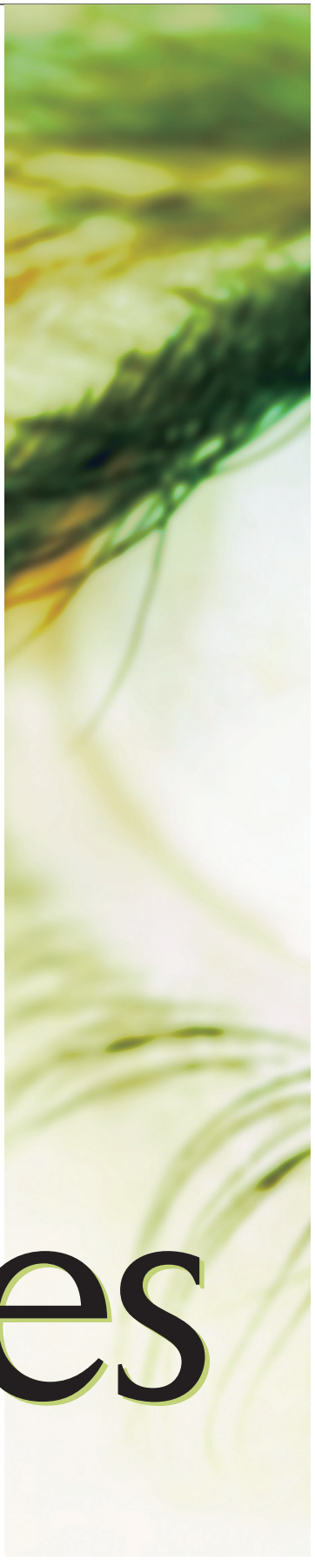
CE

1.9
ANCC CONTACT HOURS



The eyes

By David A. Schlessinger, MD and Elizabeth Ulitsch, RN

Oculoplastic surgery, a subspecialty within ophthalmology, studies the complex anatomy of the eyelids, orbits, lacrimal system, and face. The field has expanded to treat many cosmetic and reconstructive procedures on the entire face, and many within the field have changed the term to "oculofacial and orbital surgery." The modern oculoplastic surgeon can treat diseases of the eyelids, face, orbits, and lacrimal drainage system, and primary care providers should be familiar with this anatomy to properly refer patients to specialists.

As the patient population ages, oculoplastic procedures have become more common. Most oculoplastic surgery is performed on an outpatient basis, either in ambulatory surgical centers or in the outpatient surgical department of the hospital. Perioperative nurses should be knowledgeable about the diseases and causes that require oculoplastic surgical intervention.

Anatomy of the eyelid

The eyelids are covered by the thinnest skin on the body. Unlike skin on other parts of the body, there's no fat below the skin. Immediately under the skin is the orbicularis oculi muscle. This muscle is responsible for closing the eyelid. The orbicularis muscle is innervated by the facial nerve (cranial nerve VII). In Bell's palsy, cranial nerve VII is paralyzed and patients are unable to close their eyes.[1]

Both the upper and lower eyelids have a middle layer called the tarsus or tarsal plate. This is a thick structure that gives stability to the eyelid. The

have it

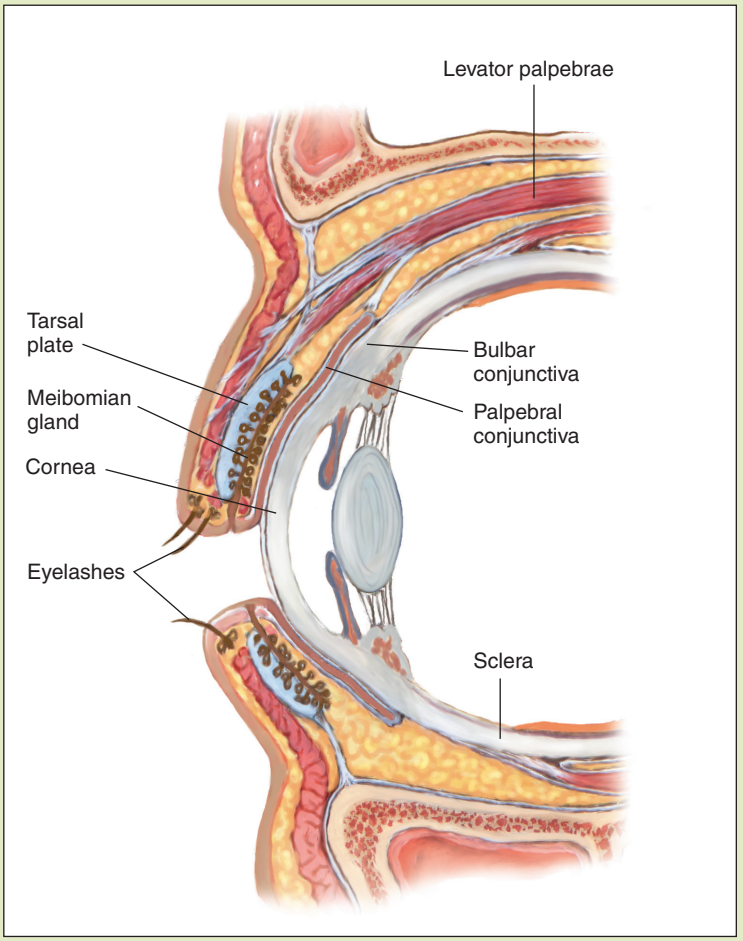
tarsus is filled with a row of oil secreting glands called meibomian glands. The oily secretions are an essential part of the tear film.

