

Prosthetic Correction of Postenucleation Socket Syndrome: A Case Report

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Received: 5 August 2012 / Accepted: 21 September 2012 / Published online: 29 September 2012
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Abstract Postenucleation socket syndrome is a frequent late complication of enucleation of eye globe. Several pathophysiological mechanisms have been proposed to account for the symptoms of postenucleation socket syndrome, which include lost orbital volume, superior sulcus deformity, upper eyelid ptosis, lower eyelid laxity, and backward tilt of the prosthesis. The goal of postenucleation socket syndrome treatment is to achieve the best possible functional and esthetic result. The treatment can be either conservative or surgical. For the patient interested in a non-surgical correction, the conservative treatment is simple and non invasive and can be done with prosthesis modification for good positioning, comfort, and mobility. This paper describes prosthetic correction of a patient with postenucleation socket syndrome by modified ocular prosthesis.

Keywords Postenucleation socket syndrome · Sunken socket · Contracted socket

Introduction

The enucleation of the eye globe is undertaken by an ophthalmic surgeon only when all other eye treatments are ineffective, inappropriate or undesirable. It is the final measure taken most frequently when a patient has intra-ocular malignancy, trauma, and a blind, painful eye. Following enucleation, the orbital tissues that once supported and protected the natural eye no longer serve a useful purpose and tend to shrink leading to loss of orbital

volume. The cosmetic disfigurements which arise due to loss of orbital volume after enucleation of an eye include enophthalmos, ptosis of the upper eyelid, deepening of the superior sulcus, backward tilt of the ocular prosthesis, and drooping of the lower eyelid i.e. ectropion. These symptoms, summarized in ‘the postenucleation socket syndrome,’ may arise separately or in combination and vary in severity [1]. The postenucleation socket syndrome is the most common late complication of enucleation of the eye globe that results from volume deficit of the orbital tissues surrounding the socket. In 1982, Tyers and Collin first described “postenucleation socket syndrome” composed of total appearance of enophthalmos, deepening of the upper eyelid sulcus, ptosis of the upper eyelid, and ectropion [2].

The goal of postenucleation socket syndrome treatment is to increase orbital volume, to enable wearing of the eye prosthesis and to achieve the best possible functional and esthetic result. These features should be addressed in appropriate order and with a team approach involving prosthetist and the ophthalmologist. The treatment can be either conservative or surgical. For patients who does not want to undergo further surgical procedures, the conservative treatment is simple, non invasive, and appropriate. It involves modification of the ocular prosthesis for good positioning, aesthetics, comfort, and mobility. This case report describes the prosthetic correction of the postenucleation socket syndrome by modified ocular prosthesis.

Case Presentation

A 66-year-old woman reported to prosthodontic clinic to improve the appearance of ill fitting left ocular prosthesis. Patient gave a history of having been struck in the left eye by a stone at the age 2 years. The left eye was enucleated a

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Fig. 1 Patient with enucleated left eye



Fig. 2 Postenucleation socket syndrome

few days later and eye shell ocular prosthesis was given. In the past few years she noticed sunken socket and progressive drooping of the upper eyelid and frequent dislodgement of prosthesis from the socket. The patient was examined along with an ophthalmologist. The examination revealed that no ocular implant was inserted after enucleation and there was enophthalmos, sunken socket, superior sulcus deformity, ptosis, and lower eyelid ectropion. The case was diagnosed as postenucleation socket syndrome on the basis of these clinical findings. (Figs. 1, 2).

On examination of existing ocular prosthesis, it was noticed that the prosthesis was large and prevented adequate lid closure. The prosthesis was also tilted backwards and gaze upwards. The prosthesis was not retentive and frequently dislodged from the socket. This was again typical sign of postenucleation socket syndrome. (Fig. 3).

Treatment Plan

The objective was to create well fitting ocular prosthesis with a shape that increase the height of the upper lid,



Fig. 3 Patient's previous ocular prosthesis with backward tilt and gaze upwards

corrects the direction of the gaze and takes the pressure off the lower eyelid. The first step in addressing postenucleation socket syndrome is to update the existing prosthesis either by modifying or replacing it. For the patient presented here, replacement of old ocular prosthesis with modified new ocular prosthesis was planned as the patient refused the surgical correction. The treatment plan was discussed with the patient and an informed consent was signed to ensure her willingness for fabrication of new modified ocular prosthesis.

