

PROSTHETIC MANAGEMENT OF PHTHISIS BULBI PATIENT: A CASE REPORT

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Abstract:

Phthisis bulbi is an ocular condition caused by wound healing secondary to severe trauma, inflammation or necrotizing tumours of the eye. It represents an ocular end stage disease characterized by atrophy, shrinkage and disorganization of the eyeball and intraocular contents. Disfigurement associated with eye can cause significant physical and emotional disturbance. Prosthetic rehabilitation over the residual eyeball is the preferred treatment of choice over surgical intervention such as enucleation or evisceration. Prosthetic rehabilitation of such patients is challenging and a multidisciplinary approach is required to provide a satisfactory ocular prosthesis. This case report describes the prosthetic management of a patient with phthisis bulbi.

Key words: Phthisis bulbi, Atrophia bulbi, Ocular prosthesis

Introduction

The eye is a vital organ not only in terms of vision but also as an important component of facial expression. The disfigurement associated with eye can cause significant physical and emotional disturbance.¹ Wound healing secondary to severe trauma, inflammation, necrotizing tumors may result in an ocular condition known as Phthisis bulbi or Atrophia bulbi. It is characterized by small, shrunken, non-functional eye, leading to esthetic disfigurement of face, which significantly affects the individual physical, psychological, emotional and social well being.² The immediate rehabilitation can reduce psychological distress and enhance esthetics with improvement in facial contours. A multidisciplinary approach involving an ophthalmologist, the plastic surgeon and a maxillofacial prosthodontist

is required to provide a satisfactory ocular prosthesis.³ This case report describes prosthetic rehabilitation of the patient with uniocular phthisis bulbi.

Case Presentation:

A 68 year old male patient reported to the Department of Prosthodontics, P.M.N.M. Dental College, Bagalkot, Karnataka, India for the prosthetic rehabilitation of scarred, shrunken and unaesthetic right eye. (Fig.1) History revealed that his right eye was operated for cataract 16 years back following which there was infection, pain and discomfort. Due to negligence and poor economic status no proper medical care was taken. Later on he lost his vision completely with shrinkage and scarring. Patient was referred to ophthalmologist for thorough ophthalmic evaluation and was diagnosed as

phthisis bulbi. According to treatment based classification given by Himanshi Aggarwal et al⁴ it was classified as Type IIa [Corneal opacity with mild enophthalmos and normal sclera without corneal sensitivity] (Fig.2).



Fig. 1: Patient with missing right eye



Fig.2: Patient's right eye showing corneal opacity with mild enophthalmos and normal sclera

Treatment Plan:

After thorough evaluation the treatment plan was formulated. It was decided to fabricate an ocular prosthesis to be fitted over phthisis bulbi to improve the esthetic appearance and psychological well being of the patient. Treatment plan was thoroughly explained to the patient and informed consent was obtained.

Technique

The impression procedure:

Impression of the socket was made using the technique developed by Allen and Webster⁵, in which acrylic resin impression tray shaped like an ocular prosthesis is attached to a syringe (Fig.3). While making impression the patient was instructed to tilt head backward and the eyebrow and eyelashes on the defect side were lightly lubricated using petroleum jelly (Biolin, Biopharm laboratories, Bangalore Batch No:- 21406). The socket was cleaned by injecting cooled saline solution into it and dried with cotton pellets.

Medium body polyvinyl siloxane impression material (Aquasil, Dentsply Caulk, lot no. 121115) was injected into the eye socket through the syringe (Fig.4).



Fig. 3: Extension of fabricated custom ocular tray checked in patient's eye

The patient was asked to do eye movements in all directions, so that the functional impression of the defect could be obtained. Patient was asked to look at a distant spot at eye level with gaze maintained in a forward direction till the impression material sets. After the material was set, impression was retrieved from the socket and examined for completeness, any voids or defects. (Fig.5)



Fig. 4: Impression made with medium body elastomers

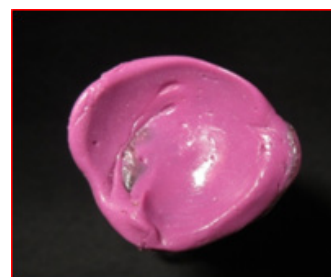


Fig. 5: Impression of ocular defect

Boxing of the impression was done and the cast was poured in two layers to get a split cast. (Fig.6)

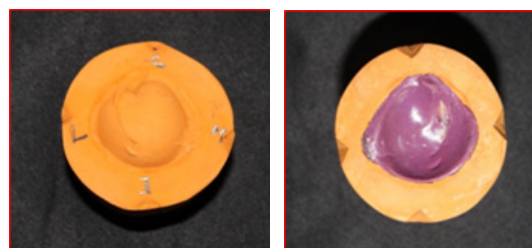


Fig. 6: Split cast mold

The wax pattern fabrication and positioning of the iris:

A wax pattern was fabricated by allowing molten modeling wax to flow (Maarc, shiva product, Mumbai, Batch no.0616) into the mold. A stock eye shell which matched the patient's natural iris in colour and size was selected. The eye shell's borders were trimmed so that it would be confined within the borders of the cast. Because there is mild enophthalmous with associated loss of orbital fat extra thickness of wax was added at the upper anterior surface of the wax pattern. A transparent graph grid was used to position the iris in the exact symmetrical placement on the defect side as suggested by Satyabodh Guttal et al⁶.



