



Eyelids and lacrimation

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The eyelids

- The Eyelids (palpebrae) are two thin, movable folds, placed in front of the eye, protecting it from injury by their closure. The upper eyelid is the **larger**, and the more movable of the two, and is furnished with an elevator muscle, the **Levator palpebrae superioris**.

- **Structure of the Eyelids.**—The eyelids are composed of the following structures taken in their order from without inward:

The integument is extremely thin, and continuous at the margins of the eyelids with the conjunctiva.

The subcutaneous areolar tissue is very lax and delicate, and seldom contains any fat.

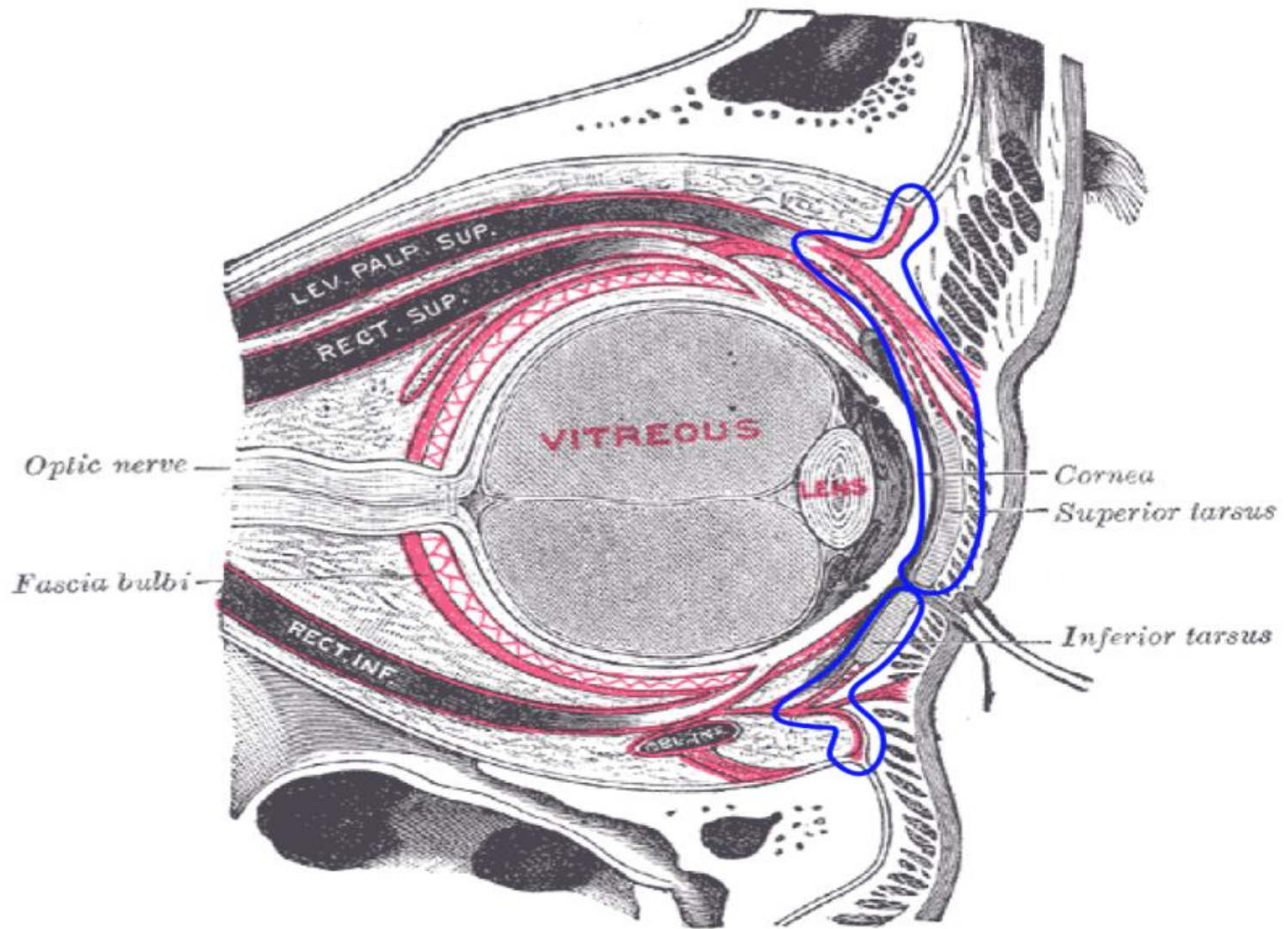
The palpebral fibers of the Orbicularis oculi are thin, pale in color, and possess an involuntary action.

The tarsi (tarsal plates) are two thin, elongated plates of dense connective tissue, about 2.5 cm. in length; one is placed in each eyelid, and contributes to its form and support.

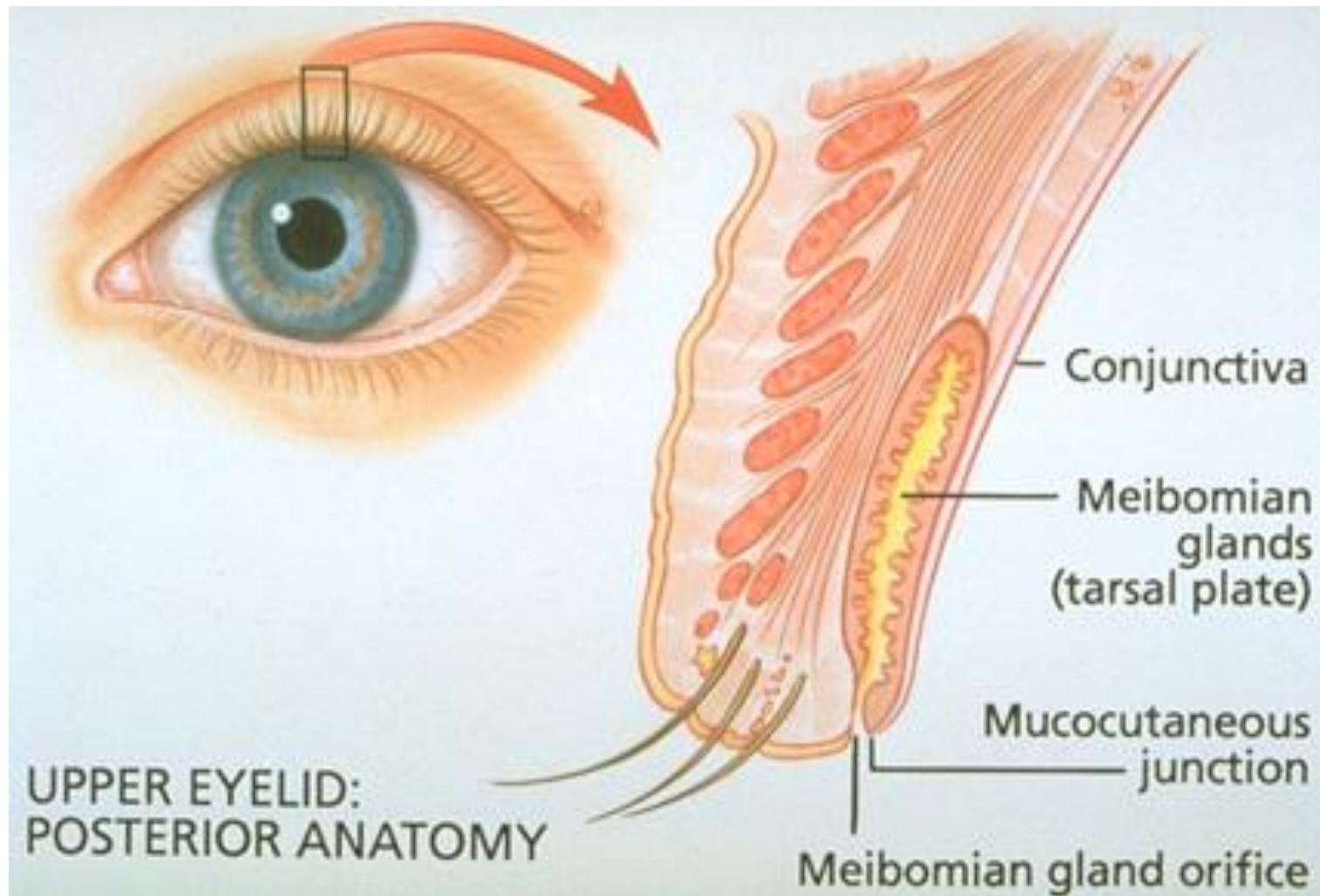
- **The superior tarsus** (tarsus superior; superior tarsal plate), the *larger*, is of a semilunar form. To the anterior surface of this plate the aponeurosis of the Levator palpebrae superioris is attached.

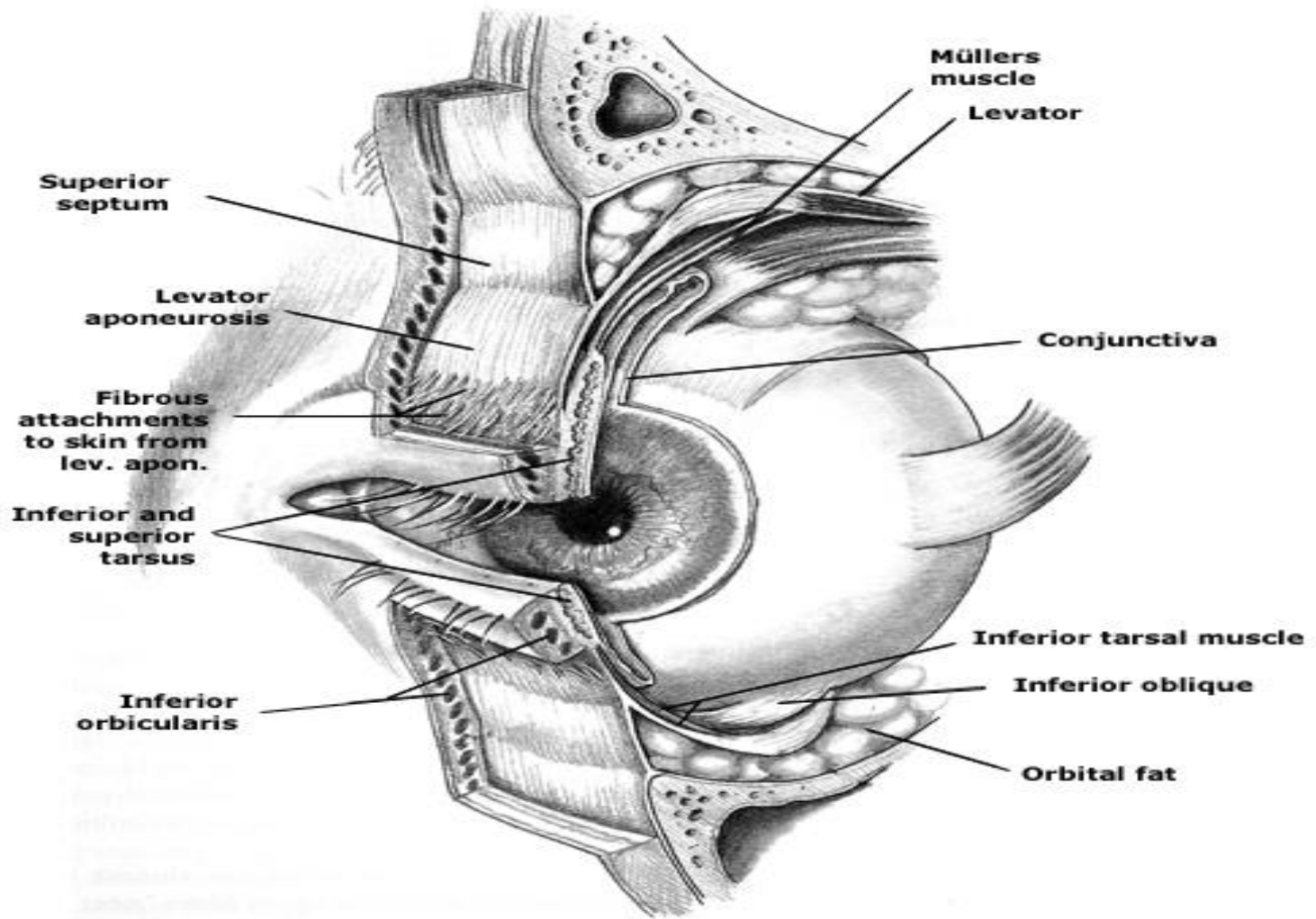
The inferior tarsus (tarsus inferior; inferior tarsal plate), the smaller, is thin, elliptical in form.

