OPIS PRZYPADKU CASE REPORT

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Post-traumatic lagophthalmos reconstruction with concomitant ocular evisceration

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HIGHLIGHTS

Reconstruction of post-traumatic lagophthalmos combined with ocular evisceration presents significant challenges. This study details a case involving complex surgical interventions and outcomes.

ABSTRACT

Introduction: Post-traumatic lagophthalmos is a significant clinical challenge, leading to serious ocular health consequences. This article examines the diagnostic, therapeutic aspects and outcomes of this important pathology.

Material and methods: A 78-year-old patient with lagophthalmos of the left eye after a traffic accident with loss of consciousness was referred to our clinic.

Results: Post-traumatic lagophthalmos is a complex clinical challenge. Craniofacial and eyelid reconstruction, despite a complex course, failed to fully restore function and aesthetics. Due to corneal complications and ocular inflammation, a left ocular evisceration with eyelid reconstruction using ear cartilage and a skin flap was performed.

Key words: evisceration, post-traumatic lagophthalmos, corneal malaise

INTRODUCTION

When it comes to eye health, most of us tend to focus on the cornea, the retina, or even the tear film. However, there's a crucial element in maintaining healthy eyes that often gets overlooked – our eyelids. The health of our ocular surface is intrinsically connected to the well-being of these seemingly unassuming flaps of skin that guard our eyes. In this article, we will uncover the secret to ocular surface success: why you should never forget about your eyelids.

The ocular surface is a complex and delicate structure consisting of the cornea, conjunctiva, and tear film. This surface is responsible for protecting and nourishing the eye, ensuring clear vision, and preventing infections. Any disruption in this delicate ecosystem can lead to discomfort, visual disturbances, and potentially severe eye conditions.

Eyelids are not just there to make our eyes look good; they play a vital role in maintaining the health of the ocular surface by tear distribution. Blinking is a natural mechanism that spreads the tear film evenly across the cornea. This helps keeping the eye moist and nourished. Healthy eyelids ensure smooth, efficient blinking. Eyelids serve as a protective barrier, shielding the eyes from dust, debris, and harmful ultraviolet radiation (UV) rays. They also act as a first line of defence against potential eye injuries. The meibomian glands, located in the eyelids, secrete lipids that contribute to the composition of the tear film and prevent tear evaporation and maintain tear film stability.

Several eyelid-related problems can affect the ocular surface's health, for example blepharitis [1–3], Meibomian gland dysfunction (MGD) [4], eyelid tumors [5] and eyelid injuries [6–9].

Eyelid injuries can result from various causes, including:

- trauma: accidents, falls, sports injuries, or direct blows to the eye can cause damage to the eyelids, these injuries range from minor abrasions to severe lacerations
- exposure to chemicals, hot liquids, or flames can lead to burns on the eyelids, causing pain and potentially disfiguring scars [10]
- foreign bodies: particles like dust, wood splinters, or metal fragments can get lodged in the eye or under the eyelid, causing irritation, redness, and injury
- bites from animals, particularly dogs, can result in eyelid injuries, which may require medical attention to prevent infection and complications [11].

Eyelid injuries can take several forms, each requiring specific treatment:

- contusions and cruising result from blunt trauma to the eyelid, causing swelling, discoloration, and pain; rest and cold compresses are often sufficient for treatment
- superficial scratches on the eyelid may cause discomfort and redness; proper cleaning and antibiotic ointments can aid in healing
- deep cuts or lacerations on the eyelid can be serious and may involve the underlying structures, they require immediate medical attention and often surgical repair to prevent complications and maintain the eyelid's function
- eyelid burns should be treated promptly to minimize tissue damage, cooling the affected area with cold water and seeking medical attention are crucial steps.

The treatment of eyelid injuries depends on the type and severity of the injury. Lacerations often require surgical repair to ensure proper healing and maintain the eyelid's function and appearance. This may involve sutures or other techniques. Proper wound debridement and right approximation of the wound edges play a key role in maintaining proper eyelid function, aesthetic integrity of the eyelid and avoiding complications such as dry eye syndrome and consequent corneal erosions and ulcers [12, 13]. After initial treatment, regular follow-up visits are essential to monitor the healing process and address any complications.

