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Case Report

A comparative assessment of prosthetic outcome on enucleation and evisceration in three different etiological eye defects: A case series

Nafij Bin Jamayet[1], John Kariuki Kirangi[1], Adam Husein[2], Mohammad Khursheed Alam[3]

[1]Maxillofacial Prosthetics Unit, School of Dental Sciences, Universiti Sains Malaysia, Kota Bharu, Kelantan, Malaysia,
[2]Prosthodontic Unit, School of Dental Science, Universiti Sains Malaysia, Kota Bharu, Kelantan, Malaysia,
[3]Department of Orthodontic, College of Dentistry, Al Jouf University, Sakaka, KSA

Correspondence: Dr. Nafij Bin Jamayet
Email: dr.nafij@gmail.com

ABSTRACT

Enucleation and evisceration are the most common surgical procedures that are performed to manage tumor, trauma, and infection. Given the consequences of surgical intervention, the conditions of the remaining eye socket may affect future prosthetic rehabilitation. A custom-made ocular prosthesis can be used to help restore the esthetics and functional defects and to improve the quality of life of patients with such conditions. An assessment must be performed on the prosthetic outcome before rehabilitation. The etiology of defect, type of surgery, condition of the remaining socket, and patient's age should all be considered. This report discusses three different etiological eye defects that have undergone enucleation and evisceration and describes the factors that have a significant role in the esthetic and functional outcome of the prosthesis. This report should serve as a helpful aid for maxillofacial prosthodontists to understand the primary objective of rehabilitating each eye defect and to meet patient expectations.

Key words: Enucleation, evisceration, eye prosthesis, ocular defect, prosthetic outcome

INTRODUCTION

Surgical interventions are performed to manage trauma, infection, and tumor which lead to eye defects.[1-3] These surgical procedures can be classified into three categories: Enucleation, evisceration, and exenteration. Enucleation involves the removal of the globe contents and leaves the sclera intact. Evisceration is the removal of the entire eyeball after severing the muscles and the optic nerve. By contrast, exenteration is a more invasive surgical incision, which involves removal of the entire content of the orbit including the eyelids and the surrounding tissues.[4-6] A custom-made ocular prosthesis is usually advised after surgery, and an acceptable prognosis of eye prosthesis depends on the fitting, esthetics, and function of the remaining structure. Before the fabrication of the prosthesis, the relevant factors that may have a role in the outcome of prosthetic rehabilitation need to be identified.[6-8] After the evolution according to the etiology, type of surgery performed, and patient's age and expectations, an ocularist may come up with a conclusion about the

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future outcome of the prosthesis. The objectives of this series of cases are to describe postsurgical factors that have a role in the prosthetic outcome of eye prosthesis.

CASE REPORTS

Case 1

The first case involved a 13-year-old male patient whose right eye was surgically enucleated as a result of retinoblastoma. The socket had an average volume, and intact tissue bed and muscles with residual movements were exhibited. An adequate superior sulcus depth was found. The muscle tonicities of the upper and lower eyelids were sufficient for opening and closing movements [Figure 1a and b]. A custom impression was made using light body polyvinyl siloxane impression material (3M ESPE, USA). Following a visit, a conformer was given for 1 week, with some instructions for muscle exercises. An evolution was done after 1 week [Figure 2a]. The current dimension of the conformer gave a harmonious status with the surrounding structure of the contralateral eye [Figure 2b]. The patient felt comfortable opening and closing both eyelids. Following the size conformer, a definitive prosthesis was fabricated and issued [Figure 2c]. The evaluation was conducted in relation to the patient's expectations regarding esthetics and comfort [Figure 3a and b].

Case 2

A 67-year-old female suffered an injury followed by subsequent infection, which resulted in the evisceration of her right eye. Upon examination, the defective eye socket revealed an intact tissue bed with a detectable limited movement of the remaining eye muscles, absence of infection, and adequate volume to support the prosthesis. The presence of the deepening of the superior sulcus was observed in this case [Figure 4a and b].