- **The orbital septum** (septum orbitale; palpebral ligament) is a membranous sheet, attached to the edge of the orbit, where it is continuous with the periosteum. In the upper eyelid it blends by its peripheral circumference with the tendon of the Levator palpebrae superioris and the superior tarsus, in the lower eyelid with the inferior tarsus. The septum is perforated by the vessels and nerves which pass from the orbital cavity to the face and scalp. The eyelids are richly supplied with blood.



- **The Tarsal Glands** (glandulae tarsales [Meibomi]; Meibomian glands) are situated upon the inner surfaces of the eyelids, between the tarsi and conjunctiva, and may be distinctly seen through the latter on everting the eyelids, presenting an appearance like parallel **strings of pearls**.
- The **conjunctiva** is the mucous membrane of the eye. It lines the inner surfaces of the eyelids or palpebrae, and is reflected over the forepart of the sclera and cornea





In summary

- They comprise :
 - An anterior layer of skin
 - The orbicularis muscle , innervated by the 7th nerve.
 - A tough collagenous layer (the tarsal plate) which houses the oil glands.
 - an epithelial lining , the tarsal conjunctiva , which is reflected onto the globe via the fornices.

Function of the eyelids

- Provide mechanical protection to the anterior globe
- Contain the **meibomian** oil glands which provide lipid component of the tear film.
- Spread the tear film over the conjunctiva and the cornea.
- Prevent dryness of the eyes, through closure and blinking.
- Contain the puncta through which tears drain into the lacrimal drainage system.

Eyelid movements

- Two muscles are responsible for eyelid movement :

- * **The orbicularis oculi** closes the eyelids and is innervated by CN7.

Bell's Palsy patients cant close their eyelids and may need to be patched to protect the cornea.

- * **Levator palpebrae** opens the eye and is innervated by CN3

- Damage results in drooping.(ptosis)

- * A flat smooth muscles(muller muscle) innervated by the **sympathetic nervous system** arises from the deep surface of the levator and insertes into the tarsal plate

- Damage results in slight ptosis

Abnormal lid
position

inflammation

Diseases of the eyelids

Lid lumps

Abnormalities
of the lashes

Abnormalities of the lid position

- Ptosis : abnormally low position of the eyelid.

Ptosis (párpado caído)



Pathogenesis

1- mechanical factor:

- -large lid lesion pulling the lid down.
- - lid edema
- -tethering of the lid by conjunctival scarring.
- -structural abnormalities :disinsertion of the aponeurosis of the levator muscle, usually in elderly.

2-neurological factor

- - 3rd nerve palsy
- -horner's syndrome (sympathetic nerve lesion)
- - marcus-gunn jaw winking syndrome .congenital condition in which there is mis-wiring of the nerve supply to the pterygoid muscle and the levator of the eyelid , eyelid moves in conjunction with jaw movement.

3- myogenic factor:

- -myasthenia gravis
- -muscular dystrophy
- - chronic external ophthalmoplegia.

Patient with ptosis of the right upper lid secondary to levator dehiscence



Note the absence of the right upper lid crease. The patient is raising the right eyebrow to try and compensate for the ptosis. The left lid shows pseudoretraction because of Hering's law of equal innervation.

Courtesy of Michael S Lee, MD.

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Child with Marcus Gunn Jaw winking ptosis of the right eye



As the child sucks on a bottle, the right upper lid opens due to aberrant innervation of the levator by the mandibular branch of CN V.

Courtesy of C Gail Summers, MD.

Patient with neurofibromatosis 1 and mechanical ptosis secondary to a plexiform neurofibroma on the right upper lid



Patient with a mechanical ptosis of the right upper lid secondary to a plasmacytoma.

Courtesy of Michael S Lee, MD.

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Horner's syndrome



In dim light, the anisocoria is accentuated with the right pupil more miotic. The right upper lid is ptotic by 1.5 mm.

Courtesy of Michael S Lee, MD.

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Cardinal features of common underlying causes of ptosis

Cause	Levator function	Eyelid crease margin		Other clinical features
Congenital abnormality of the levator muscle*	Reduced	Crease often absent	Often unilateral	Many patients also have amblyopia, strabismus
Aponeurotic ptosis	Normal	Often increased	Uni- or bilateral	Isolated finding of ptosis
Cranial nerve 3 palsy	Reduced	Normal	Usually unilateral	Impaired extraocular movement in ipsilateral eye. If ipsilateral pupil dilated, urgent evaluation for aneurysm is required.
Horner's syndrome	Normal	Normal	Usually unilateral	Ipsilateral miotic pupil
Myasthenia	Reduced	Normal	Uni- or bilateral	Variable and fatigable. Diplopia and extraocular movement abnormalities often present.
Muscle disease	Reduced	Normal	Usually bilateral	Orbicularis oculi, other extraocular or bulbar muscles may be affected

* Other, less common causes of congenital ptosis are discussed in text.

Symptoms:

- Cosmetic effect
- Vision may be impaired

Symptoms of the underlying illness: diplopia & ↓ eye movement in 3rd nerve palsy, asymmetric pupils in horner.

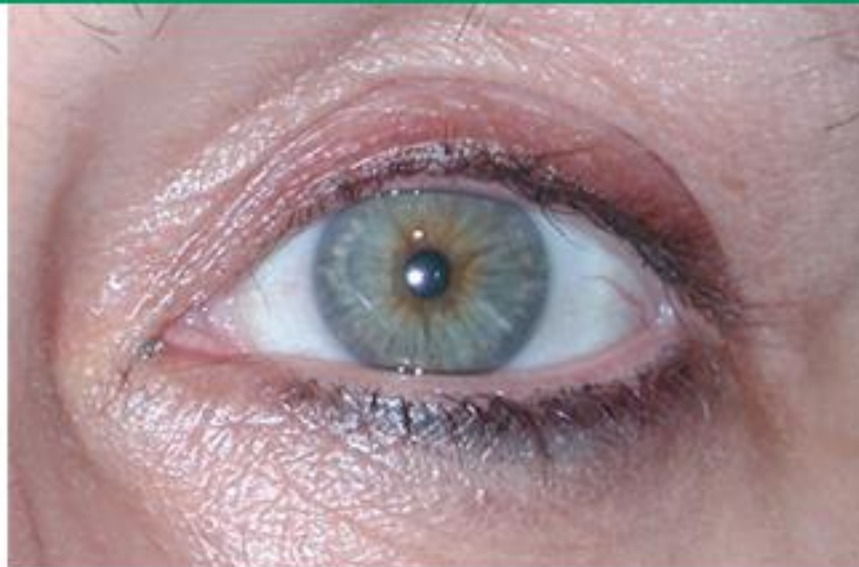
Signs:

- Reduction in the size of palpebral aperture.
- The upper lid margin may partially cover the pupil.
- Function of the levator muscle (max distance=15-18 mm)
- Elevation of eyebrows
- ptosis in myasthenia gravis .

Management:

- Treat the underlying cause if known otherwise surgical correction

Normal eyelid position

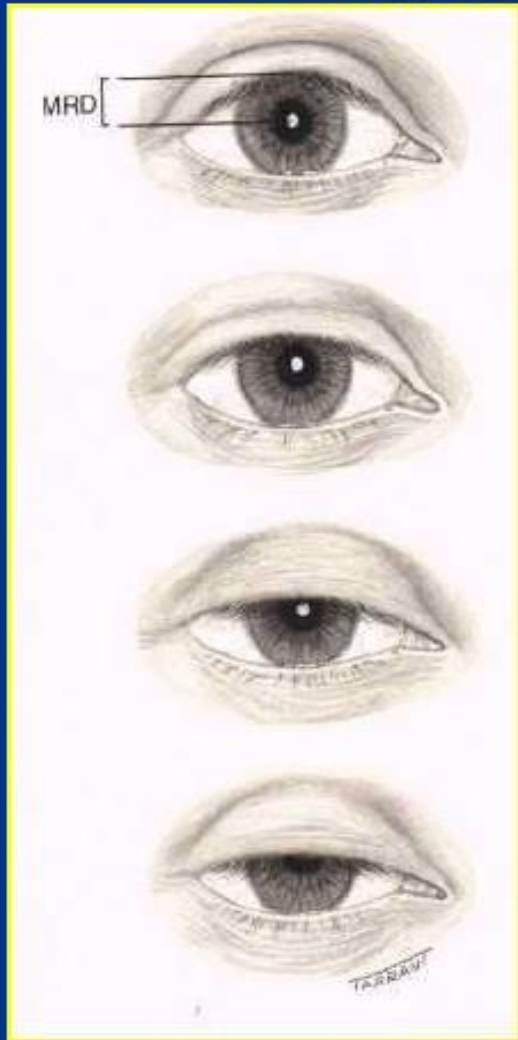


The upper lid covers 1 to 2 mm of the upper limbus. The lower lid covers the lower limbus minimally. The central light reflex can be seen within the pupil. The margin reflex distance is measured from this reflex to the upper eyelid margin.

Courtesy of Michael S Lee, MD.