CASE REPORT

A 78-year-old male patient was referred to our outpatient department in July 2013 with eyelid regurgitation of the left eye after a traffic accident with loss of consciousness.

According to the information sheet from the patient's stay at the maxillofacial surgery department in June 2023, the accident resulted in a multifracture fracture of the left zygomatic-maxillary-orbital region, hemifacial crushing of the face on the left side, a fracture of the coronoid process of the mandible, and a laceration wound of the face in the frontal, suborbital and cheek areas of the left side and the upper and lower eyelid of the left eye. The lower orbital rim was reconstructed and anastomosed with plates. A bone fragment from the lateral orbital rim was then positioned and anastomosed with a plate. Orbital bone fragments were anastomosed to the zygomatic bone with a plate, and two bone fragments from the zygomatic arch were anastomosed with plates. Normal anatomical conditions of the craniofacial bones were obtained. The upper and lower conjunctiva of the left eye were sutured, the eyelids of the left eye were sutured in layers. The skin defect of the upper eyelid of the left eye was covered with a free skin graft taken from the left thigh. The eyelids of the left eye were sutured to protect the cornea from drying out. During hospitalisation, general amoxicillin with clavulanic acid, metronidazole, topical tobramycin, neomycin were included. The patient remained in a pharmacological coma in the intensive care unit (ICU) for 7 days after surgery.

Ophthalmological examination was performed 4 weeks after the trauma. We described eyelid scarring after transplantation, eyelid regurgitation, lower eyelid protruding

from the nose, upper eyelid with scar immobile. Cornea with extensive keratopathy, opaque, in disintegration and dry. Visual acuity of the left eye was sense of light without localization. Visual acuity of the right eye was 1.0. Left eye conjunctival swab culture grew *Corynebacterium spp*., lab tests showed leukocytosis 14,000/µl. Topical and systemic antibiotic therapy was included. A flash VEP test was performed and showed features of optic nerve atrophy in the left eye.

The patient was qualified for left eye evisceration due to corneal malaise, pain of the left eye and eyelid plasty. The aim of the procedure was to eliminate the inflammation of the left eye and for cosmetic effect. Left eyeball evisceration with eyelid reconstruction with ear cartilage and skin flap was performed. A skin flap was taken from behind the left earlobe and single 5.0 sutures were placed. Eyelid scars were removed, the eyelids were debrided and reshaped anatomically, the upper eyelid was lengthened with a cartilage

FIGURE 1

The patient's left eye 4 weeks after the trauma.

FIGURE 2

The patient's left eye with cornea malation.

FIGURE 3

The patient's left eye one day after eyelid reconstruction.

FIGURE 4

The patient's left eye one day after eyelid reconstruction.

and skin flap, and non-absorbable 5.0 sutures were placed. During hospitalisation, general cefuroxime, topical levofloxacin, neomycin, atropine were included.

At follow-up one month after the procedure, the wound of the lower eyelid of the left eye has dehiscence, but the patient did not consent to another reconstruction procedure. The patient did not agree to further treatment and did not agree to an orbital prosthesis due to his general condition. Topical anti-inflammatory treatment was initiated, e.g. ofloxacin, dexamethasone. The patient did not attend further follow-ups.

FIGURE 5

The patient's left eye 4 weeks after eyelid reconstruction.

FIGURE 6

The patient's left eye 4 weeks after eyelid reconstruction.

DISCUSSION

Patients in ICU after eyelid trauma are at risk of eye disorders such as dry eye syndrome, exposure keratopathy (EK) and corneal ulcer due to impaired blinking and incomplete eye closure. EK is a clinical syndrome characterized by the inadequate closure of eyelids and an impaired tear film, which can result in corneal damage. During clinical examinations, EK is identifiable by small, irregular abrasions typically found on the lower half of the cornea. A comprehensive review study revealed that EK affects a wide range of ICU patients, with prevalence rates ranging from 3.6% to 60%. Notably, the highest occurrence of EK is observed between the second and seventh days of an ICU stay. EK is a complex condition influenced by multiple factors. Primary contributors include diminished tear production, compromised corneal reflexes, impaired blinking, and incomplete eyelid closure. Additional risk factors associated with EK encompass reduced levels of consciousness, the use of endotracheal intubation, extended durations of ICU care, and disturbances in electrolyte balance [14].