The orbital septum attaches to the top of the tarsus and separates the superficial eyelid structures from the actual orbit. Immediately behind the orbital septum is a fat pad that lies anterior to the lifting eyelid muscles. The levator palpebrae superioris is the main lifting muscle of the upper eyelid. The tendon of this muscle attaches to the top of the tarsus where it fuses with the orbital septum. Immediately posterior to the levator muscle is Mueller's muscle. This smooth muscle lifts the eyelid approximately 2 mm. The lower eyelid has an analogous structure called the lower eyelid retractor that moves the lower eyelid down when the eyeball rotates downward. The palpebral conjunctiva is a mucus membrane that lines the most posterior portion of the upper and lower eyelids. The conjunctiva contains glands that produce tears to lubricate the eye (see *Sagittal section of anterior eye with lids closed*).

Both the upper and lower eyelids are supported by strong attachments to the bony orbital rim. The lateral canthal tendon supports the eyelids by inserting inside the lateral orbital rim while the medial canthal tendon insert on the medial orbital rim.

Tear drainage begins in the eyelid. Each eyelid has a small opening in the medial aspect called the lacrimal punctum. This opens into the lacrimal canaliculus, which brings tears into the lacrimal sac (located in the lacrimal fossa of the medial orbit). The tears then are drained through the nasolacrimal duct, which releases tears into the nose just below the inferior turbinate (see *Lacrimal drainage system*).

Sagittal section of anterior eye with lids closed



Source: Bickley LS, Szilagyi P. *Bates' Guide to Physical Examination and History Taking.* 10th ed. Philadelphia: Lippincott Williams & Wilkins; 2009:206.

Is surgery necessary?

There are a number of different diagnoses that may require surgery, all resulting from a wide range of causes. Causes for oculoplastic surgery can include trauma, age-related conditions, congenital defects, autoimmune disorders, or cosmetic reasons.

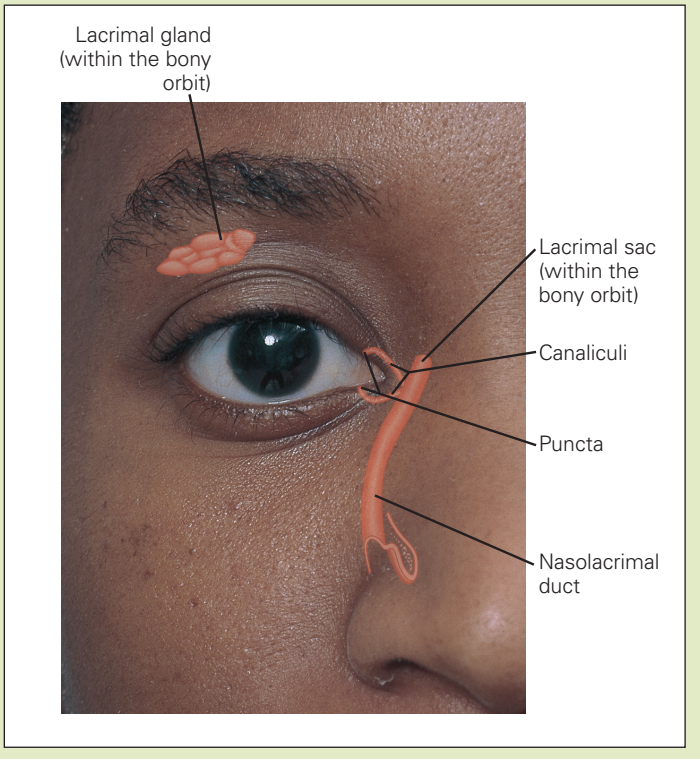
Eyelid ptosis. Blepharoptosis is a condition in which the upper eyelid doesn't completely open. Although there are many reasons for ptosis, the detachment of the levator muscle from the tarsus is the most common. This may be caused by age-related changes, trauma, or extended use of contact lens. When the levator muscle detaches, the muscle usually functions properly and repair involves reattaching the tendon.[2-4]

