KWAŚNIEWSKA, Oliwia, ŁOŚ, Dawid, NOWAK, Aleksandra, JANUS, Anita, KAPTUR, Agata and DZIEDZIŃSKI, Dawid. Succesful eyelid reconstruction surgery - case report. Quality in Sport. 2024;19:53754. eISSN 2450-3118.
https://dx.doi.org/10.12775/QS.2024.19.53754
https://apcz.umk.pl/QS/article/view/53754

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.
Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.
Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 22.07.2024. Revised: 06.08.2024. Accepted: 12.08.2024. Published: 17.08.2024.

SUCCESFUL EYELID RECONSTRUCTION SURGERY - CASE REPORT

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Abstract

Facial trauma often involves injuries to the eyelid and periorbital region. Management of these injuries is quite a challenge due to a proximity of multiple anatomic structures. A 45-year-old man presented to the hospital two days after severe eye injury. Physical examination revealed a holohedral laceration of lower eyelid, damage of tear ducts and amblyopia of his left eye. CT examination of eye sockets excluded fracture of the left orbit walls and presence of foreign body. Reconstruction of the left lower eyelid was performed. The inferior tear duct was not visualized. A fragment of the full-thickness eyelid covered with necrosis was excised. Patient received an antibiotic therapy, metronidazole and hydrocortisone. Local treatment of the operated eye included Floxal, Tobrex, Vigamox and humid chamber. Patient was discharged from the hospital after three days and was to come to the clinic after a week for a check-up, during which some of the sutures were removed and no complications were found. Eyelid reconstruction surgery can prevent serious complications, including lacrimation and tear flow disorders, corneal exposure, and fissure regurgitation. In this case, the procedure turned out to be successful despite the patient's significant neglect of the situation. However, it is crucial to prevent the causes of late patient reporting in emergencies and to raise public awareness of possible consequences of such behavior.

Key words: eye; eyelids; trauma; eyelid reconstruction; emergency.

Introduction

Eyelids are one of the most delicate and complex structures. They protect the globe from trauma and excessive light, maintain the integrity of tear films and move the tears toward the lacrimal drainage system. No less important is the aesthetic role in facial rejuvenation and cosmesis. Eyelid reconstruction is performed due to loss of a part or all of the eyelids. Such situations are a result of birth defects, accidents or tumor excision [1]. Trauma can cause significant tissue loss and is the most common cause of this surgery. The paramount goal is to optimize both functional and cosmetic outcomes, and these repairs can be among the most challenging reconstructive procedures [2].

The eyelid is composed of anterior and posterior lamellae. The posterior lamella, lined with conjunctiva, is supported by tarsal plates that provide structure to the eyelids. The conjunctiva is a nonkeratinized epithelial mucous membrane filled with secretory glands. The anterior lamella consists of the thin skin and orbicularis oculi muscle, responsible for eyelid closure. The canthal tendons at the medial and lateral borders of the eyelids offer support and maintain the shape of the eyelids. The tarsus has its largest vertical height centrally (10–12 mm upper eyelid and 4 mm lower eyelid) and tapers toward the canthal angles attaching to the canthal tendons [3]. The lacrimal drainage system starts in the eyelids and drains into the nasolacrimal duct. The skin of the eyelid is unique because it is the thinnest in the body. It is devoid of subcutaneous fat, so the epidermis and dermis directly overlie the orbicularis oculi muscle. The orbicularis oculi is anterior to the tarsal plates and deep to skin. Forceful closure is obtained from the orbital portion of the muscle, whereas involuntary blink originates from the pre- septal and pretarsal portions of the orbicularis oculi. Maintaining orbicularis innervation from the facial nerve is essential to ensure eyelid closure and blink [4].

Eyelid reconstruction aims to restore the anatomy and function of the eyelid with minimal surgical complications. Attention must be paid to recreate the bilamellar eyelid

structure, preserving skin and muscle function. Preoperative consultation allows the surgeon to plan for the surgical procedure, anesthesia, and inform the patient about potential surgical outcomes and risks. Lower eyelid defects are classified based on the extent of the defect and involvement of surrounding structures. Various reconstructive options, such as composite flaps, are used to repair lower eyelid defects. Surgical tension should be carefully managed to prevent eyelid retraction. Proper fixation of the medial and lateral canthal areas is crucial for maintaining eyelid position and contour. Nonmarginal eyelid defects can impact eyelid function and require thorough consideration for reconstruction. Complex defects may require a multidisciplinary approach for repair beyond the expertise of a single surgeon.

