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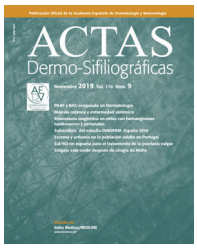

PRACTICAL DERMATOLOGY

[Translated article] Safety in Dermatologic Procedures: Ophthalmologic Complications

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Abstract Ophthalmological complications are uncommon in dermatologic surgery. Nonetheless, all surgeons should know the basics of recognizing, preventing, and treating the 4 complications addressed in this article from the series 'Safety in Dermatologic Procedures'. The first complication that surgeons should be familiar with is eye damage due to chemical irritants. This is a common complication in operating rooms given the presence of irritant substances and the performance of procedures in the eyebrow and eyelid region. The second complication is laser-induced eye damage. In this case, eye protection with safety glasses or eye caps is crucial. The third complication is accidental eyeball perforation, which can occur during certain surgical procedures. The fourth and final complication is retinal artery vasospasm or embolism due to drugs or filler materials. This complication is rare but important to recognize, as early treatment can prevent permanent blindness.
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Seguridad en procedimientos dermatológicos: complicaciones oftalmológicas

Resumen Las complicaciones oftalmológicas en las cirugías dermatológicas son poco frecuentes. A pesar de ello, todo cirujano debe tener un conocimiento básico del reconocimiento, la prevención y el tratamiento de las cuatro complicaciones que se abordan en este artículo incluido en la serie «Seguridad en procedimientos dermatológicos». La primera complicación a tratar es el daño ocular por irritantes químicos, una situación habitual dadas las sustancias

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irritantes empleadas en quirófano y las localizaciones anatómicas donde se puede producir la intervención (región ciliar, región palpebral...). En segundo lugar, se aborda el daño ocular por láser, una complicación donde la prevención (utilización de gafas o lentillas protectoras) a lo largo de toda la intervención es esencial. Otra complicación a tener en cuenta debido a la proximidad de algunas intervenciones quirúrgicas al globo ocular es la punción traumática accidental. En cuarto y último lugar, se abordará el vasoespasmo o embolismo arterial retiniano por fármacos o materiales de relleno. Dicha complicación es infrecuente, pero es recomendable saber reconocerla para realizar un tratamiento precoz evitando una situación de ceguera permanente.
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Introduction

Ophthalmologic complications in dermatologic surgical procedures are rare. Nevertheless, every dermatologist must be able to recognize and perform basic management of the most frequent complications, in our experience, in dermatologic procedures: eye damage caused by chemical irritants, eye damage caused by lasers, eyeball perforation, and retinal-artery vasospasm or embolism.

Eye damage due to irritants

Damage caused by chemical irritants in the operating room is one of the most common ophthalmologic accidents. The severity of the lesions depends on the product that causes the damage (and the amount of product). For example, alkaline agents cause the greatest eye irritation.[1] Potentially irritant products frequently used in dermatologic procedures include chlorhexidine digluconate, hydrogen peroxide, and isopropyl alcohol.[2–6] Eye damage due to chemical agents can be classified (Roper-Hall classification) 1 into 4 grades:

- Grade I: Corneal epithelial involvement. Lesions with good prognosis.
- Grade II: Mild corneal damage. Focal limbal ischemia.
- Grade III: Deep corneal damage. Total loss of corneal epithelium. Major limbal ischemia.
- Grade IV: Cornea is opaque. Total limbal ischemia. Poor prognosis of lesions.

Table 1 shows the preventive measures and treatment of eye damage due to chemical irritants.

Table 1 Prevention and management of patients with eye irritation due to chemic agents.[1,2,7]

Prevention	Treatment
On skin, use 5–10% povidone-iodine as a disinfectant. Do not use chlorhexidine. On the eye surface, use 5% povidone–iodine diluted to 50% with saline solution.	Remove contact lenses and wash with saline solution for 10–30 min (1–2 L). Cotton buds may be used to clean the culs-de-sac. Maintain a pH of 7–7.2 (use pH paper).
Always remove contact lenses.	Keep the eye open manually. The patient must move the eye in all directions.
Long surgeries: occlusion/protective ophthalmic ointment.	Verify the irritant substance.
Peelings: consider protective ophthalmic ointment.	Refer to ophthalmology for assessment and treatment: Artificial tears. Ophthalmic antibiotic in combination with topical corticosteroids (tobramycin ointment and dexamethasone ointment 4 times a day for 7 days). A cycloplegic agent (cyclopentolate every 8 h for 2–3 days) may improve patient comfort.
Eyelid surgery: consider protective eye cap.	