Congenital ptosis is caused by dysgenesis of the levator muscle. The levator muscle is usually in its proper position; however, the muscle doesn't move properly. If the eyelid droops enough to block vision, amblyopia (vision loss that occurs when there's poor transmission of vision from the eye to the brain) may develop. If amblyopia remains untreated, permanent vision loss may occur. Cases of pediatric ptosis may require surgical repair at a young age to prevent this from occurring.

Ptosis may be neurogenic in origin. The oculomotor nerve (cranial nerve III) is responsible for controlling the levator muscle. Cranial nerve III palsy may be caused by stroke, trauma, tumors, and cerebral aneurysms. If a patient presents with ptosis and double vision, neuron imaging may be necessary. Horner's syndrome is a defect in the sympathetic nervous innervation of the eyelid and eye. It has a classic presentation of a small degree of eyelid ptosis, a small pupil (miosis), and lack of sweating in the area surrounding the affected eyelid. It is critical that these patients have a neurological workup as Horner's syndrome may be caused by pulmonary tumors, carotid artery dissection, or possibly neuroblastoma (in children).[5]

Most cases of adult ptosis can be repaired with minimal sedation or under local anesthesia in an outpatient setting. The levator muscle is reinserted onto the tarsus. The patient may be asked to sit up to ensure the correct height and contour of the eyelid. Most patients return to normal activities within days of surgery. In cases of congenital or neurogenic ptosis, however, the levator muscle doesn't function properly. These patients may require surgery that bypasses the levator muscle entirely. In the frontalis sling operation, a material is sutured into the eyelid and attached to the lifting muscle of the eyebrow. The patient is then able to open the eyelid by raising the eyebrow. Different materials may be used, such as autogenous fascia lata, silicone rods, or teflon sheets (polytetrafluoroethylene).

Lacrimal drainage system



Source: Bickley LS, Szilagyi P. *Bates' Guide to Physical Examination and History Taking.* 10th ed. Philadelphia: Lippincott Williams & Wilkins; 2009:206.

Blepharoplasty. Blepharoplasty is the surgical removal of the eyelid skin and may involve the removal of orbital fat and orbicularis muscle, essentially "debulking" the eyelid. As the face ages, excess skin may develop in the eyelids. The orbital septum becomes lax and orbital fat moves forward into the eyelid, resulting in an aged appearance for the patient. In severe cases, the skin may hang into the visual axis and cause vision loss, and upper eyelid blepharoplasty may be indicated to improve vision. This may or may not be done at the same time as a blepharoptosis repair, depending on whether or not the drooping is due to a weakened levator muscle in addition to excess skin and fat. Lower eyelid blepharoplasties are almost always performed for cosmetic reasons.

Lower eyelid malpositions. The lower eyelid is extremely important to the proper functioning of the eye, creating a platform for the tear film to rest. Proper lower eyelid position is necessary to allow the lacrimal drainage system to rid the eye of excess

tears. Lower eyelid malpositions lead to dry eye, corneal surface disease, recurrent infections, and chronic tearing.

Ectropion is an outward turning of the eyelid margin. The most common cause is an age-related laxity of the canthal tendons. Other causes include congenital issues, paralysis (cranial nerve VII dysfunction), and scar tissue from surgery, burn, or trauma. Mechanical ectropion can be caused by tumors or edema that weigh down the eyelids.

Most oculoplastic procedures are performed on an outpatient basis either under local anesthesia or with I.V. sedation/analgesia.

Entropion is an inward turning of the eyelid margin. Entropion may be congenital, caused by scarring of the conjunctival surface, or age-related from lower eyelid laxity. The condition is very irritating as the eyelashes rub against the conjunctiva and cornea.

Surgical repair of age-related ectropion usually involves a tightening of the lateral canthal tendon. In cases of cicatricial ectropion, skin grafts may be necessary to lengthen the outer layer of the eyelid. Entropion repair can be similar to ectropion repair with a repair of the lax lateral canthal tendon. Sometimes the retractors of the lower eyelid need to be repaired and in cicatricial cases, conjunctival grafting may be necessary. Surgery is usually performed in an outpatient setting with minimal sedation or local anesthesia. Most patients return to a normal routine within days of the surgery.