In the study by McHugh et al., it was found that exposure keratopathy was notably more prevalent among patients with lagophthalmos, with a prevalence of 70%, compared to those whose eyelids were fully closed, where the prevalence was 28.9%. These findings align with similar observations made in other research studies [15].

Notably, incomplete eyelid closure, a significant risk factor for EK, is a prevalent issue affecting approximately 75% of patients who are administered hypnotic medications [16–19].

The absence or inadequate occurrence of blinking can similarly result in EK and subsequent damage to the cornea. Furthermore, EK carries the risk of causing serious complications, including microbial keratitis, acute corneal perforation, endophthalmitis, and persistent visual deficits [20]. Conditions like EK not only elevate healthcare expenses but also diminish a person's overall Quality of Life (QoL) [21]. EK remains a significant concern within ICU. This is primarily due to the fact that healthcare professionals in ICUs primarily prioritize the stabilization of hemodynamics and the support of essential organ function, often overlooking the importance of eye care. Consequently, EK continues to be a prevalent issue among patients who are unconscious or lack awareness of their eye health [16, 22]. A research conducted in a hospital's eye care unit in Pakistan involving 70 patients discovered that, initially, 57% of them exhibited EK. Specifically, a higher incidence of EK was observed among participants with lagophthalmos [23]. In present case there was a correlation between lagophthalmos and corneal complications. This finding aligns with prior research findings, as exemplified by McHugh et al. study, where 70% of individuals with lagophthalmos were found to have EK [15]. Additionally, Kocaçal Güler et al. reported a substantial association between lagophthalmos and EK [21].

In this case report we present the patient who developed serious complications of post-traumatic eyelid regurgitation. Our discovery of a notable connection between the position of the eyelid and the likelihood of exposure keratopathy aligns with the initial findings presented by Mercieca et al. [24]. Their research underscored that eyelid position played the most pivotal role in influencing the occurrence of exposure keratopathy. Furthermore, additional studies have provided supporting evidence by establishing a clear association between lagophthalmos and the development of exposure keratopathy [16, 25, 26].

Firstly, suture an eyelid wound properly in order to protect the surface of the eye and preserve the eyelids' primary function as the protective apparatus of the eye.

Following the stabilization of the patient's condition, it is advisable to promptly address soft tissue wounds. While most facial soft tissue wounds are not immediately life-threatening, repairing them urgently can lead to better aesthetic outcomes in the postoperative phase.

In cases where immediate repair is not feasible, applying antibiotic ointment and covering the wound with sterile non-stick dressings is recommended as an interim measure [27, 28].

To prevent the development of corneal ulcers and exposure keratopathy, patients with eyelid defects exposing the cornea should have a moisture chamber applied. This can be achieved by applying lubricating ophthalmic ointment over the cornea and securely sealing the periocular area with an occlusive dressing [29].

In cases of lacerations where there is no tissue loss, the process of reconstructing the eyelid is more complex than simply bringing the adjacent tissues together. Precise alignment of the gray line and tarsal plate is essential to prevent any notching of the eyelid and to achieve a seamless contour along the eyelid margin. Both the upper and lower eyelids are divided into 2 layers – anterior and posterior lamellae – and these 2 layers need to be reconstructed separately.

When dealing with extensive soft tissue defects, it's highly likely that a follow-up procedure will be required. Therefore, it's advisable not to utilize any flaps during the initial closure that could potentially complicate future reconstruction efforts. In cases where there is missing eyelid tissue, the critical factor to consider when selecting a reconstruction method is the degree of tissue laxity. In older patients, the eyelid may still have sufficient laxity for primary closure, even in the absence of some tissue.

