CASE REPORT

Prosthetic rehabilitation of an ocular defect with post-enucleation socket syndrome: A case report

Pokpong Amornvit a,*, Dinesh Rokaya b, Binit Shrestha c, Theerathavaj Srithavaj d

a Maxillofacial Prosthodontist, Maxillofacial Prosthetic Service, Faculty of Dentistry, Mahidol University, Bangkok, Thailand
b Resident, Maxillofacial Prosthetic Service, Faculty of Dentistry, Mahidol University, Bangkok, Thailand
c Instructor, Maxillofacial Prosthetic Service, Faculty of Dentistry, Mahidol University, Bangkok, Thailand
d Assistant Professor, Maxillofacial Prosthetic Service, Faculty of Dentistry, Mahidol University, Bangkok, Thailand

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KEYWORDS
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Abstract Ocular trauma can be caused by road traffic accidents, falls, assaults, or work-related
accidents. Enucleation is often indicated after ocular injury or for the treatment of intraocular
tumors, severe ocular infections, and painful blind eyes. Rehabilitation of an enucleated socket
without an intraocular implant or with an inappropriately sized implant can result in superior sul-
cus deepening, enophthalmos, ptosis, ectropion, and lower lid laxity, which are collectively known
as post-enucleation socket syndrome. This clinical report describes the rehabilitation of post-enucle-
ation socket syndrome with a modified ocular prosthesis. Modifications to the ocular prosthesis
were performed to correct the ptosis, superior sulcus deepening, and enophthalmos. The rehabili-
tation procedure produced satisfactory results.

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1. Introduction

Ocular trauma often results from road traffic accidents or from sharp objects like pencils, glass, nails, or needles (Stevens, 1997). Enucleation is often indicated for serious injuries to the eyes. After enucleation surgery, the loss of volume and rotation of

intraorbital contents can result in superior sulcus deepening, enophthalmos, ptosis, ectropion, and lower lid laxity, which are known as post-enucleation socket syndrome.

Ptosis of the upper eye is characterized by an abnormally low-lying upper eyelid margin, which narrows the palpebral opening of the eye. There are two types of ptosis: pseudo and true. Pseudo ptosis usually results from a lack of orbital volume, and may result from microphthalmus, enophthalmos, phthisis bulbi, or poorly fitted prostheses. True ptosis is commonly attributed to improper development of the levator muscle, aging, trauma, or muscular or neurologic disease. Superior sulcus deformity produces deep surface contours in the upper eyelid above the tarsus and may arise from atrophy of the orbital fat, degeneration of the extraocular muscles, or displacement of the orbital implant. Ocular prostheses are indicated in post-
enucleation and anophthalmic socket syndromes, and they improve quality of life of patients (Raizada and Rani, 2007).
Patients with ophthalmic sockets complain about mucoid discharge associated with wearing their prosthetic eyes. This problem is the second highest concern among patients with prosthetic eyes. Deposits dictate the responses of sockets to prosthetic eyes, and different cleaning regimens and surface finishes can reduce problems (Pine et al., 2013). This clinical report describes the rehabilitation of post-enucleation socket syndrome with an ocular prosthesis. Surface finish modifications to the ocular prosthesis were done to correct ptosis, superior sulcus deepening, and enophthalmos.

2. Case Report

A 50-year-old male was referred to the maxillofacial prosthetic service for rehabilitation of an ocular defect. The patient’s chief complaint was a defect associated with an artificial right eye. The patient’s past medical history revealed that the eye was lost after it was injured with a stick 15 years previously. Enucleation was performed, and an intraorbital implant was placed 2 months prior to presentation (Fig. 1a and b).

Examination of the eye revealed the presence of superior sulcus deepening, upper eyelid ptosis, superior and inferior eyelid laxity, normal lacrimal secretion, adequate superior fornix depth, and shallow inferior fornix depth (Fig. 1). The treatment plan involved fabrication of an ocular prosthesis with modifications to correct the upper eyelid ptosis and the superior sulcus deformities. An ocular impression of the eye was made with polyvinyl siloxane impression material (Fig. 2) (3M ESPE, Express, 3M, USA). A mold was made with Type III dental stone (Lafarge Prestía, Meriel, France), and a conformer was fabricated with clear, heat-polymerized polymethyl methacrylate (PMMA) (Fig. 3).

