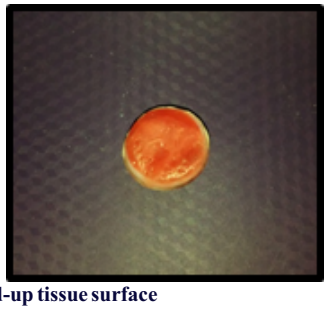

Fig. 14: Waxed-up tissue surface

The acrylic shell is then re-oriented in the mold and relined with heat-cure clear acrylic (Fig. 15). It is finished and polished after deflasking procedures (Fig. 16).

Fig. 15: Acrylic shell ready for packing

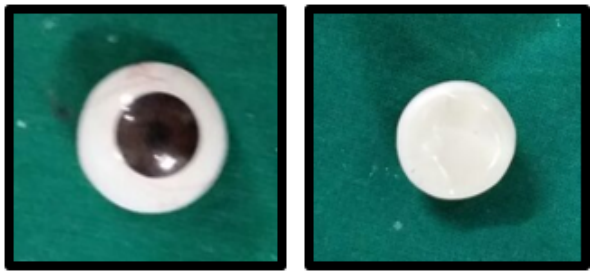

Fig. 16: Finished and polished prosthesis

The eye prosthesis was inserted at the next appointment (Fig. 17). Patient was asked to do the various physiologic movements of the eye, and any discomfort was checked for.

Fig. 17: Post-insertion view of the patient

Specific instructions were given to the patient regarding care and hygiene maintenance. She was asked to wear the prosthesis day and night. It was required to remove from the socket and washed with mild soap once every 1 or 2 weeks. More frequent cleansing would be indicated if particularly dusty or dirty conditions were encountered. With the prosthesis removed, the soft tissues of the socket are rinsed with an ophthalmic irrigation solution. Any infection or irritation in the underlying defect should be reported promptly and taken care of.

Conclusion

The goals of the surgeon and the prosthetic specialist regarding the rehabilitation of the patient with an orbital defect are closely allied. The surgeon desires to render the patient free of disease, and provides the basis for successful rehabilitation. The prosthetic specialist desires to provide prosthetic treatment to the best of his ability. Hence a pre-surgical communication is desirable to get a post-surgical socket close to an ideal one, which promotes both esthetics and comfort of the patient.

References

1. Laney W.R, Gardner A.F. (1979), Maxillofacial prosthetics. Littleton:P S G Publishing,:255-89.
2. Skyes L.M (1996), Custom made ocular prosthesis: A clinical report. J Prosthet Dent; 75(1):1-4.
3. Smit T.J, Koornneef L, Zonneveld F.W, Groet E et al. (1991), Management of acquired anophthalmos: A historical review.Orbit ;10(2):63-76.
4. Parr G R, Goldman B M, Rahn A O. (1983) Surgical considerations in the prosthetic treatment of ocular and orbital defects. J Prosthet Dent.; 49(3):379-85.
5. Mathews M F, Smith R M, Sutton A J. (2000) The ocular impression: A review of the literature and presentation of an alternate technique.J Prosthodont.; 9(4):210-16.
6. Bartlett S.O, Moore D.J. (1973) Ocular prosthesis: A physiologic system. J Prosthetic Dent.; 29(4):450-59