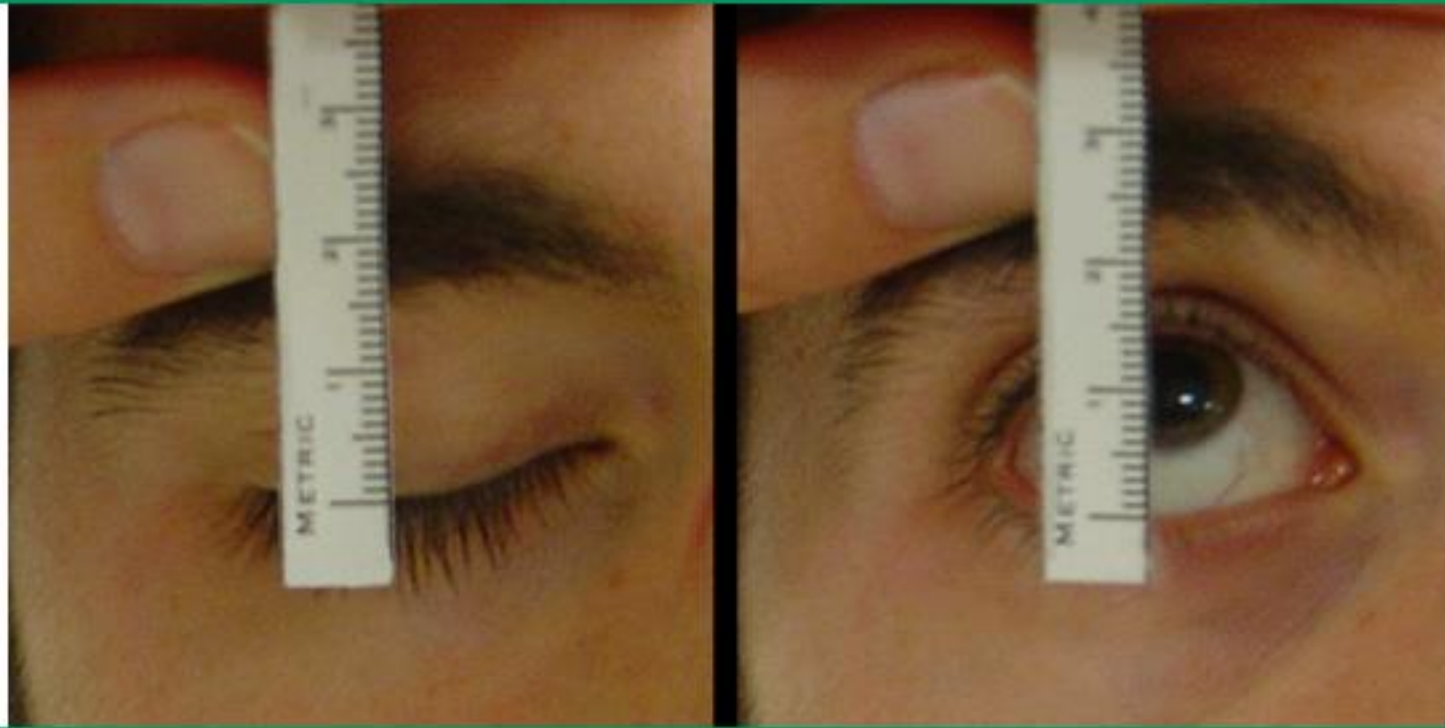
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Marginal reflex distance



- Distance between upper lid margin and light reflex (MRD)
- Mild ptosis (4 mm)
- Moderate ptosis (3 mm)
- Severe ptosis (2 mm or less)

Measurement of levator function of the upper lid with the patient in downgaze (left) and upgaze (right)



The brow should be better fixated to prevent frontalis action on the eyelid.

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- Entropion:

inturning of the the lids , usually the lower toward the globe.

Entropion



Inward turning of the lower eyelid with eyelashes rubbing against the ocular surface.

Entropion

- -occur if the pt looks downward or induced by forced lid clousure.

caused by:

- -weakness of the orbicularis muscle as in elderly pt
- -conjunctival scarring drawingthe lid downwards(cicatricial entropion)

cicatricial entropion : causes are inflammatory,infectious,traumatic , surgical
symptoms occur because the inturned lashes cause irritation of the eye and may abrade the cornea

Treatment

- Short term→lubricants or taping the lid
- Permanent → surgery.
- The condition may be alleviated by injection of **botulinum toxin** into the palpebral part of the orbicularis muscle.

• Ectropion

Eversion of the lid away from the globe.

Ectropion



Outward turning of the lower eyelid with increased exposure of the ocular surface and sensitive mucous membrane of the inner lid, as well as disruption of normal tear drainage patterns.

◉ Ectropion

causes:

- ◉ -age-related orbicularis muscle laxity
- ◉ -scarring of the periorbital skin
- ◉ 7th nerve palsy

Symptoms

- ◉ -epiphora → because the lid evert the puncta and prevent drain of the tears
- ◉ Red eye → it exposes the conjunctiva

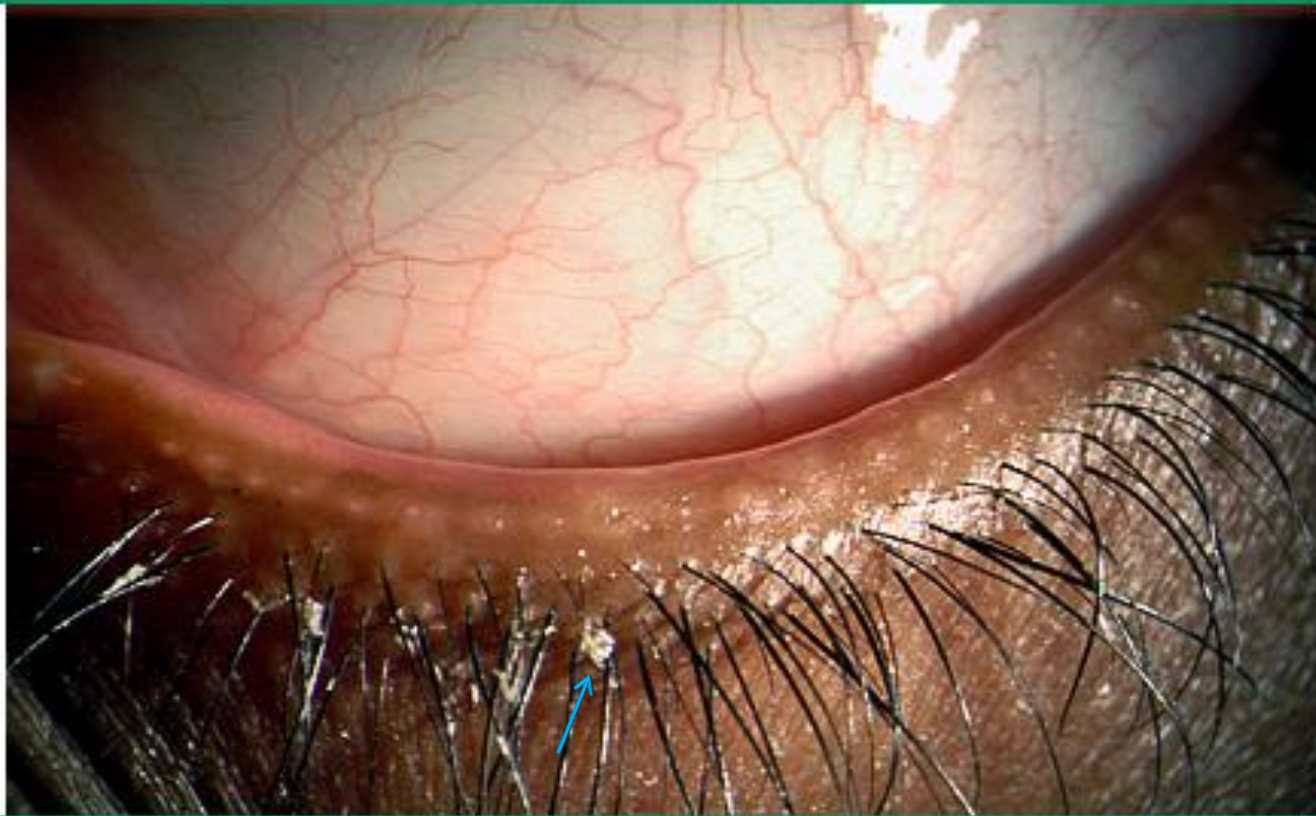
Treatment: surgical

Inflammation ... blepharitis

- Blepharitis is a chronic eye condition characterized by inflammation of the eyelids.

- **Anterior blepharitis** — Anterior blepharitis, less common than posterior, is characterized by inflammation at the base of the eyelashes. Patients with anterior blepharitis, compared to those with posterior blepharitis, are more likely to be **female and younger**. Two variants of anterior blepharitis are identified: staphylococcal and seborrheic.
- ● In **staphylococcal** anterior blepharitis, colonization of the eyelids by staphylococci leads to formation of fibrinous scales and crust around the eyelashes.
- ● The **seborrheic** variant is characterized by dandruff-like skin changes around the base of the eyelids, resulting in greasy scales around the eyelashes.

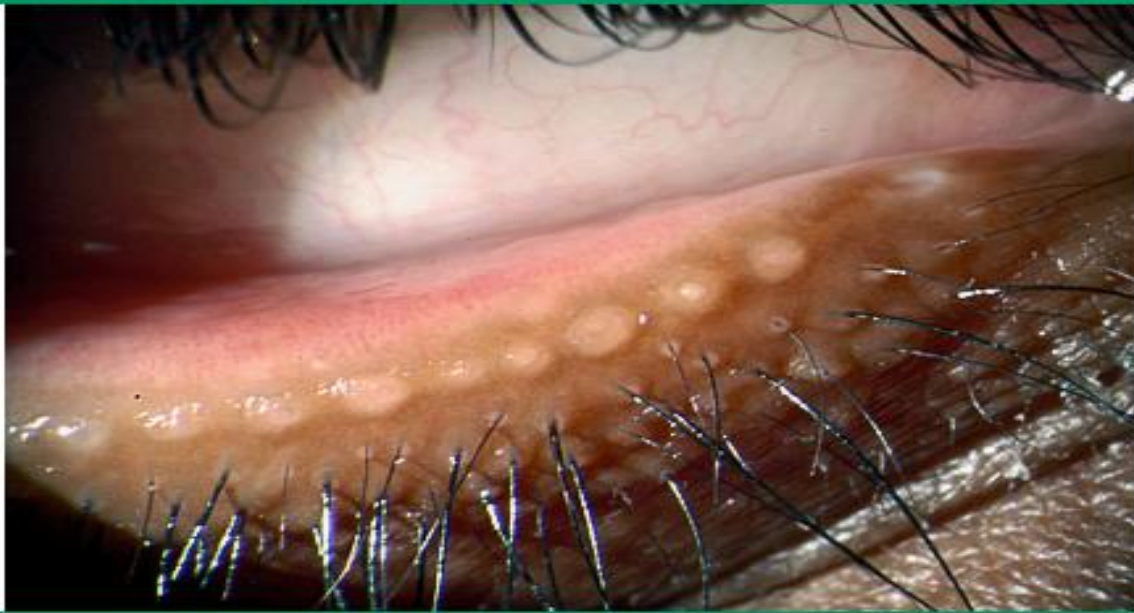
Anterior blepharitis



Lower lid with inflammation with characteristic scales on the eyelashes.

- **Posterior blepharitis** — Posterior blepharitis, the more common condition, is characterized by inflammation of the inner portion of the eyelid, at the level of the meibomian glands. It is often described as meibomian gland dysfunction.

Posterior blepharitis



Lower eyelid with characteristic posterior lid inflammation and oily white plugs visible at the meibomian gland openings.



