Improving the Motility of a Scleral Shell prosthesis with an Acrylic Orbital Implant: A case report

Varsha Ignatious[1], Umesh Y Pai[2], Shobha J Rodrigues[3], Thilak Shetty B[5]

[1]Post Graduate Student, [2]Associate Professor, [3]Professor and Head, [4]Professor, Department of Prosthodontics,Manipal College of Dental Sciences,Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

Evisceration or enucleation of the eye may be performed due to ocular injury, cosmetic deformity, infection or malignancy. After the surgical management, orbital implants can be placed to improve the cosmetic appearance, improve the motility of the scleral shell prosthesis and restore the loss of orbital volume. Various type of orbital implants are available amongst which, the acrylic orbital implant has gained popularity, over the years, due to its limited complications.

The following case report represents a 26 year old patient who underwent enucleation and had an existing scleral shell prosthesis. His chief concern was the motility of the prosthesis. The prosthetic rehabilitation was done with the help of an Acrylic Orbital implant and a customized scleral shell prosthesis.

Keywords*: Eye, Orbital, Implant, Prosthesis, Rehabilitation*

Introduction

Eye is a vital organ not only for function but also from an aesthetic point of view. Defects of eye can be classified as ocular or orbital defects which can be due to enucleation, evisceration and exenteration. These defects have aesthetic, psychological and physiological impact on the patient. Prosthetic rehabilitation of these defect often includes ocular and orbital prostheses.[1] Acrylic ocular prosthesis can be stock or custom-made. Stock prosthesis are used for interim and post-operative purposes. Custom ocular prosthesis involves impression making of the affected socket and subsequently molding the scleral blank to achieve excellent adaptation with tissues.[2] Custom ocular prosthesis has several advantages which include better eyelid movements, reduced incidence of ulceration, improved fit, better comfort, improved facial contours, and enhanced aesthetics gained from the control over the size of the iris, pupil and colour of the iris and sclera.[3]

Corresponding Author:
Dr Umesh Y Pai,
Associate Professor, Department of Prosthodontics,
Manipal College of Dental Sciences ,
Mangalore, Manipal Academy of Higher
Education,Manipal,Karnataka,India Pin:575004
(CORRESPONDING AUTHOR)
Contact number: 9741729097
E-mail – scorpai@rediffmail.com

Case Report

A 26-year-old male patient reported to the Department of Prosthodontics with the chief complaint of a non-motile artificial eye in his right socket (Figure 1). He lost his right eye in a road traffic accident a year ago and has been wearing the scleral shell prosthesis ever since. Examination revealed enucleation of the right eye with a healthy socket mucosa. Evaluation of the socket depth was deemed sufficient to retain an acrylic orbital implant followed by a scleral shell prosthesis for optimal fit and aesthetics. The Ophthalmologist then carried out the peritomy surgery by opening the conjunctival sac and tenon's capsule under local anaesthesia and placement of the 18 mm acrylic implant(Figure 2). The conjunctival sac was then closed with 5-0 vicryl sutures.The eye was then patched up and post operative antibiotic coverage was prescribed.

The patient was then recalled after an 8 week period for the fabrication of the ocular prosthesis.

Fig.1: Preoperative

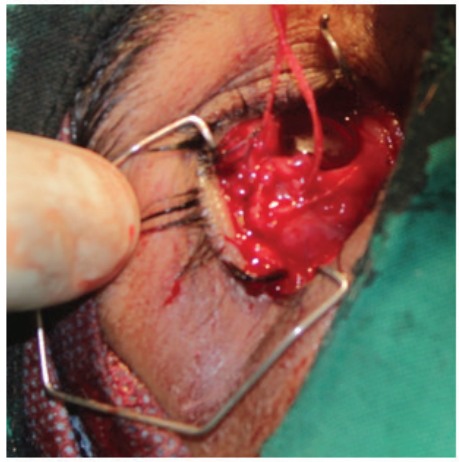

Fig.2 Placement of ocular implant

On examination after 8 weeks, the post operative healing was deemed satisfactory and there were no signs of implant extrusion .The patient was then prepped for the impression procedure for the ocular prosthesis.

Petroleum jelly was applied to the eyebrow, eyelashes and skin around the socket to prevent impression material from sticking to them. A thin mix of alginate impression material was mixed and loaded in a 2 ml plastic disposable syringe. Impression material was slowly injected into the socket. The impression was carefully removed from the socket and checked for any air bubbles. The impression was separated from syringe and invested in type III gypsum stone to make a two-part mold. Molten wax was poured in this mold to obtain the scleral wax pattern. It was tried in the patient and checked for proper contour and retention while performing the various eye movements. For iris positioning, the patient was asked to maintain a straight gaze at an object kept 6 feet away. Shade was selected as per the patient's normal eye sclera. Flasking was done in a two-part metal flask followed by dewaxing, packing and curing. The retrieved prosthesis was trimmed, polished and inserted. Prior to insertion of the finished prosthesis, it was disinfected using 70% isopropyl alcohol and 0.2% chlorhexidine solution. After thoroughly cleaning the prosthesis with saline solution to prevent chemical irritation, it was inserted and checked for fit, contour, and movements (Figure 3).

Fig.3 Postoperative image with the ocular prosthesis.