Technique

Impression Procedure

Impression of the socket was made using the technique developed by Allen and Webster [3], in which acrylic resin impression tray shaped like an ocular prosthesis is attached to an impression syringe. Medium body polyvinyl siloxane impression material (Aquasil, dentsply Caulk, lot no. 100901) was injected into the eye socket through the syringe. 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 is retrieved from the socket and examined for completeness, any voids or defects. Boxing of the impression was done and the cast was poured in two layers to get a split cast.

Wax Pattern Fabrication and Positioning of the Iris

A wax pattern was fabricated by flowing molten modeling wax (Maarc, shiva product, Mumbai, lot no. 711) into the

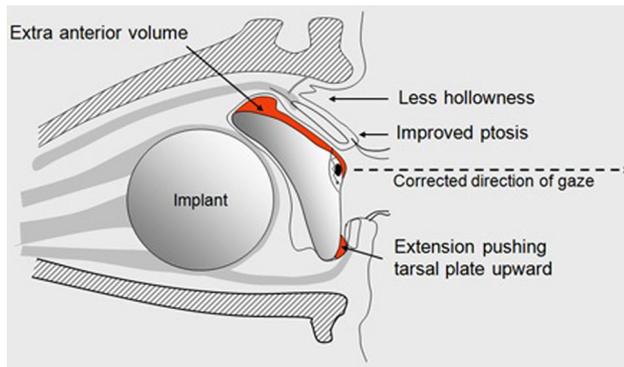


Fig. 4 Diagrammatic presentation of modifications in ocular prosthesis

mold. Stock eye shell matching the patient's natural iris in color and size was selected. The eye shell was trimmed to remove sclera portion and only iris was placed in the wax. Extra thickness of wax was added at the upper anterior surface of the wax pattern. The inferior surface was made less bulky and small extension was made anteriorly. The anterior surface was made as conical as possible. [4] (Fig. 4).

Wax Pattern Try in

The wax pattern was tried in the patient's ocular defect for comfort, stability, motility, and proper orientation in vertical and horizontal plane. The transparent graph grid was used for symmetrical placement of the iris into the socket in both horizontal and vertical plane as suggested by Satyabodh Guttal et al. [5]. The fullness of both the palpebra and the eye socket was checked along with the extensions, this was confirmed by asking the patient to close eyes and patient was inspected from the profile view and any short comings in contour were corrected. The patient was asked to perform various eye movements and retention of the wax pattern was checked. The position, gaze, and aesthetics of the prosthesis were verified and got approved from the patient. The shade matching of sclera was done using acrylic resin based pigments mixed in heat cured clear acrylic resin (DPI, batch no.7102, 2010) to match with the contralateral normal eye.

Flasking and Curing

Wax pattern was flaked in a crown flask to create a split mold. After dewaxing, the shade matched heat cured acrylic resin of sclera along with nylon fibrils separated from denture base acrylic resin to replicate the blood vessels to match with the contralateral normal eye were mixed and packed into the mold. The curing was done as per manufacturer's instructions. After processing, prosthesis



Fig. 5 Prosthetic correction of postenucleation socket syndrome

was recovered and finishing and polishing was to get a high shine. The prosthesis was disinfected and stored in water for 24 h before insertion.

Insertion

Prosthesis was inserted into the socket and evaluated for aesthetics, mobility, and comfort of the patient. The patient was educated to insert and remove the prosthesis. Regular follow-up appointments were given along with instructions regarding maintenance of the prosthesis. (Fig. 5).

Post Insertion Care and Maintenance of the Prosthesis

The following instructions were given to the patient after insertion of ocular prosthesis.

1. The patient was instructed to handle the prosthesis with care and with clean hands.
2. The prosthesis should be removed at least once a day and washed properly. It 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.
3. The prosthesis should be stored in water when not in use. If the prosthesis is scratched in any way it should be repolished before wearing.

Patient Follow-up

For prosthesis evaluation and adjustment the patient was asked to return on days 1 and 7 for follow-ups. Thereafter, a 6 month follow-up was done and it was noted that the patient had no complaints and was satisfied about aesthetics, mobility, and comfort of the ocular prosthesis.

Discussion

Removal of an eye for treatment of ocular disease was first described by Bartisch in 1583 [6].

Surgical enucleation may give rise to a variety of complications including wound dehiscence, postoperative infection, implant migration or extrusion, and most noteworthy, postenucleation socket syndrome. According to literature, postenucleation socket syndrome is a relatively frequent complication after enucleation.