Laser-induced eye damage

One of the complications to take into consideration when performing treatments with lasers is eye damage. The risk of damage to the retina is greater when using a laser with a wavelength of between 400 and 1400 nm (visible spectrum). Lasers with a wavelength of between 200 and 400 nm (infrared radiation) or between 1400 and 10,600 nm (ultraviolet radiation), on the other hand, produce limited damage to the cornea and/or lens. Other factors that lead to more severe damage are pupil dilation, foveal involvement, greater fluence together with short pulses of the laser, and retinal pigmentation of the patient.[8]

When damage occurs, symptoms will depend on the type of laser used. The most common symptoms are sudden loss of sight, photophobia (sometimes permanent), pain (more frequent with Erbium-YAG laser or CO_2 laser), oval pupil, conjunctival synechiae, difficulty perceiving certain colors (due to retinal damage), and floaters (frequent in pulsed dye laser treatment).[8]

Prevention by using appropriate glasses or eye caps during the procedure is essential to prevent eye damage. It is important to always protect the iris completely and, if contact lenses are used, an anesthetic eye drops (tetracaine and oxybuprocaine) should be used together with an ophthalmic ointment to aid re-epithelization. During the procedure, care must be taken to ensure that the glasses or lenses are correctly place at all times.[8]

With regard to treatment, urgent assessment by an ophthalmologist is essential. This will depend on the type of lesion, which will depend on the laser used.

Eye puncture

Occasionally, dermatologic surgery must be performed in the region of the eyelid or the periocular region, where the risk of causing an accidental traumatic eye puncture is greater. Depending on the depth of the trauma, the lesions can be classified as superficial or deep.[12]

- Superficial:
  - Superficial conjunctival involvement: subconjunctival bleeding and pain.
  - Superficial corneal involvement (without leaking aqueous humor): intense pain and conjunctival hyperemia.
  - Scleral laceration: subconjunctival bleeding accompanied by intense pain. No loss of vision. Pain on eye movement.
- Deep:
  - Corneal involvement with perforation: very intense pain. Loss of vision and eye tone. Irregular pupils. Visible leakage of vitreous humor. Visible hyphema (accumulation of blood in the anterior chamber of the eye).
  - Scleral perforation: intense pain with loss of vision and loss of eye tone. Irregular pupils together with leakage of the vitreous humor. Hyphema.

The use of surface protection by means of a metal eye cap or chalazion forceps is highly recommended when performing surgery in areas close to the eye. With regard to treatment, assessment by an ophthalmologist is always required. Surface punctures must be treated by means of occlusion, antibiotic ointment (tobramycin ointment 4 times daily for 7 days), and cycloplegic drugs (cyclopentolate every 8 h for 2–3 days). Deep punctures require ophthalmic surgical repair. After the intervention, systemic antibiotherapy is recommended (500 mg oral levofloxacin daily for 7–10 days in cases with a low risk of endophthalmitis, or 1 g intravenous vancomycin every 12 h, in conjunction with 1 g intravenous ceftazidime every 12 h in situations with a high risk of endophthalmitis), antiemetics, and avoidance of Valsalva maneuvers.[13,14]

Retinal-artery vasospasm/embolism

Vasospasm or embolism of the central retinal artery (or of its peripheral branches) in dermatologic procedures may occur after accidental intravascular injection of delayed-release triamcinolone acetonide or filler materials (hyaluronic acid, autologous fat, or calcium hydroxylapatite). Clinical manifestation is complete painless loss of vision (in the case of involvement of the central retinal artery) or incomplete painless loss of vision (if the damage is to a peripheral artery involving a sector of the visual field).[9,15]

Evolution of loss of vision depends on the time to appropriate treatment. If more than 90 min have passed without treatment, the probability of developing a permanent loss of visual acuity increases.[9] Table 2 shows management of a patient with retinal-artery vasospasm/embolism.

Table 2 Management of patients with retinal-artery vasospasm/embolism.[9–11]

Treatment of retinal-artery vasospasm/embolism
This is an emergency with a reversibility window of 90 min.
Urgent assessment by an ophthalmologist is therefore necessary.
The patient may be asked to massage the eye with the fingers continuously for 5 min (the patient can do this using 2 fingers).
Place the patient in the supine decubitus position, as this may improve perfusion.
Ophthalmologist
To reduce intraocular pressure:
- Timolol eye drops, 0.5% twice daily and/or 500 mg acetazolamide and/or 20% mannitol intravenously (100 mL 30 min).
- Paracentesis of the anterior chamber.
Oral antiplatelet agents such as 100 mg acetylsalicylic acid per day with the aim of reducing the possibility of thrombosis due to blood stasis in the embolized vessel.
Application of retrobulbar hyaluronidase (in the event of occlusion due to hyaluronic acid).

Table 3 Basic first-aid kit for ophthalmologic complications in the operating room.

First-aid kit for ophthalmologic complications
Artificial tears.
Ophthalmic ointment
Antibiotic ointment (gentamicin/tobramycin)
Antibiotic eye drops (gentamicin/tobramycin)
Double anesthetic eye drops (tetracaine and oxybuprocaine)
Cotton buds
Timolol eye drops, 0.5%
Oral acetylsalicylic acid, 100 mg
Oral levofloxacin, 500 mg
Hyaluronidase, 3 vials (1500 UI)
Other: metoclopramide, pH paper

Conclusion

Although ophthalmologic complications in dermatologic procedures are rare, it is important to take the appropriate preventive measures to avoid them. The use of protective lenses in periocular cutaneous surgery or laser surgery and the use of minimally irritant antiseptic products reduce the risk of these complications. If these complications do occur, an ophthalmic first-aid kit should be kept at hand in the operating room (Table 3).

Conflicts of interest

The authors declare that they have no conflicts of interest.

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