○ **CLINICAL PRESENTATION** — Patients with blepharitis often present with symptoms of chronic eye irritation. Common complaints include:

- ● Red eyes
- ● Gritty sensation
- ● Burning sensation
- ● Excessive tearing
- ● Itchy eyelids
- ● Red, swollen eyelids
- ● Crusting or matting of eyelashes in the morning
- ● Flaking or scaling of the eyelid skin
- ● Light sensitivity
- ● Blurred vision

Signs:

Anterior blepharitis:

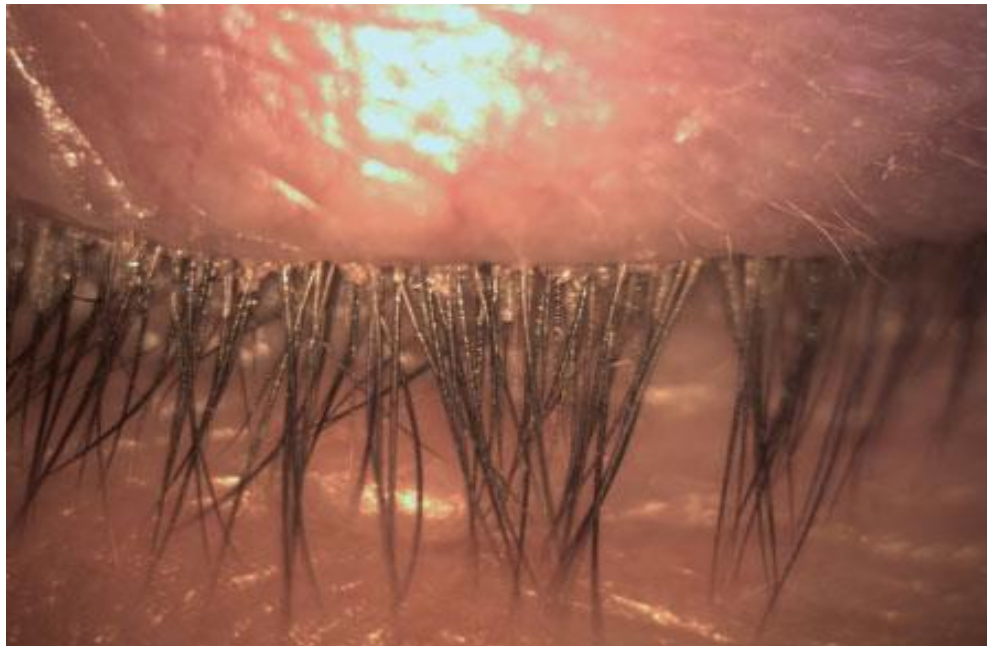
- Scaling and redness of the lid margin
- Debris in the form of collarette around the eyelash
- Reduction in the number of eyelashes

Posterior blepharitis:

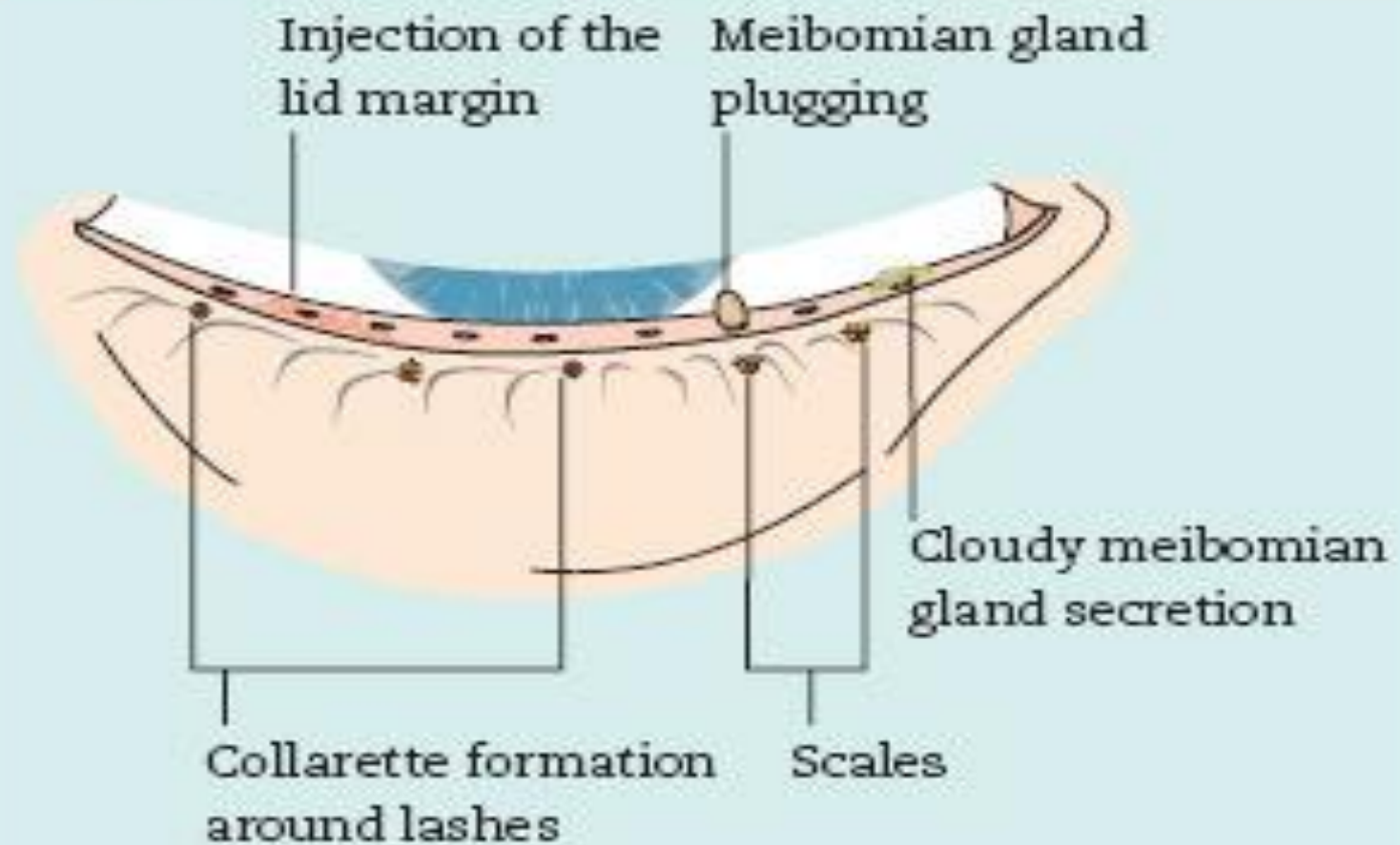
- Obstructing and plugging of the meibomian orifices.
- Thickened Cloudy meibomian secretion
- Injection of the lid margin and conjunctiva.
- Tear film abnormalities

NOTE : Posterior blepharitis can be associated with rosacea or seborrheic dermatitis.

Cylindrical dandruff (demodex)



SIGNS OF BLEPHARITIS





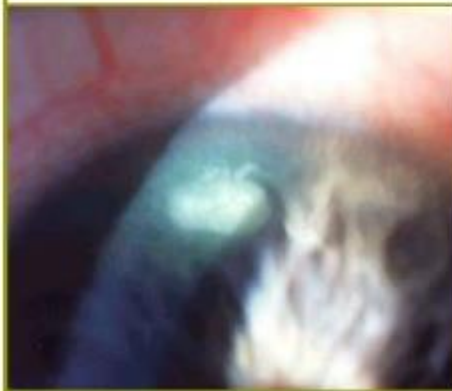
In sever disease:

- **Marginal keratitis:** small infiltrates ulcers in the peripheral cornea due to staph exotoxin immune complex response
- **Blepharokeratitis**→ when the corneal epithelium is affected

Marginal keratitis

- Hypersensitivity reaction to *Staph.* exotoxins
- Associated with *Staph.* blepharitis
- Unilateral, transient but recurrent

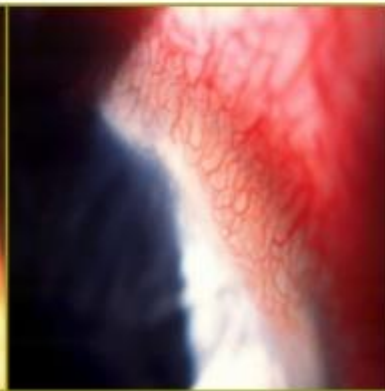
Progression



Subepithelial infiltrate
separated by clear zone



Sup & Inf Limbus
Circumferential
spread



Bridging vascularization
followed by resolution

Treatment - short course of topical steroids

Treatment :

anterior blepharitis

to remove debris: cotton bud wetted with bicarbonate or diluted baby shampoo

to reduce inflammation: topical steroids

staph: topical AB , **demodex** : tea tree oil

Posterior blepharitis

→ hot bath to closed lids then lid massage

→ topical azithromycin , oral tetracycline

→ artificial tears.

Benign lid lumps and bumps

- Chalazion : is a chronic inflammatory lesion that develops when a Zeis or meibomian tear gland of the eyelid becomes obstructed. Common
- painless
- Presented as lid swelling which usually resolve within 6 months.
- If it persists incised and the gelatinous contents curetted away.

Chalazion



Chronic meibomian gland plugging leads to granulomatous inflammation seen as a yellow-white bump on the inner aspect of the mid-lower lid.

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Chalazion



A nodular lesion is present on the upper eyelid.

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Internal hordeolum •
(abcess) •

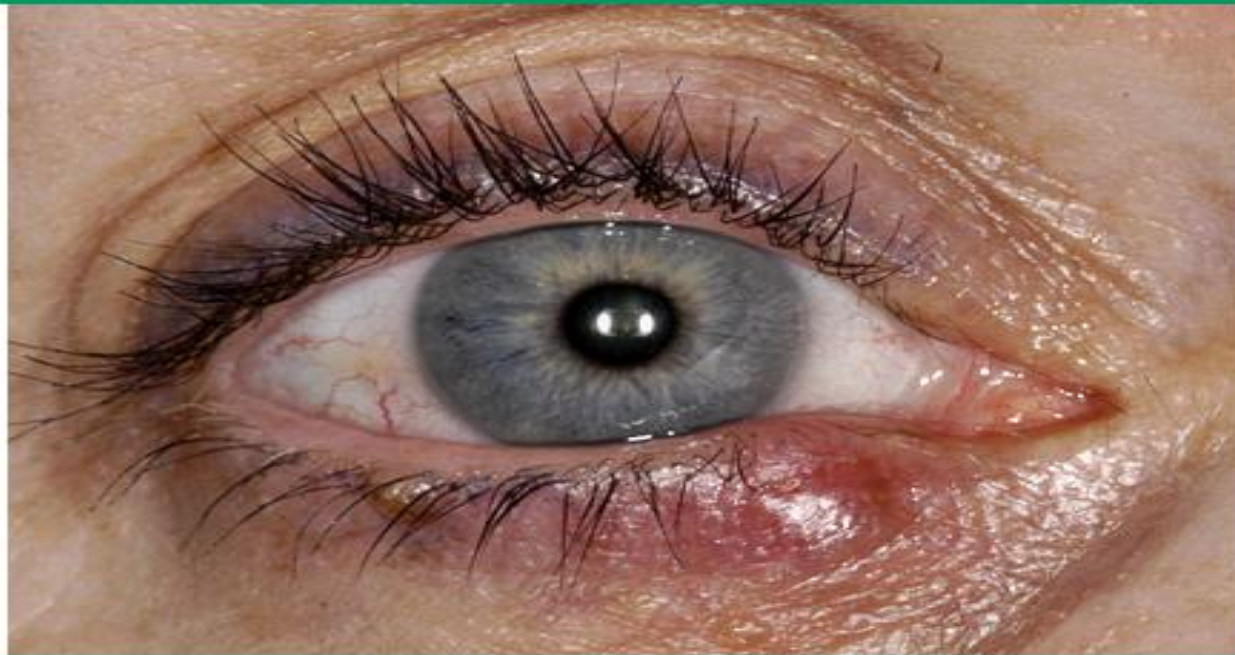
Abscess within the meibomian gland. •

May respond to topical AB but usually incision is •
necessary •
painful •



- Stye (external hordeolum)
 - * painful abscess of an eyelash follicle.
 - * Treatment : removal of the associated eyelash and application of hot compresses.