Several etiologies of postenucleation socket syndrome have been postulated like, atrophy of orbital fat, migration of muscle cone, traumatic bony loss, herniated orbital fat secondary to unrecognized orbital wall fracture, loss of volume when globe is removed, levator disinsertion, malposition of superior rectus muscle and long-standing gravitational burden of orbital implant and prosthesis [7]. Among these, the loss of volume resulting from the removal of the eyeball is the chief cause of postenucleation socket syndrome.

The underlying pathophysiology, however, has not been well established but it is suggested that, the orbital tissues settles downward after enucleation and the upper lid loses its support and drops down over the prosthesis. This pseudo-ptosis is accompanied by a degree of hollowness over the upper eyelid i.e. superior sulcus deformity. Over time, the loss of orbital volume causes the prosthesis to tilt backwards and gaze upwards. This puts forward pressure on the lower eyelid which shallows the fornix and causes the lower lid to droop. Due to the weight of a large prosthesis and drooping of the lower lid, there is spontaneous subluxation of the eye prosthesis from the socket.

To regain a normal appearance after the postenucleation socket syndrome, it should be prevented and/or treated. As it is said that the primary cause of postenucleation socket syndrome is lack of sufficient volume of the orbital tissues, it can be best prevented by the use of a sufficiently large implant at the time of enucleation to replace the lost volume. If there has been no implant at the time of enucleation, the first step in the correction is placing a late implant. In doing so, the potential for contracture and volume deficit is reduced and the best cosmetic results are achieved [8].

The management of the postenucleation socket syndrome can be either surgical or conservative. Oculoplastic and orbital surgeries have a wide variety of approaches to address postenucleation socket syndrome. Surgical procedures are selected according to severity of the problem and simple procedures include synechiolysis, deepening of the fornix, fat tissue implantation, resection of lateral ligament, and reconstruction of the lid. Tissue augmentation is achieved with grafts such as fat, cartilage, bone or porous polyethylene and the most novel of these methods is the

use of autologous fat transplant [9]. Surgical techniques like orbital floor implantation have advantages like they do not disrupt the intraperiorbital contents at operation, thereby reducing further orbital fat atrophy [10]. A discussion of surgical techniques and implants is beyond the scope of this paper and only the prosthetic management is discussed in this paper.

For the patient interested in a non-surgical correction, the conservative treatment is simple and non invasive. It is less expensive and less painful than surgical correction. It can be done with prosthesis modification for good positioning, comfort, and mobility. In prosthetic correction some improvements are done in the eye prosthesis for the purpose of neutralizing the effects of a postenucleation socket syndrome. In 1907, Grossman proposed that artificial eyes be made with a bulge at their upper anterior surface to abolish the enophthalmos that often occurs at the upper portion of the upper lid [11]. The increased bulge supports the eyelid and increases the height of the upper eyelid thus correcting the superior sulcus deformity and ptosis. The enophthalmos can also be improved by the use of “phantom glasses” where magnifying glass is inserted in front of the prosthesis to magnify the damaged side and approximate it to the healthy eye making the enophthalmos less noticeable. The extra volume in the upper anterior part and less bulk in lower part of the prosthesis makes the prosthesis to tilt forward correcting the upward gaze of the prosthesis, improving aesthetics. Arthur E.Sherman stated that the change to a less bulky prosthesis in an adequate lower fornix eliminates the downward and forward thrust on the lower eyelid and corrects the lower-lid ectropion [12]. A small extension made anteriorly on the inferior part helps to push the tarsal plate upward [4].

Postenucleation socket syndrome can manifest with numerous clinical signs, so treatment is individual and multilevel. For the patient interested in a non-surgical correction of postenucleation socket syndrome, modification of ocular prosthesis for good positioning, aesthetics, mobility, and comfort is advocated. This treatment modality is simple, non invasive, non time consuming and cost effective.

Summary

The three most common indications for enucleation of eyeball are intraocular malignancy, trauma, and a blind, painful eye. According to literature, postenucleation socket syndrome is a relatively frequent complication after enucleation. The management of these patients should be carried out with close communication between the ophthalmologist and prosthetist to achieve optimal comfort and aesthetics. Clinical manifestations of postenucleation socket syndrome

are numerous and treatment is individual and multilevel. For the patients interested in a non-surgical correction, the conservative treatment is simple and non invasive. It can be done by modifying the ocular prosthesis for good positioning, aesthetics, comfort, and mobility.

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