Figure 1: Acquired right eye defect due to enucleation. (a) Frontal view of the face profile. (b) Right lateral view

The patient was given conformer therapy for 2 to 3 weeks [Figure 5a]. An evolution was conducted after 3 weeks, which included the esthetic overcoming of the deepening of the superior sulcus, which was apparently present, and the improvement of the tonicity of the muscles [Figure 5b]. We asked patient about the level of comfort she felt while using the conformer. According to patient's comfort, the size and dimension of the conformer were finalized. The conformer was later transformed to customize the eye prosthesis, with the matching shade of the contralateral eye [Figures 5c and 6a, b].

Case 3

A 58-year-old male patient who had lost his eye due to trauma was reported after evisceration [Figure 7a]. The patient had an average socket volume to retain the prosthesis. The muscle tonicity of the lower eyelid was acceptable. However, that of the upper eyelid was poor, which resulted in the difficulty of the eye opening movement. The deepening of the superior sulcus was also inevitable [Figure 7b]. Following the impression, a conformer was inserted and relined in different sizes to increase the eye opening movement [Figure 7c-e]. Various muscle exercises with variously sized conformers were given. An evolution was conducted after a month to evaluate the eye opening [Figure 8a and b]. Upon satisfactory opening of upper eyelid, an ocular prosthesis was fabricated and issued [Figure 9a-d].

DISCUSSION

In this series of cases, the prosthetic rehabilitation of three eye defects was discussed. All the cases were successfully rehabilitated with custom-made eye prosthesis. Conformer therapy was used with different periods of time across the cases. However, the outcome of the three prostheses resulted in different levels. In Case 1, the etiology was retinoblastoma, and enucleation was performed. Enucleation is a conservative approach to the removal of the eye from the globe; thus, following the surgery, the periorbital

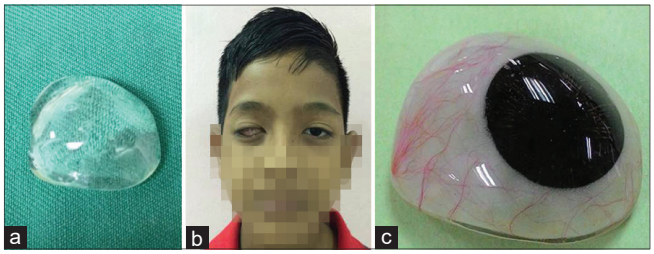

Figure 2: (a) Conformer (b) conformer try in (c) definitive custom-made eye prosthesis followed by final conformer dimension

Figure 3: Issue of custom-made definitive eye prosthesis. (a) Frontal view of face profile (b) right lateral view

Figure 5: (a) Conformer (b) conformer try in with noticeable lack of improvement of superior sulcus deepening (c) definitive custom-made eye prosthesis followed by final conformer dimension

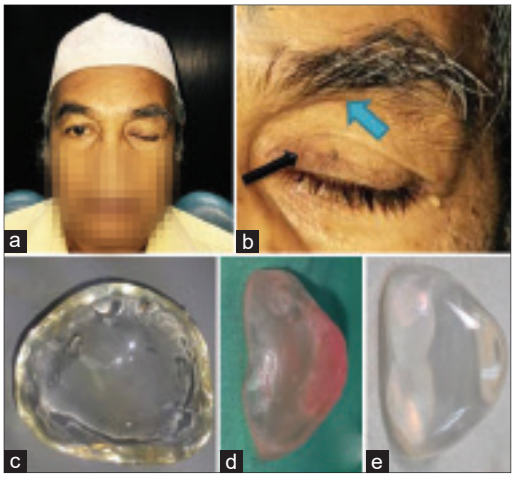

Figure 7: Acquired left eye defect due to evisceration. (a) Frontal view of face profile (b) defect consists of ptosis (black mark) and superior sulcus deepening (blue mark) (c) initial conformer (d) after try in initial conformer, conformer relined with pink wax to improve ptosis and superior sulcus deepening (e) final relining with heat cure acrylic resin