Lower eyelid defects are classified based on the extent of the full-thickness eyelid defect in relation to the eyelid margin, the level of nonmarginal eyelid involvement, the overall size of the defect, the extent of canthal and lacrimal involvement. Having knowledge of various reconstructive techniques is important for planning the surgical repair process. Many lower eyelid reconstructions involve a bilamellar advancement of both the anterior and posterior lamellae as a combined flap [5], often taken from the lateral canthus [6,7]. It is common for defects requiring reconstruction of one lamella of the eyelid to use a graft to reconstruct the other lamella, as placing a graft on another graft is typically not feasible due to lack of blood supply and the risk of necrosis in both layers [8]. Surgeons should take into account any past or future treatments that could impact the repair process, such as previous surgeries in the area or radiation therapy.

In lower eyelid repair, surgical tension should be applied horizontally on flap pedicles, usually in a superolateral direction. Vertical tension on flaps or recruitment of tissue vertically often leads to lower eyelid retraction, which can be challenging to correct later on. Proper fixation of the medial and lateral canthi is crucial for maintaining the position, contour, and horizontal dimension of the eyelid. Techniques such as direct suturing to the periosteum, periosteal flaps, or screw and drill hole fixation are frequently needed to stabilize the reconstructed eyelid and maintain the appropriate eyelid fissure and position. In cases involving the medial canthus, reconstruction of the lacrimal drainage system may be necessary, or surgical procedures like Jones tube surgery may be required [9].

Even nonmarginal eyelid defects can affect eyelid function and position, requiring careful consideration and reconstruction following general principles of facial reconstruction

[10-12]. Complex defects may surpass the expertise of a single surgeon and necessitate a multidisciplinary approach for repair.

Case description

A 45-year-old male patient was admitted to the Ophthalmic Emergency Department of the University Clinical Hospital of the Medical University of Lodz two days post a serious eyelid injury from an iron blunt tool. The patient denied chronic illnesses or allergies. Physical examination revealed a holohedral laceration of the left lower eyelid and damage of the tear ducts and amblyopia of his left eye (Figure 1). Trauma is the second leading cause of blindness, and a review is, therefore, warranted. On admission, the best corrected visual acuity was checked. The results were 1.0 for the right eye and 0.05 for the left eye. CT examination of eye sockets excluded fracture of the left orbit walls and presence of foreign body but proved a state after multiple fractures of nasal bones. Smear for aerobic bacteria and fungi was taken and local subcutaneous anesthesia was administered. Reconstruction of the lower eyelid of the left eye was performed in local anesthesia. A tetanus shot was administered.

Figure 1. The patient on admission

Case analysis

Before any surgery in the area around the eyes, it is important to gather a detailed medical history from the patient. This includes a comprehensive list of all medications, including herbal supplements. It is crucial to consider the use of blood thinners and antiplatelet medications, as they can increase the risk of bleeding during surgery. However, stopping these medications should be carefully discussed with the patient's primary care physician [13]. Additionally, the use of artificial tears should be assessed, as some patients may not consider them to be medication.

Specific aspects of the patient's medical history that should be addressed before eyelid surgery include any previous eye conditions, dry eye symptoms, past orbital surgeries, systemic diseases, neuromuscular conditions, and tendency for scar formation. Factors such as previous laser eye surgery should also be taken into consideration, as they may impact the outcome of the surgery[14]. Systemic diseases and neuromuscular conditions to be aware of include Graves disease, Sjogren syndrome, rheumatoid arthritis, Bell palsy, and myasthenia gravis. Scar formation is an important topic to address because certain patients, particularly those with darker skin pigmentation, may be predisposed to poor scar or keloid formation.

It is important to evaluate the lower eyelids thoroughly to prevent common postoperative issues such as swelling, eyelid drooping, misalignment, and dry eye syndrome. Various examination techniques, such as the snap-test and distraction test, can help assess the tone and laxity of the lower eyelids. The classic examination maneuver to assess lid laxity is the snap-test, where the examiner’s index finger is used to provide downward traction on the lower eyelid and then abruptly released. If the eyelid returns to the globe, this indicates a normal eyelid tone. Another examination maneuver to assess the lower eyelid is the distraction test where the examiner pulls the lower eyelid in an anterior vector. If the eyelid is able to be pulled 6 to 8 mm, this indicates lower lid laxity. The position of the medial and lateral canthus, the lower eyelid-cheek junction, and the presence of a negative vector eyelid should also be assessed. Patients with a negative vector lower eyelid are at higher risk for complications, such as eyelid misplacement [15].

A comprehensive examination of the area around the eyes should be conducted before any cosmetic or functional eyelid procedures. This includes measuring visual acuity, assessing pupil reactions and eye movements, and conducting a slit-lamp evaluation to rule out any eye surface irregularities. If a surgeon is not able to perform these tests, a referral to an ophthalmologist is recommended.