Additionally, a lateral canthotomy and cantholysis procedure might create enough laxity to permit primary closure. When there is a substantial loss of tissue, a semicircular flap from the lateral canthal area can sometimes be used to shift tissue inward for reconstruction. In cases where there is complete loss of either the upper or lower eyelid, a more advanced technique like a lid-sharing procedure, such as a tarsoconjunctival pedicled flap, may be necessary [30, 31].

Secondly, various protective measures for the ocular surface are essential in ICU, ranging from basic cleansing, manual closure of eyelids, and eyelid taping to suturing the eyelids [32]. Additionally, the use of polyethylene covers and eye lubricants has proven effective in lowering the occurrence of corneal damage among patients in intensive care settings, as demonstrated in studies by Dawson [33], Ezra et al. [34], Koroloff et al. [35], So et al. [36], and Cortese et al. [37]. It's important to note that maintaining adequate eye moisture is a fundamental principle in this context [30]. Nevertheless, it's crucial to acknowledge that no single method is entirely foolproof, and the effectiveness of various protective strategies may vary.

We propose the implementation of routine screening assessments carried out by ICU medical professionals or nurses, utilizing fluorescein and a pen torch equipped with a blue filter to detect patients exhibiting signs of EK. Patients diagnosed with EK can then receive treatment from the ICU staff or, as per locally established protocols, be referred for further evaluation by ophthalmologists. This proactive approach not only aids in the early identification and management of EK cases but also facilitates the prompt recognition of potential bacterial keratitis cases, enabling swift assessment and treatment by ophthalmologists. While patients are admitted to the ICU in critical conditions, the decision is typically made with the expectation that they have a substantial chance of survival and a reasonable quality of life upon discharge. However, for some patients, the development of bacterial keratitis in one or both eyes during their ICU stay could result in the most significant consequence of their illness – either vision loss, the need for corneal graft surgery or in severe cases leads to evisceration. We propose that in many such instances, the occurrence of ocular morbidity could be averted or reduced through the implementation of regular screening conducted by ICU personnel. This proactive approach facilitates the timely recognition and treatment of eye-related issues, mitigating potential complications [15].

Lagophthalmos significantly contributes to the occurrence of complications caused by medical interventions. Strategies that effectively close or shield the eye to preserve corneal moisture seem to be effective in reducing the likelihood of complications. Numerous techniques for eyelid closure have been suggested, including natural eyelid closure, the use of hypoallergenic tape, eye patches, saline-soaked gauzes, as well as temporary tarsorrhaphy [38–41].

Patients who are critically ill face a heightened risk of developing microbial keratitis due to exposure keratopathy and compromised immune function [42]. Positive pressure ven-

tilation, a common practice in intensive care, can lead to fluid accumulation and swelling of the conjunctiva, making it more susceptible to bacterial contamination [39]. Additionally, ICU environments are often teeming with various pathogens, and the extensive use of antibiotics has contributed to the emergence of antimicrobial resistance [32, 43, 44]. *Pseudomonas aeruginosa* is the most frequently encountered infectious agent in these cases. This particular bacterium is highly aggressive and tends to cause rapid and severe infections. The combination of exposure keratopathy and the proximity of these pathogenic organisms to the compromised cornea has been identified as predisposing factors for corneal infections [44–47].

CONCLUSION

Healthy eyes require more than just good vision. The secret to ocular surface success lies in caring for your eyelids. They play a crucial role in maintaining the health of the cornea, conjunctiva, and tear film. By practicing good eyelid hygiene and seeking professional help when needed, ocular surface remains in top shape, keeping eyes comfortable.

Eyelid injuries, regardless of their cause or type, should never be taken lightly. The eyes are incredibly sensitive, and any injury to the eyelids can have lasting consequences on both vision and appearance. Seeking prompt medical attention and following the recommended treatment plan are essential steps in ensuring the best possible outcome for eyelid injuries. Don't forget about your eyelids – they're the unsung heroes of eye health.

Figures: from authors' own materials.

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