Orbital trauma or tumor. The orbit contains the facial bones that comprise the eye socket. This bony socket holds the structures necessary for the eye to function properly. The extraocular muscles, eyelid muscles, optic nerve, motor nerves, and sensory nerves of the eyeball, eyelid, and lacrimal system are all housed within the orbit, which has a volume of 30 mL.[2]

Most orbital surgery is performed after the patient experiences some sort of trauma. Since orbital fracture may be repaired weeks after the injury, the patient is usually stabilized medically before surgery. Orbital fractures may be isolated or part of more complex facial fractures. Orbital floor fractures, or "blow-out fractures," are a defect in the bones that separates the orbit from the maxillary sinus below. Mild orbital floor fractures may be managed without surgery. Larger fractures need to be repaired if the floor is damaged enough to cause double vision or enophthalmos (a recession of the eyeball). Surgery involves repositioning the orbital structures from the maxillary sinus and placing an implant to correct the defect in the orbital floor. This is typically done on an outpatient basis with rapid recovery.

Zygomatic-maxillary fractures, or tripod fractures, may be associated with complex orbital floor or other facial fractures. These need repair if the side of the face is "sinking in" or if jaw articulation problems occur. Medial wall fractures are often associated with nasal fractures and need repair if the medial rectus muscle is entrapped or if the medial canthal tendon is avulsed. Orbital apex fractures can occur with more severe facial fractures. These are very serious and may involve damage to the optic nerve. These are usually repaired in conjunction with a neurosurgeon as the cavernous sinus and intracranial space may be involved. Zygomatic-maxillary fracture repair is acceptable for outpatient surgeries. If other trauma exists, the patient is stabilized prior to repair.

Orbital tumors are an uncommon occurrence, can affect any age group, and are usually benign. Symptoms of orbital tumors include proptosis, double vision, and vision changes. Modern neuro-imaging techniques allow early diagnosis. Most tumors can be removed through a transconjunctival (an incision from the inside of the eyelid) or transcutaneous approach. Larger and deeper tumors may require the removal of orbital bone, and in rare cases may need to be addressed through a transcranial approach by a neurosurgeon.

Thyroid eye disease. Graves' disease, an autoimmune disease that causes inflammation of the thyroid gland, is associated frequently with inflammation of the extraocular muscles and orbital fat. The effects on the eye may be temporary and reversible; however, some patients experience severe and permanent orbital inflammation. This can cause proptosis (a forward displacement of the eye) also referred to as exophthalmos. The upper and lower eyelids may become retracted

causing exposure of the cornea and conjunctiva (see *Graves' disease*).

Mild cases can cause tearing, corneal dryness, and irritation. More severe cases of chronic exposure of the surface of the eye can lead to permanent corneal scarring. The extraocular muscles may become thickened resulting in double vision. The orbital inflammation may compress the optic nerve leading to vision loss and possibly blindness.[5]

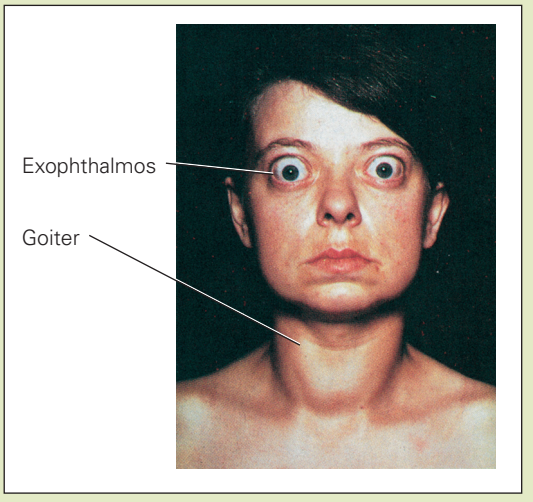
Treatment of thyroid eye disease depends on the severity of the disease. Many patients do well with simple measures, such as frequent use of lubricants and topical anti-inflammatory drops. If the eyelid is retracted without significant proptosis, eyelid-lengthening procedures may be performed. In cases of severe proptosis, treatment options are controversial. Radiation therapy has been shown to be effective in some studies and not in others.[2,5] Surgical orbital decompression may be performed when proptosis is severe and could cause loss of vision. A fatty decompression removes orbital fat without removing bone. More severe cases of proptosis require the removal of the bony walls of the orbit—this operation is associated with significant morbidity. Complications include double vision, facial numbness, and eyelid malpositions.[4] It's not uncommon for patients with bony orbital decompression to require multiple operations to treat double vision and eyelid retraction.

Lacrimal drainage surgery. The evaluation of an abnormal tearing patient requires a comprehensive exam of the eyelids, eye surface, and lacrimal drainage system. If the lacrimal punctum isn't in proper position, tearing may result (this is why ectropion and entropion can cause tearing). A stenotic lacrimal punctum may be dilated or opened with a simple "snip procedure," allowing the tears to drain properly.