The surgery should address the unique anatomical boundaries in the eyelid, in particular, reconstructing the anterior and posterior lamellae as two independent components. Another consideration is to avoid lower eyelid ectropion or upper eyelid retraction. For larger eyelid defects, the surgeon must evaluate the degree of horizontal eyelid laxity before choosing the reconstructive procedure [13]. Medial and lateral canthal fixation is critical. For lower eyelid defects involving less than one-third of the eyelid margin, direct closure is the recommended method of reconstruction. Full-thickness lower eyelid defects involving one-third to one-half of the eyelid margin can be repaired by advancement of the lateral portion of the eyelid using semicircular advancement or rotation flaps, such as the Tenzel semicircular rotation flap [16].

The inferior tear duct was not visualized. A fragment of the full-thickness eyelid covered with necrosis was excised. Two 6.0 Vicryl sutures were placed on the shield and on the muscles of the lower eyelid, then ligated onto the skin 1 mm below the lash line. 6.0 Silk seams were applied to the skin and the eyelid margin. Monafox drops and Dexamytrex ointment for the operated eye were administered and a monocular dressing was applied. Patient received an antibiotic therapy, metronidazole and hydrocortisone. Local treatment of the operated eye included Floxal, Tobrex, Vigamox and humid chamber. Patient was discharged from the hospital after three days and was to come to the clinic after a week for a check-up, during which some of the sutures were removed and no complications were found. Figure 2 shows the result one day after the procedure. Figure 3 shows the result a week after surgical reconstruction of the eyelid.

Figure 2. One day after surgery

Figure 3. One week after surgery

Patient received intravenous and oral therapy. Local treatment of the operated eye included moxifloxacin eye drops and tobramycin ophthalmic ointment. During the check-up the sutures were removed and no complications were found.

Facial trauma often involves injuries to the eyelid and periorbital region. Management of these injuries is often quite a challenge due to a close proximity of multiple complex anatomic structures. Perhaps no other area of the human body provides such a delicate interplay among anatomy, aesthetics, and function. In order to protect the underlying globe and vision, the eyelids require restoration of both function and appearance following eyelid repair. Restoration of normal anatomic relationships is crucial for optimum functional and aesthetic outcome after trauma. Eyelid reconstruction surgery can prevent serious complications, including lacrimation and tear flow disorders, corneal exposure, and fissure regurgitation [17]. Although the patient denied any complications, the presented case is special due to a significant negligence of the problem by the patient. Too much time has passed since the injury and therefore the inferior tear duct was not visualized during the surgery. Nevertheless, during the inspection a week after the procedure, the patient denied epiphora. Probably the patient's tear gland gives off too few tears to cause hyperlacrimation. This hypothesis is simple to check with the Schirmer test, which was scheduled for the last follow-up visit. It did not take place due to the strong dyspnoea, which the patient reported a week after the procedure. He is currently in hospital for further diagnosis. We expect that hyperlacrimation will occur in the future and the patient will require a reconstruction of the tear ducts.

Epiphora is a common complication of lower lid blepharoplasty, particularly in the first few days postoperatively. There are three mechanisms responsible for normal tear

production: (1) the production and release of tears from the lacrimal and accessory glands, (2) blinking and distribution of tears, and (3) tear pumping into the lacrimal drainage system [18]. The three most common causes of postblepharoplasty epiphora are corneal irritation, conjunctival chemosis, and lower lid ectropion [19]. Epiphora usually resolves within the first several days postoperatively, particularly if caused by corneal irritation or chemosis. However, if it persists, further evaluation for punctal malpositioning or cannalicular damage should be initiated. Surgical approaches to correct punctal malpositioning include a horizontal tightening procedure, medial spindle procedure, or medial/ lateral canthopexy [20].

In this case, the procedure turned out to be successful despite the patient's significant neglect of the situation. However, it is extremely important to prevent the causes of late patient reporting in emergencies and to raise public awareness of possible consequences of such behavior.

Conclusions

1. Facial trauma often involves injuries to the eyelid and periorbital region. Management of these injuries is often quite challenging due to a close proximity of multiple complex anatomic structures.
2. Restoration of normal anatomical relationships is crucial for functional and aesthetic outcome after trauma.
3. Eyelid reconstruction surgery can prevent serious complications, including lacrimation and tear flow disorders, corneal exposure and lagophthalmos.
4. In this case, the procedure turned out to be successful despite the patient’s significant neglect of the eye trauma. That is why it is extremely important to prevent the causes of late patient reporting in emergencies and to raise public awareness of possible consequences of such behavior.

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Receiving funding - no specific funding.

All authors have read and agreed with the published version of the manuscript.

Financing Statement

This Research Received No External Funding

Institutional Review Board Statement

Not Applicable

Informed Consent Statement

Not Applicable

Data Availability Statement

Not Applicable

Conflict Of Interest

The authors deny any conflict of interest.

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