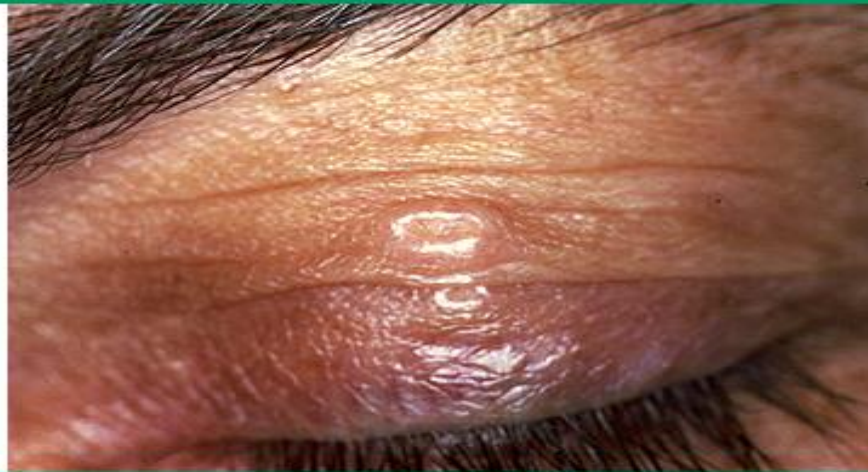
Hordeolum / Stye



Acute plugging of a meibomian gland and associated inflammation results in a tender, red bump seen in the medial lower lid.

- **Molluscum contagiosum** — Molluscum contagiosum is caused by a poxvirus and spread by direct contact or by fomites. It is usually seen as one or multiple small, pale, shiny nodules with central umbilication..
- **Treatment** — Molluscum may resolve spontaneously within one year. Treatment options include simple excision, cryotherapy, and desiccation.

Mollusca contagiosa



A giant molluscum with typical central umbilication is visible in this close-up view of the eyelid of an HIV-infected patient.
Reproduced with permission from The Skin and Infection: A Color Atlas and Text. Sanders CV, Nesbitt LT Jr (Eds) Williams and Wilkins, Baltimore 1995. <http://www.lww.com>

CYSTS

Sebaceous cysts	A cyst of Moll	A cyst of Zeis
opaque	translucent	opaque
<ul style="list-style-type: none">- rarely cause symptoms- excised for cosmetic reasons	obstruction of a sweat gland	<ul style="list-style-type: none">-blockage of an accessory sebaceous gland-excised for cosmetic reasons.

Sebaceous cyst



Cyst of zeis



Cyst of moll



Squamous papilloma — The most common benign tumor of the eyelid is squamous papilloma, a lesion caused by the human papillomavirus. It presents as a frond-like (skin tag) or lobular projection of skin that contains a central vascular core. Simple excision or cryotherapy is curative.

Squamous papilloma



A projection of skin is evident on the lateral corner of the eyelid (arrow).

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- **Xanthelasma** — Xanthelasma are cholesterol-filled, soft, yellow plaques that usually appear on the medial aspects of the eyelids bilaterally. They most often occur in middle-aged and older adults.
- Young individuals, in particular, with xanthelasma, appear to have a relatively high prevalence of lipoprotein abnormalities.
- **Treatment** — Xanthelasma are always benign lesions. Therapy is usually undertaken only for cosmetic reasons

Xanthelasma



Yellow plaques are present bilaterally.

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- **Keratoacanthoma** — Keratoacanthoma is a rapidly growing hyperkeratotic nodule with a central keratin plug .The growth of a keratoacanthoma occurs over three to six weeks, in contrast to the slow growth of typical squamous cell carcinomas over months to years.
- **Treatment** — There is controversy regarding whether keratoacanthomas are malignant or benign; although they resemble squamous cell carcinomas histologically, most will spontaneously regress with scar formation.

Keratoacanthoma

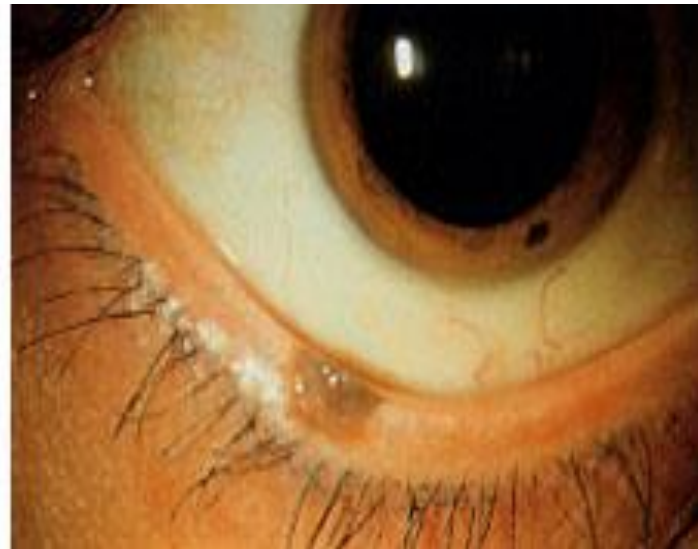


A central keratin plug is present in this rapidly growing lower lid nodule.

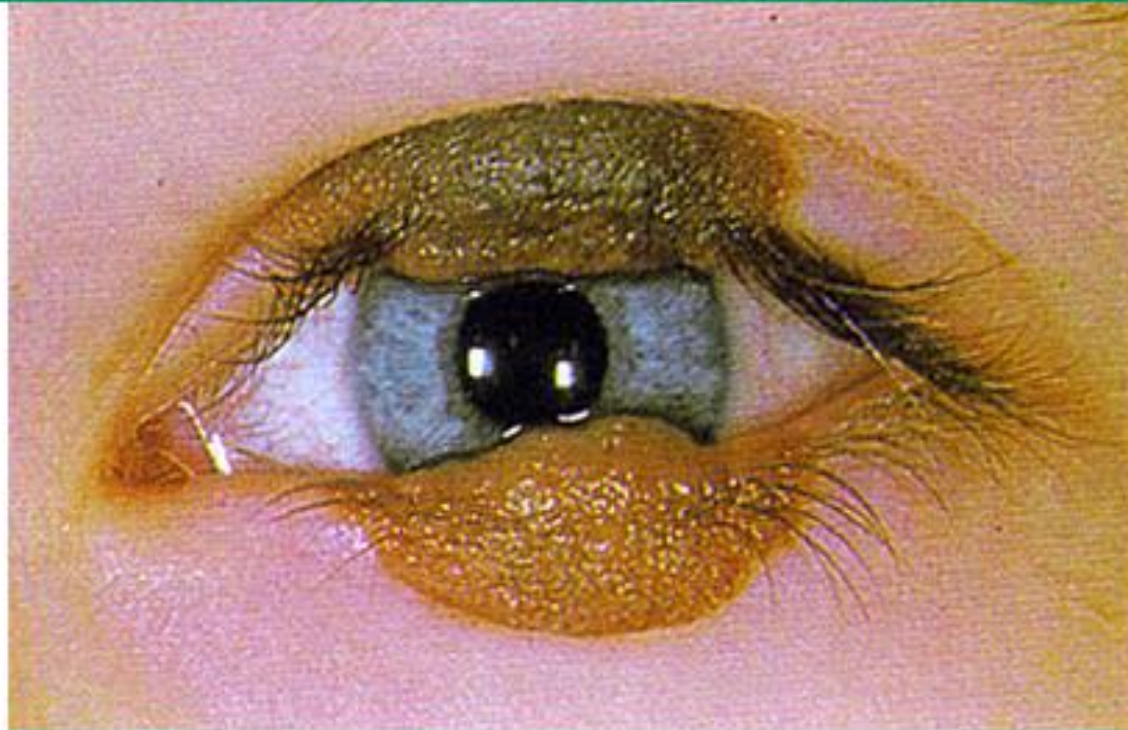
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Naevus (mole):

- *Lesion that derived from the naevus cell (altered melanocytes)
- *Can be pigmented or not
- *No treatment is necessary



Kissing nevus



The nevus includes both the upper and lower eyelids.
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courses section, American Academy of Ophthalmology, San Francisco
1996.*

● Malignant tumors



Basal cell carcinoma — Basal cell carcinoma is the most common malignant tumor of the eyelid.

Risk factors :

- fair-skinned individuals
- history of prolonged sun exposure.

Basal cell carcinomas are commonly ***small, slow-growing, firm, painless, pearly, and indurated*** . One-half to two-thirds of basal cell carcinomas involve ***the lower eyelid margin***

These tumors are:

- **locally invasive,
- **only rarely metastasize..

Treatment — **Excision** with a margin of normal tissue surrounding the normal lesion.

For large lesions : Mohs' chemosurgery and excision with frozen-section control

Cryotherapy / Radiotherapy

Basal cell carcinoma



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- **Squamous cell carcinoma** — Squamous cell carcinoma is much less common but **faster growing** than basal cell carcinoma. Squamous cell carcinoma can arise de novo or from preexisting actinic keratosis and is **more likely to metastasize** .
- The tumor usually is found on the **lower eyelid**, with a propensity for the lid margin
- **Risk factors** :Similar to basal cell carcinoma, prolonged sun exposure is a risk factor for this malignancy.
- Squamous cell carcinomas present as nodules or plaques with everted edges that enlarge and often develop crusting
- **Treatment** — The clinical diagnosis should be confirmed by incisional biopsy. **Wide local surgical excision** with frozen section is usually sufficient for cure.