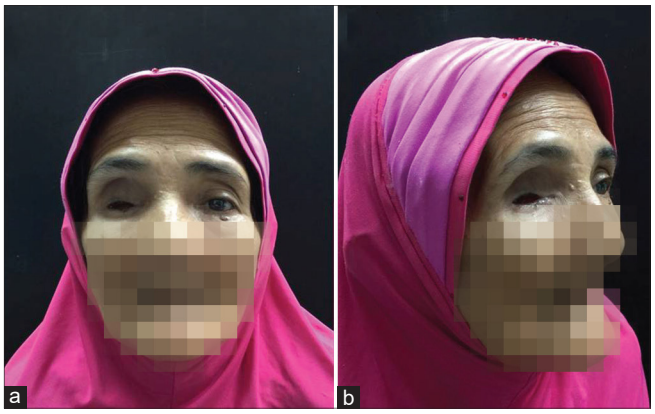

Figure 4: Acquired right eye defect due to evisceration. (a) Frontal view of face profile (b) right lateral view

Figure 6: Issue of custom-made definitive eye prosthesis. (a) Frontal view of face profile (b) right lateral view

Figure 8: Evolution of conformer in the patient. (a) Initial conformer try in (b) after relining with pin wax ptosis slightly improved (black mark) but slightly superior sulcus deepening exist (blue mark)

supporting structure exhibited good integrity. Thus, prosthetic outcome was excellent, and there was no any form of surrounding soft tissue void, which could result in asymmetry. In Case 2, the superior sulcus of the patient exhibited deepening as a result of the removal of orbital pad of fat and some portion of the muscle due to evisceration. Thus, the deformity of the superior sulcus produced a deep surface contour in the upper eyelid above the tarsus. The conformer had a role in increasing the socket volume. As a result, a slight disfigurement occurred at the superior sulcus above the upper eyelid. Thus, the outcome was slightly compromised in relation to the harmony of the periorbital soft tissue compared to the contralateral eye. In this case, according to Cowen and Antonyshyn,

Figure 9: (a) Issue of custom-made definitive eye prosthesis. (b) Frontal view of face profile (c) left lateral view (d) right lateral view

the deepening of the superior sulcus can be corrected by surgical intervention, such as grafting of dermis fat levator tendon suturing with the periosteum of the superior orbital rim.[9] Case 3 was a classic presentation of the postenucleation socket syndrome, featured by ptosis. It was characterized by an abnormally low-lying upper eyelid margin, which narrowed the palpebral opening of the eye.[10] In the current case, ptosis was attributed because of the weakness of the levator muscle, which is one of the complications of evisceration. As a result, eye-opening was limited with the prosthesis, which resulted in an average to poor prosthetic outcome. In this case, following the statement of Finsterer, if the surgical correction would have planned, then the procedure could include the resection of Müller's muscle and shortening of the levator palpebrae.[11] However, in this situation, the patient was satisfied with the esthetic outcome, and further surgical treatment was not recommended.

According to Pokpong *et al*. (2014) study, their described patient also had a mild ptosis (2 mm). Authors mentioned that the superior sulcus deepening and the ptosis could be corrected surgically, rather than by modifying the prosthesis because 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.[10]

For the surgical point of view, socket reconstruction surgery with nonmeshed intermediate split thickness skin graft/Blair-Brown graft with pre- and post-surgical conformer stent was successfully introduced in a severely contracted socket.[12] Severely contracted sockets warrant the use of skin grafts; several authors stated that though the use of skin grafts for reconstruction of severely contracted postenucleation sockets is a relatively simple procedure, a stent or prosthesis needs to be kept in the socket for several weeks (even up to 6 months) to prevent the recurrence of socket contracture.[13-15]

CONCLUSION

The type of surgery, according to etiology and the remaining structure, has a great influence on the prosthetic outcome of eye prosthesis. It is important to understand that to what extent prosthesis can restore a defect. Rehabilitation with eye prosthesis includes restoring not only the eye but also its associated structures.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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