The conformer was tried in the patient, and modifications were made according to Allen’s Technique (Allen, 1976). The conformer was reduced on the anterior-superior aspect to reposition the superior tarsal plate, correct the ptosis, and increase eye opening. Baseplate wax (Carvex TT 100 soft, Carvex, Holland BV, Haarlem, Holland) was added on the anterior corneal area to support the upper eyelid, and the anterior-inferior surface of the conformer was reduced to lift the lower eyelid. Baseplate wax was also added on the postero-superior surface to lift the margin of the eye (Figs. 4 and 5). Finally, the baseplate wax was replaced with PMMA. The final conformer was delivered to the patient, who was instructed to wear it for 2 weeks (Fig. 4) to allow tissue adaptation.

Figure 1 Appearance of patient with right ocular defect in frontal view (A) and lateral view (B).

Figure 2 Impression of ocular defect made with polyvinyl siloxane impression material.

Figure 3 Clear heat polymerizing polymethyl methacrylate (PMMA).

Figure 4 Adjustment done on the conformer; reducing the antero-superior aspect, addition of wax on the anterior corneal area, reducing the anterior-inferior surface and addition of wax on postero-superior (A) and final conformer (B).

Figure 5 Final ocular prosthesis on frontal view (A) and lateral view (B).
The ocular prosthesis was fabricated from PMMA (Fig. 5), and, after 2 weeks, it was delivered to the patient with care instructions (Fig. 6). The patient was given exercise protocols to increase the tonicity of the eyelid muscles. At a 1-month follow-up, the patient was satisfied with the treatment.

3. Discussion

Radiographic images taken after enucleation revealed the downward and forward redistribution of intraorbital fat and inferior displacement of the superior rectus–levator complex. The most common complications for patients with ocular prostheses include recession of the upper lid sulcus, absence of the superior lid folds, and progressive enophthalmos. These complications are attributed to the degeneration of inactive extraocular muscles, orbital fat atrophy, and a tendency for enophthalmos associated with aging. The size and design of the implant impacts these symptoms. For example, if the implant is sized incorrectly, if the position is incorrect, or if the type or design is wrong, enophthalmos can result (Beumer et al., 2011). In this case, the superior sulcus deformity was corrected by reshaping the prosthesis into a more vertically elongated design. Volume was also added posteriorly and superiorly to push the lid tissue into the superior sulcus (Fig. 6) (Workman, 1991).

The patient also had a mild ptosis (2 mm). Although the final result was satisfactory (Fig. 6), the superior sulcus deepening and the ptosis could be corrected surgically, rather than by modifying the prosthesis. The addition of acrylic on the posterior-superior surface of the ocular prosthesis may not improve the esthetic result, but it may increase the weight of the prosthesis, which can cause further complications. The excess weight of the prosthesis might cause lower lid laxity and sagging of the lower eyelid. Surgical correction of superior sulcus deepening includes dermis fat grafting, suturing the levator complex tendon to the periosteum of the superior orbital rim, or replacing or repositioning of the intraocular implant (Cowen and Antonyshyn, 1995). The surgical procedure to correct ptosis includes resection of Müller’s muscle and shortening of the levator palpebrae (Finsterer, 2003). In this situation, the patient was satisfied with the esthetic outcome, and further surgical treatment was not recommended.

Early replacement of the conformer by an ocular prosthesis allows for cosmetic rehabilitation and improved quality of life (Chin et al., 2006). Therefore, in this case, the conformer was inserted 2 months after the enucleation and implant placement, the ocular prosthesis was inserted within 3 months of inserting the conformer, and the patient’s quality of life was increased.

4. Conclusions

Post-enucleation socket syndrome with superior sulcus deformities, mild to moderate ptosis, and enophthalmos may be corrected with modifications to the prosthesis. In this case, reduction of the superior aspect, adding acrylic on the anterior corneal area, reducing the anterior-inferior surface, and adding acrylic on the posterio-inferior surface produced satisfactory results.

Ethics statement

The consent of the patient was sought prior to and approved the inclusion of his case and his photographs in this study, and the Helsinki declaration was followed. The approval was obtained from the Ethics Committee from the Mahidol University for the presentation and publication of this case.

Conflict of interest

No conflict of interest was declared.

References