Tearing in infants is frequently caused by an imperforate membrane within the nasolacrimal duct. Although most cases resolve spontaneously, the nasolacrimal duct may be opened by the use of a thin wire probe if the tearing persists.

In cases of severe nasolacrimal duct obstruction, a dacryocystorhinostomy may be indicated. This is a surgical procedure in which the obstruction is bypassed by creating a fistula between the lacrimal sac and nasal cavity below the middle turbinate. Traditionally this operation has been performed as an open procedure with an incision along the medial aspect of the nose. Newer endoscopic techniques allow this procedure to be performed without a skin incision. A small stent is placed to keep the fistula open and is removed in the office without anesthesia.

Graves' disease



Source: Rubin R, Strayer D (Eds.). *Rubin's Pathology: Clinicopathologic Foundations of Medicine.* 5th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2008:945.

Cosmetic eyelid and facial surgery. Oculoplastic surgeons have been on the forefront of cosmetic facial surgery. Most surgeons perform cosmetic blepharoplasty, as well as browlifts and facial rhytidectomy surgery.

The nurse's role

Most oculoplastic procedures are performed on an outpatient basis either under local anesthesia or with I.V. sedation/analgesia. Procedures may last from 20 minutes to several hours.

During the preoperative assessment, it's important to review the patient's medical history. All current prescription and over-the-counter medications—including vitamins, dietary and herbal supplements—need to be identified as these could interfere with the patient's surgical course. As the eyelids and upper face are extremely vascular, patients should consult their primary care provider preoperatively for instructions to discontinue medications that interfere with coagulation.

The OR setup is similar to any facial plastic surgery, and adequate light and monopolar cautery are essential. A time-out is taken and the patient and the correct operative site are identified. Patients should be positioned comfortably; the surgeon should have maximum access to the surgical site.

Immediate postoperative care includes monitoring vital signs, assesing the patient for any signs of bleeding, and assessing the patient's level of pain. The PACU nurse will provide adequate pain management, treat nausea and vomiting, and apply iced compresses to the surgical site. A small amount of bloody discharge is normal after surgery.

Patients must be educated as to what to expect during the postoperative recovery. Discharge instructions should be given to the patient, family, or caregiver about pain medication, treatments, activity level, diet, follow-up appointments, and other special instructions such as signs and symptoms to watch for and when to call for any problems.

Most oculoplastic procedures will cause bruising and swelling, and patients need to understand that this is normal. Swelling and bruising can be minimized by placing iced compresses on the surgical site every 20 minutes for the first 48 hours. An antibiotic ointment may be applied to the suture lines twice per day. Patients should sleep with the head slightly elevated to reduce swelling and should be advised to avoid heavy lifting or strenuous activity for at least 10 days. A patient undergoing a procedure that involves the eyelids might feel tightness upon waking from surgery. Dry eye is a common adverse effect in the early postoperative course. Artificial tears may help prevent patient discomfort. Severe pain is unusual; however, pain medications can be prescribed for patient comfort.

Complications from oculoplastic surgery are rare but may occur. Infections and hemorrhage are the most serious. Occasionally, eyelid malpositions and scarring may occur.[4] Most complications can be treated medically or with surgical revision. A compliant patient is less likely to have complications and it's important for the patient to understand aftercare. **OR**

REFERENCES

1. Zide BW, Jelks GW, eds. *Surgical Anatomy Around the Orbit.* Philadelphia: Lippincott Williams & Wilkins; 2005.

2. Liesegang TJ, Skuta GL, Cantor LB eds. American Academy of Ophthalmology Basic and Clinical Science Course. Orbit, Eyelids and Lacrimal System. San Francisco: American Academy of Ophthalmology; 2007.

3. Fagien S. *Putterman's Cosmetic Oculoplastic Surgery.* Philadelphia: Saunders; 2007.

4. Nerad JA. *Oculoplastic Surgery: the Requisites in Ophthalmology.* St. Louis: Mosby Inc. 2001.

5. Miller NR, Newman NJ, Biousse V, et al. eds. *Walsh & Hoyt's Clinical Neuro-ophthalmology.* Philadelphia: Lippincott Williams and Wilkins; 2004.

Dr. David A. Schlessinger is the medical director at Schlessinger Eye & Face, Woodbury, N.Y. Elizabeth Ulitsch is a nurse at Schlessinger Eye & Face, Woodbury, N.Y.

The authors have disclosed that they have no financial relationship pertaining to this article.