Squamous cell carcinoma



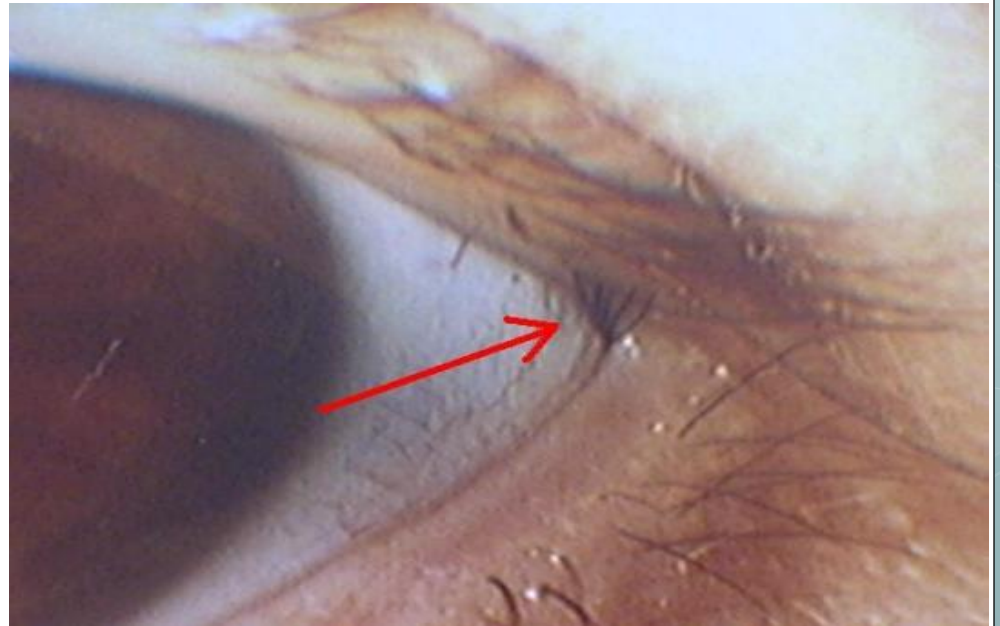
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Abnormalities of the lashes

Trichiasis

- Common condition in which aberrant eyelashes are directed backwards towards the globe



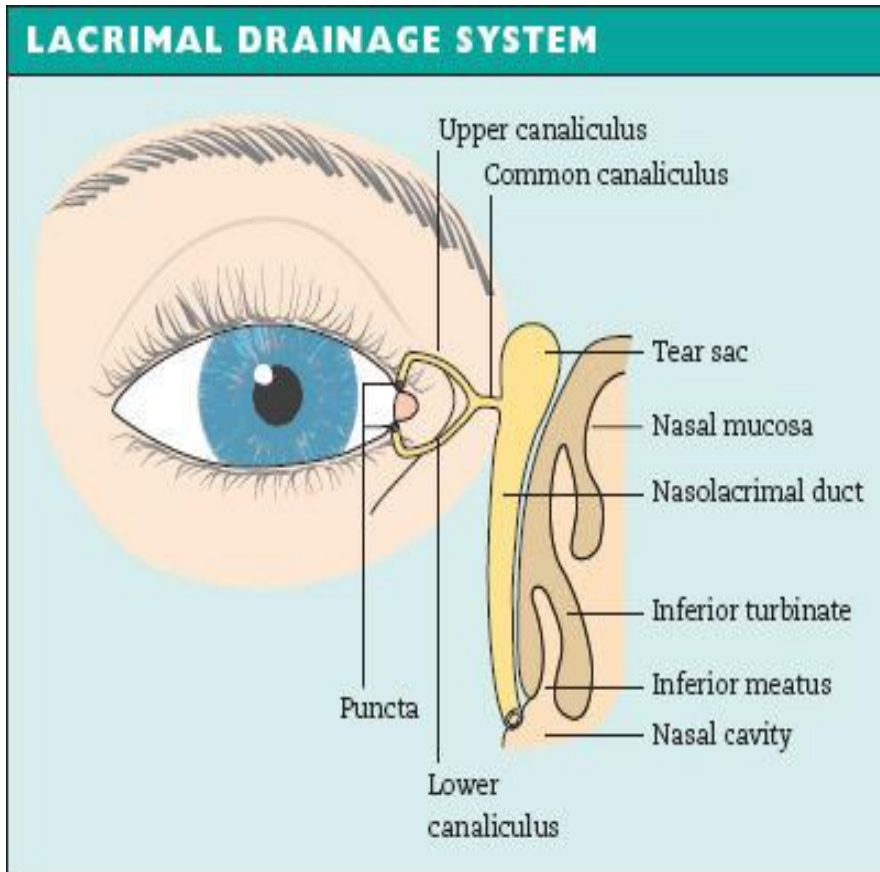
Trichiasis

- The lash rub against the cornea and cause irritation and abrasion
- **Trachoma** is important cause especially in developing countries.

Treatment :

- Epilation of the offending lashes
- Recurrence with cryotherapy or electrolysis
- Surgical correction if associated with abnormalities of lid position.

The lacrimal system



Tears drains into:

:1- upper and lower *puncta*

2- upper and lower *canaliculi* → common canaliculus

3- *lacrimal sac*

4-The *nasolacrimal duct* passes from the sac to the nose.

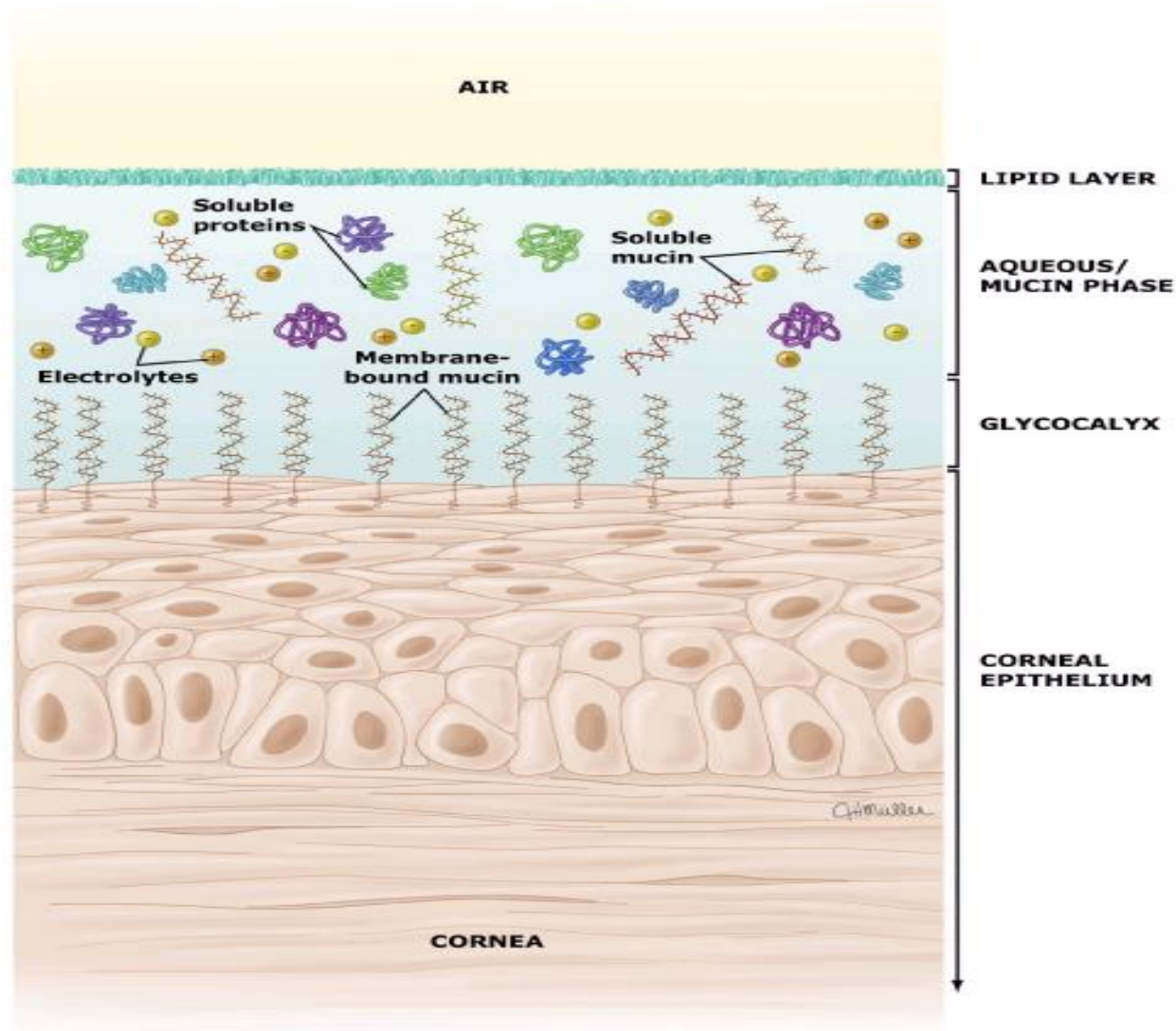
The tear film

The epithelial cells of the ocular surface express a **mucin glucocalyx** which renders the surface wettable.

The tear film(3Mm thick) covers the exposed ocular surface and comprises three layers:

- 1- a thin **mucin** layer in contact with the ocular surface and produced mainly by the conjunctival goblet cells
- 2- an **aqueous layer** produced by the lacrimal gland.
- 3- a surface oil layer produced by the tarsal meibomian glands and delivered to the lid margins.

Precorneal tear film



Adapted from: Pflugfelder, SC, Solomon, A, Stern, ME. The Diagnosis and Management of Dry Eye: A Twenty-Five Year Review. Cornea 2000; 19:644.

Function of the tear film

- it provides a smooth air/tear interface for distortion free refraction light at the cornea.
- it provides oxygen to the avascular cornea.
- it removes debris and foreign particles from the ocular surface through the flow of tears.
- it has antibacterial properties through the action of lysozyme, lactoferrin and the immunoglobulins, particularly secretory IgA.

Tears

- About 1.2 μl \ min by lacrimal glands
- Lost by: evaporation
nasolacrimal drainage
- The tear film is formed with each blink

Abnormalities in the lacrimal system are found in

• 1-tear flow and evaporation.

→aqueous-deficient dry eye(decrease tear production)

→evaporative dry eye

-inadequate meibomian oil delivery.

-malposition of the globe or lid margin.

→cicatricial conjunctival disorders

• 2-the drainage of the tears

→obstruction of tear drainage –infantile - adult

→infection of the nasolacrimal system

○ 1) Tear flow and evaporation (dry eye)

→ KCS : Kerato-Conjunctivitis Sicca.

- deficiency of tear quantity , composition, excessive evaporation
- Characterized by **hyperosmolarity** → ocular surface damage , inflammation , discomfort and visual loss,

Decrease tear flow production

Sjögren syndrome	Non-Sjögren syndrome
<ul style="list-style-type: none">- in primary: autoimmune exocrinopathy results in dry eye , mouth and other mucous membranes- In secondary sjogrens syndrome : When dry eye associated with auto-immune C.T disorder → as in RA	<ul style="list-style-type: none">- age-related dry eye in which it is believed that there is lacrimal ductal obstruction over time- conjunctival scarring conditions such as trachoma- lacrimal gland infiltration (e.g lymphoma)

Symptoms

- - non specific symptoms of grittiness, burning, photophobia, heaviness of the lids and ocular fatigue
- - symptoms worse in the evening
- -in sever cases visual acuity may be reduced by corneal damage.