Fig. 7: Grid used to determine iris size



Fig. 8: Wax pattern fabricated

The wax pattern try in:

The wax pattern was tried in the patient's ocular defect for comfort, stability, a proper orientation, motility and iris and sclera colours. The position, gaze and aesthetics of the prosthesis were shown to the patient and it got approved. (Fig.9)



Fig. 9: Wax pattern try in and grid used to orient the iris position

Flasking and curing:

The wax pattern was invested in a type III dental stone in a crown flask to create a split mold. After dewaxing, 0.5–1mm of the surface layer of the scleral portion of the stock eye shell was trimmed. The characterization of the iris and shade matching of the sclera were done by using acrylic resin based pigments to match with the contralateral normal eye. Once the artwork was completed, heat cured clear acrylic resin (DPI, batch no-7102) was mixed and packed into the mold and a thin layer of it was also placed on the characterized sclera and the iris. The stock eye shell was put back into the mold and the flask was closed. The curing was done as per the manufacturer's instructions. After the processing, the prosthesis was recovered and finishing and polishing were done to get a high shine (Fig.10). The prosthesis was disinfected and stored in water for 24 hours before its insertion.



Fig. 10: Final prosthesis

Insertion:

The prosthesis was inserted into the eye socket and it was evaluated for aesthetics and the comfort of the patient. The patient was educated to insert and remove the prosthesis. Regular follow up appointments were given, along with instructions regarding the maintenance of the prosthesis. (Fig.11)



Fig. 11: Patient with ocular prosthesis

Post insertion care and maintenance of prosthesis:

The patient was informed that, during the adjustment period there will be an increased volume of secretions and it is better to wear the prosthesis as long as it remains comfortable and is non-irritating. The prosthesis should be handled with care and with clean hands. Prosthesis should be removed at least once a day and washed properly. The prosthesis should never be cleaned with a dry cloth, abrasive soap or toothpaste. Cleaning is best done by hand with a simple liquid surfactant such as baby shampoo or soap with neutral pH. If the prosthesis is scratched in any way it should be repolished before wearing. Prosthesis should be stored in water when not in use to avoid shrinkage.

Discussion:

Phthisis bulbi is an end-stage ocular response to an injury or severe disease of the eye. Even on CT scan, intraocular structures are not easily identifiable and there is often calcification seen within the eye⁷. In phthisis bulbi, intraocular calcium may be deposited within band keratopathy, a cataractous lens, sclera, a gliotic neural retina, or optic nerve⁸.

According to Lee T. Tan et al⁹ Uveitis was the main cause of phthisis accounting for 28% of cases, closely followed by trauma and infection.

Various authors^{10,11} have given classification of phthisis bulbi based on either morphology or histology. Himanshi Aggrawal et al⁴ has proposed the new treatment based classification. The patient presented here falls in class IIa category i.e. corneal opacity with mild enophthalmos and normal sclera without corneal sensitivity and the treatment suggested for this case is ocular prosthesis. Prosthetic rehabilitation over the residual eyeball is the preferred treatment of choice over surgical intervention such as enucleation or evisceration in patients with phthisis bulbi.

A definitive technique for fabricating artificial eyes using acrylic resin has been published in 1944^{12,13}. Several techniques have been used for fitting and fabricating artificial eyes, like empirically fitting a stock eye (ocular shell prosthesis)¹⁴, modifying a stock eye by making an impression of the ocular defect¹⁵ and the custom eye technique¹⁶.

The custom made ocular prosthesis provides more aesthetic results because the iris and the sclera are custom fabricated and painted. The iris painting is one of the important steps in the fabrication of a custom-made ocular prosthesis. This technique is complex, it increases the treatment time, and it requires artistic skills, which are necessary in the iris painting. Moreover, the age, systemic conditions and financial constraints may limit their use. This can be avoided if stock iris matching with the contralateral natural eye is available. If the stock prefabricated eye shell is customized accordingly to the patients contralateral eye by using the acrylic resin pigments, it can provide satisfactory esthetic appearance for the patient. In case of geriatric patients or medically compromised patients such prosthesis would be of immense use because of their relatively simple fabrication technique and very fewer appointments required.

Conclusion

Prosthetic rehabilitation of phthisis bulbi presents a challenging clinical situation. An ocular prosthesis properly fitted over phthisis bulbi is a non invasive approach which provides acceptable esthetic improvement and helps the patient to integrate into the society by improving their psychology and quality of life.

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