Discussion:

Loss of eye has functional, aesthetic and psychological impact on the patient. Rehabilitation of such defects with ocular prosthesis can improve his/her physiological and psychological well-being. An ocular prosthesis should replicate correct gaze, shape, and colour of the natural eye. It should prevent collapse or loss of the shape of the lids, accumulation of fluid in the cavity and provides proper muscular action of the lids.A well-fabricated prosthesis not only restores function and aesthetics but also restore patient's self-confidence and psychological health.[2]

After enucleation or evisceration, it is necessary to replace the lost volume in the orbit, which is a condition that was recognized since the beginning of the 20th century.[4,5] The first orbital implants were produced by Mules in 1885, who used hollow glass spheres to restore the anophthalmic cavity volume. Subsequently, diverse materials were used to manufacture orbital implants; however, the advances in this field progressed relatively slowly until the 1940's when various materials were suggested.[6,7] The most successful were acrylic and silicone spheres, and the use of both has spread throughout the world. Acrylic and silicone implants are both smooth, non-porous, and non-integrated implants, which are inert and they cause little reaction in the host. These are still the most popular implants.[8]

A revolution in anophthalmic cavity reconstruction occurred when integrated implants emerged in the 1980s to improve the results obtained during anophthalmic cavity treatment, particularly in terms of the mobility of the external prosthesis.[9]

Unfortunately, many complications are associated with integrated implants. Rates of exposure and postoperative inflammation of integrated Hydroxyapatite implants range from 0% to 22%, while it is almost (0-7%) for acrylic and silicone implants.

Thus, the main reason for using integrated implants with a coupling system between the implants and external prosthesis was to improve mobility. However, numerous complications have been described, which are caused by dehiscence and the exposure of the implants, and they necessitate the removal or extrusion of the integrated implants. Therefore, the pegging system is rarely used at present. However, if pegging is not planned, there is no advantage in terms of mobility when using porous orbital implants instead of solid silicone and acrylic spheres.[10]

Previous studies provide no evidence that integrated implants are superior to non-integrated implants. The superiority of porous polyethylene has been reported but others note that porous polyethylene has the same rate of complications as other porous or non-porous implants.[11]

Several case reports indicate that complications have occurred with all of the different types of implants. Randomized studies and long-term follow-up are required to conclusively determine the performance of implants. Therefore, according to the current state-of-the-art and for the implants that exist in the market, it is possible to affirm that there is no ideal implant and that the integrated implants do not perform better than the non-integrated implant.[12]

An ideal orbital implant and surgical technique should yield excellent prosthesis motility and cosmesis, with very few complications. The technique includes choosing an appropriately sized implant, positioning the implant deeply in the orbit, meticulously closing the Tenon's capsule over the implant, and securing the conjunctiva over the implant without tension.[2]

Size, shape, composition and cost determine the ideal type of implant. It must approximate the normal eye, occupy the excess orbital volume and must also be made of a material the body will not reject. Implant shape also plays a role in the mechanics of the prosthesis. It may be spherical or irregularly shaped.(pyramidal,conical or egg shaped).We used the traditional spherical shaped implants to simulate the shape of the eyeball.[1]

Infection is less frequent with nonintegrated than the integrated implants because of the lack of pores which act as areas for potential complications.

The solid acrylic spheres are used commonly due to its low cost.[1] The acrylic implant used here has improved the motility of the prosthesis to a great extent. We used the acrylic implant because of its inert properties, low cost and long history of use as an orbital implant.

Considering the Indian economic system and the socio economic status of Indian patients, the acrylic implant is definitely a poor man's boon compared to the expensive porous implants with a very similar prosthetic motility.

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References

1. Archimedes Lee, Agahan, Alexander D. Tan.Use of hollow polymethylmethacrylate as an orbital implant.Phillipine Journal of

Ophthalmology.2004;29(1):21-25

2. Soares IP, França VP, Evisceration and enucleation. Semin Ophthalmol, 2010;25:94–7.
3. Gougelman HP, The evolution of the ocular motility implant.Int Ophthalmol Clin, 1970;10:689–711.
4. Shah RD, Singa RM, Aakalu VK, Setabutr P, Evisceration and enucleation: a national survey of practice patterns in the United States, Ophthalmic Surg Lasers Imaging, 2012;43:425–30.
5. Moshfeghi DM, Moshfeghi AA, Finger PT, Enucleation, Surv Ophthalmol, 2000;44:277–301. 6. Chaudhry IA, AlKuraya HS, Shamsi FA, et al., Current indications and resultant complications of evisceration, Ophthalmic Epidemiol, 2007;14(2):93–7.
7. Anderson RL, Thiese SM, Nerad JA, et al., The Universal orbital implant: indications and methods, Adv Ophthal Plast Reconstr Surg, 1990;888–99.
8. Tyers AG, Collin JR, Baseball orbital implants: a review of 39 patients, Br J Ophthalmol, 1985;69:438–42.
9. Helms HA, Zeiger HE Jr, Callahan A, Complications following enucleation and implantation of multiple glass spheres in the orbit, Ophthal Plast Reconstr Surg, 1987;387–9.
10. Hornblass A, Herschorn BJ, Double sphere orbital implantation in enucleation and evisceration, Ophthal Plast Reconstr Surg, 1985;165–8.
11. Jacob-LaBarre JT, DiLoreto DA, Total integration of an ocular implant/prosthesis: preliminary in vivo study of a new design, Ophthal Plast Reconstr Surg, 1995;11200–8.
12. Karesh JW, Dresner SC, High density porous polyethylene (Medpor) as a successful anophthalmic socket implant, Ophthalmology, 1994;101:1688–96
13. Anna Serene Babu,V Manju,C Tony Thomas. Prosthetic rehabilitation of surgically treated orbital defects-evisceration,enucleation and exenteration:A case series.J Indian Prosthodont Soc 2016;16(2):216-220
14. Supriya M, Ghadiali B. Prosthetic rehabilitation of a patient with an orbital defect using a simplified approach. J Indian Prosthodont Soc 2008;8:116-8