Signs

- in mild cases → staining of the eye with fluorescence will show small dots of fluorescence (**punctate staining**) over the exposed corneal or conjunctival surface

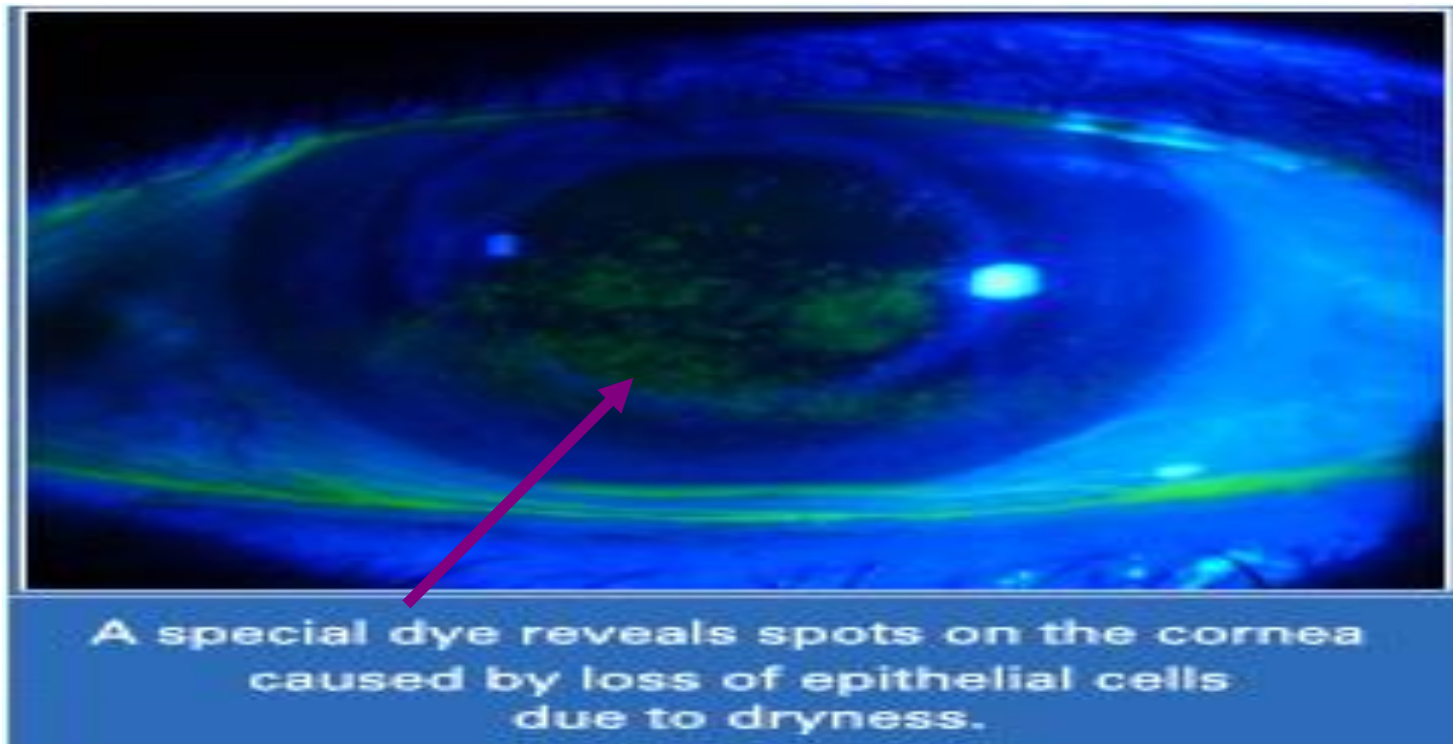
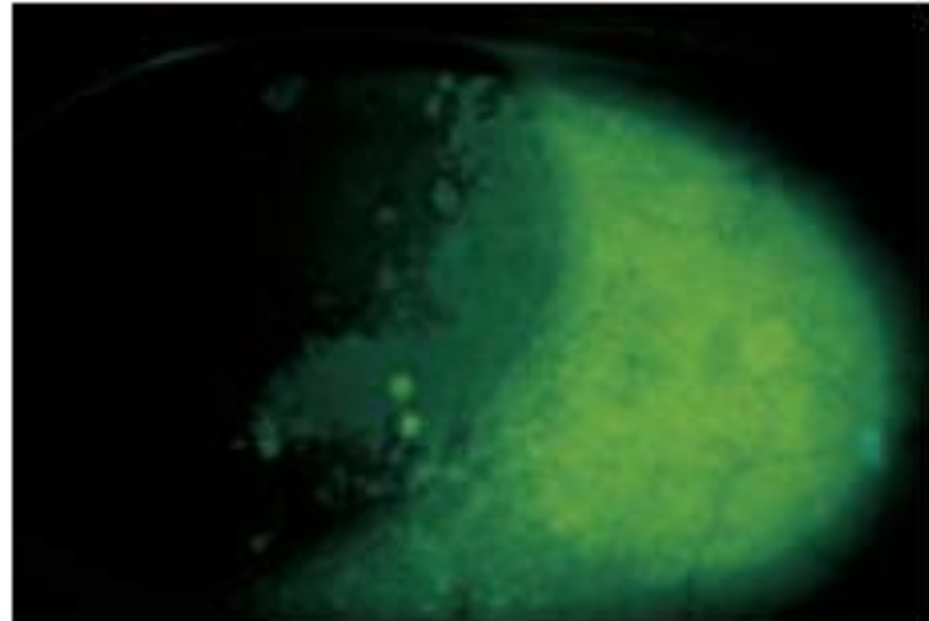
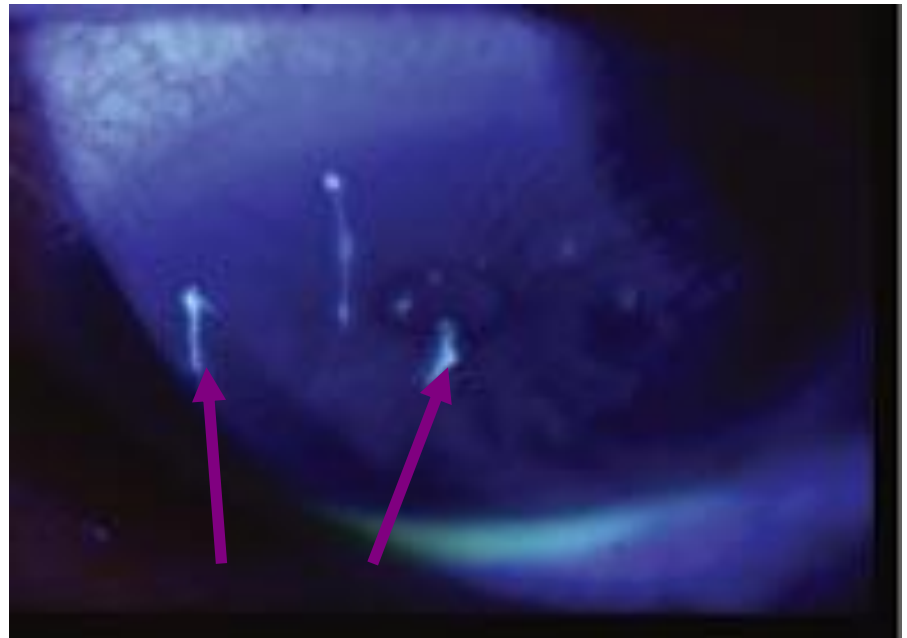
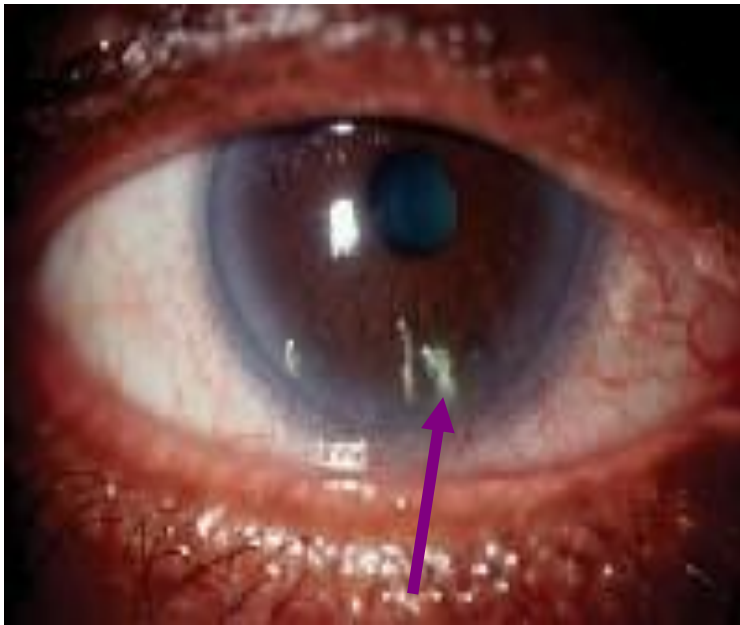


Fig. 6.1 Fluorescein staining of cornea and conjunctiva in a severe dry eye.



- In severe cases →
- filamentary keratitis :tags of abnormal mucous may attach to the corneal surface that cause pain during blinking





Treatment :

- Supplementation of the tears with tear substitutes.
- in sever cases : occlude the puncta with plugs or permanently with surgery .
- Topical anti-inflammatory drugs are also in use.

Prognosis

Mild cases respond to artificial tears.

Severe cases may be difficult to treat.

Evaporative dry eye

-inadequate meibomian oil delivery.(a form of posterior blepharitis)

Extensive meibomian gland obstruction → deficient tear film lipid layer → ↑ water loss from eyes.

-malposition of the globe or lid margin.

*ectropion

*lagophthalmus: Incomplete lid closure

*Proptosis (dysthyroid eye disease)

* Infrequent blinking (parkinson)

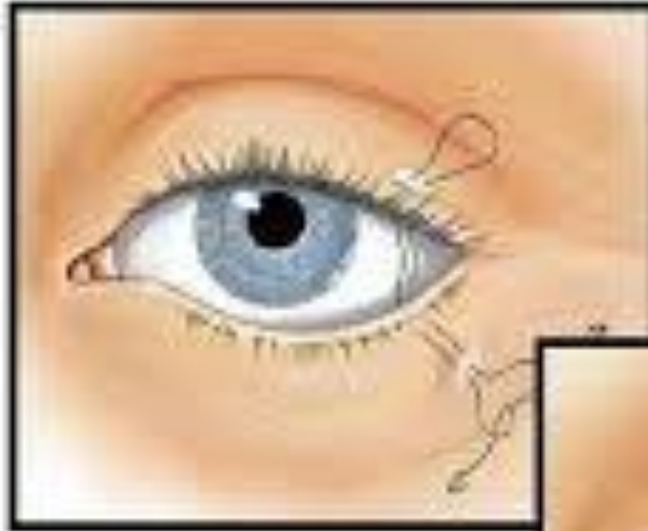
→inadequate tear film → evaporative dry eye

Treatment :

temporary causes: artificial tears

Injection of botox into the levator muscle (in temporary ptosis)

Permanent : lids margins suturing (lateral tarsorrhaphy)



Tarsorrhaphy

Lagophthalmos



As in seventh
nerve palsy

→ Inadequate mucus production

- Destruction of the goblet cell occurs in:

- 1- cicatricial conjunctival disorders such as **erythema multiforme**. this cause conjunctival shrinkage with adhesion forming between the globe and the conjunctiva (**symblepharon**) lid deformity and trichiasis
- 2- chemical burn of the eye .
- 3- trachoma
- 4- vit A deficiency-xerophthalmia

- **Symptoms**

Similar to aqueous deficiency

Examination may reveal scarred abnormal conjunctiva and area of fluorescein staining

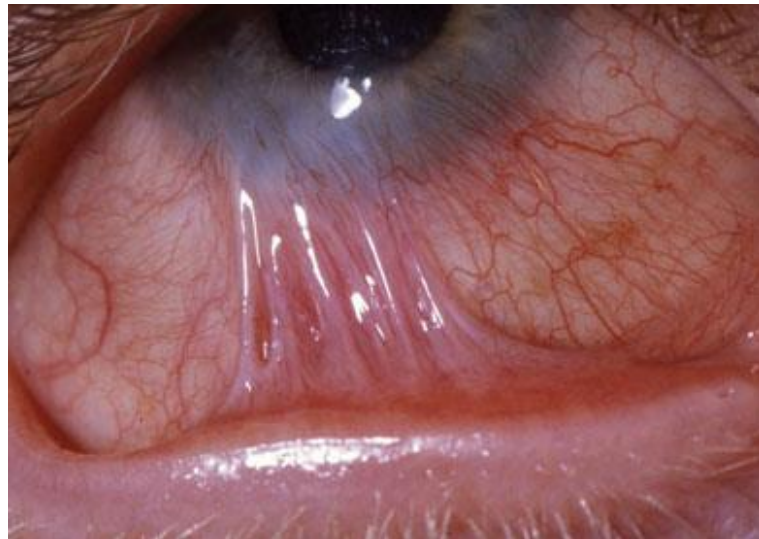
- **Ttt:** artificial lubricant

Typical target lesion of erythema multiforme



This plaque from a patient with erythema multiforme shows a central erosion on an erythematous base, surrounded by a pale edematous rim and a peripheral erythematous halo.
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symblepharon

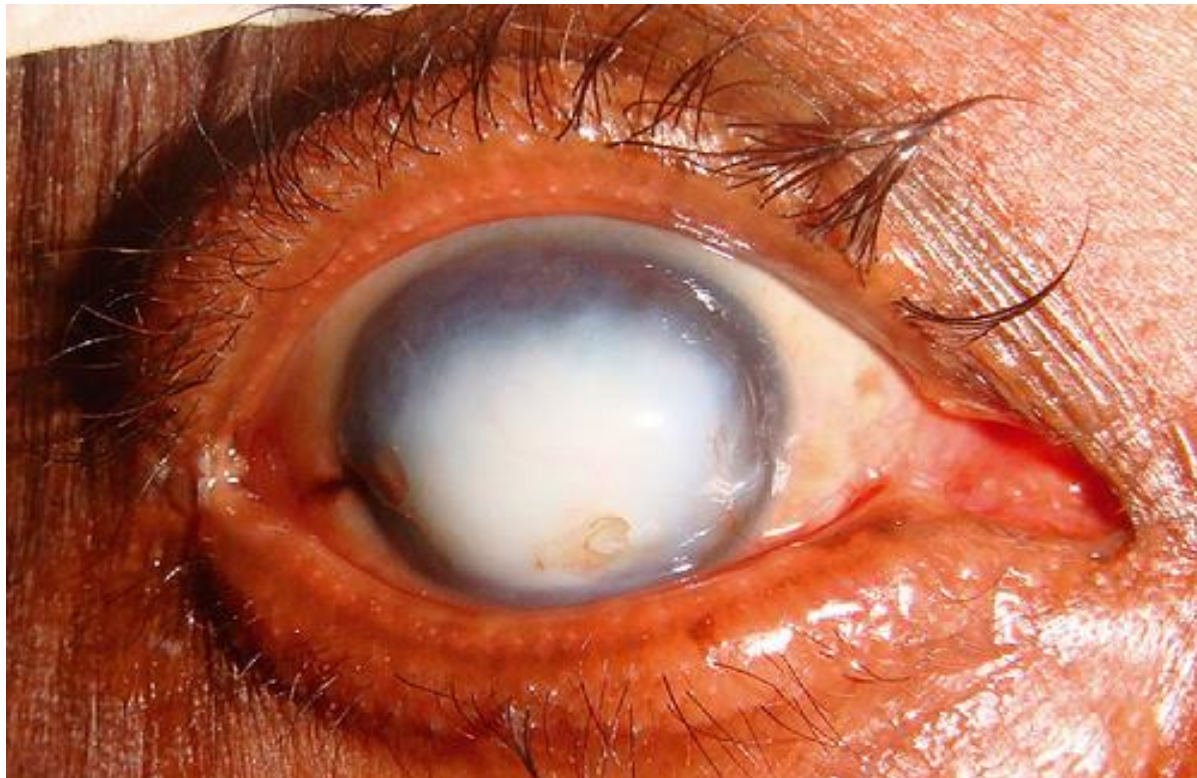


Erythema multiforme



Mucosal erosions and crusts on the lips of a patient with erythema multiforme.
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keratomalacia



◉ 2) Disorder of the tear drainage :

Tear production > drainage system capacity
caused by:

- 1- irritation of the ocular surface: foreign body-infection ..
- 2- obstruction of any part of drainage system (epiphora)

Obstruction of tear drainage (infantile)

Nasolacrimal system : solid cord → canalize,,patent just before term

- ** Imperforate distal end of nasolac. Duct → watering eye
- ** canaliculi : infection → mucocoele – dacrocystitis
- ** conjunctiva is not inflamed.

◉ Dx: pressure over lac sac → discharge

◉ Mostly Spontaneous resolution in **1st year of life.**

Or do probing-perforate the occluded membrane
Through nasolacrimal duct.

Obstruction of tear drainage in adult:

-It occur at any point , more common in the nasolacrimal duct

Causes:

- 1-infection
- 2- direct trauma
- 3- drugs

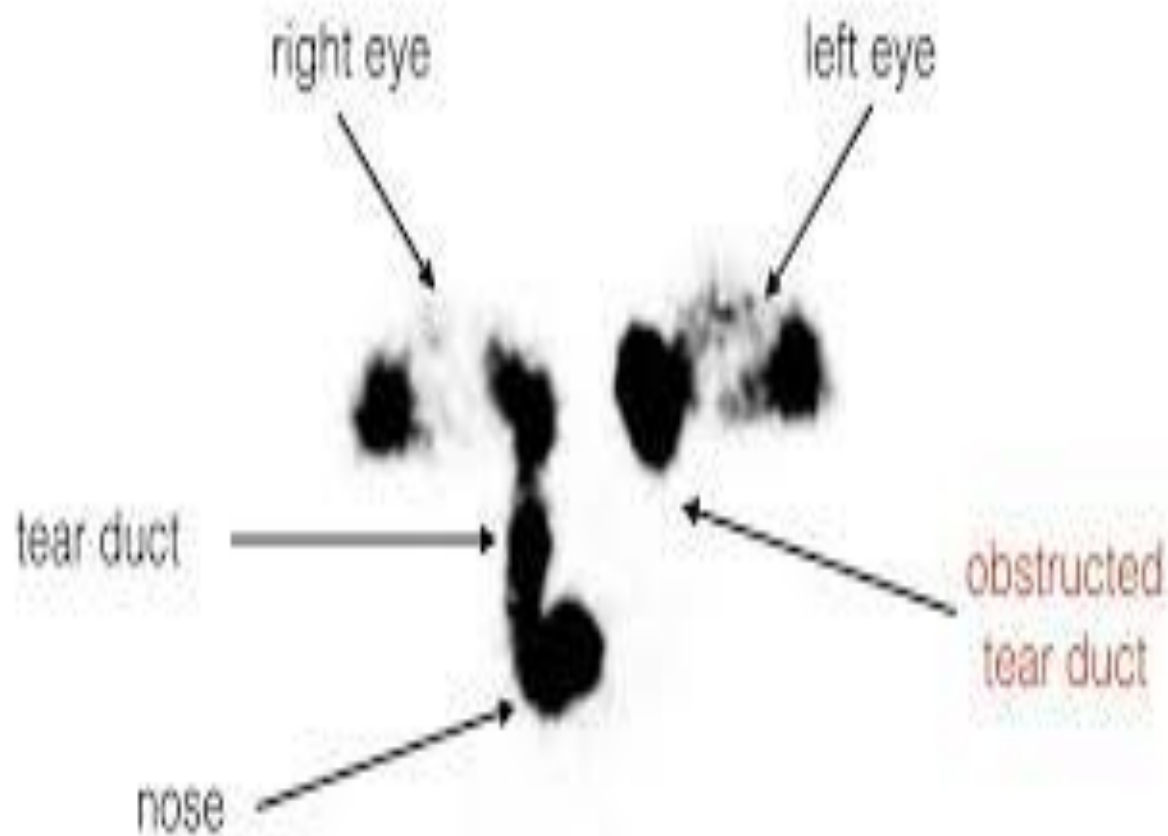
Symptoms

- watering eye sometimes associated with stickiness+ white eye.
- Symptoms may worse in wind or cold weather

Signs

- stenosed punctum may be seen on slit lamb examination
- If obstruction beyond the the punctum diagnoses made by syringing the naso-lacrimal system with saline (into a canaliculus)
 - patent system if the pt tasted the saline
 - obstruction → regurgitation from the non cannulated punctum
- Exact location confirmed by injecting a radio-opaque dye the X-ray is used
- Dacroscentogram

Dacryoscintigraphy



PRINCIPLE OF A DCR

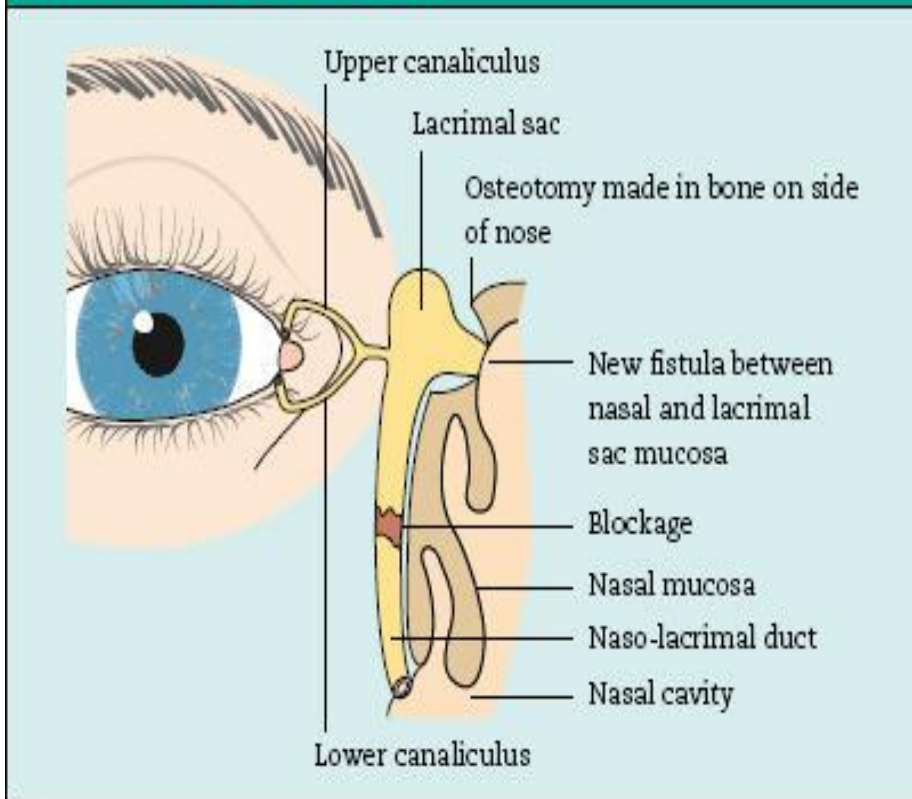


Fig. 6.3 Diagram showing the principle of a DCR.

TTT

- Surgical repair
- We connect the mucosal surface of the lacrimal sac to the nasal mucosa by removing the intervening bone → DCR

Dacryocystorhinostomy

Dacryocystitis



Infection to the nasolacrimal system

- *closed obstruction predispose to infection
- *Mostly by staph or strep
- *painful swelling on the medial side of the orbit (enlarge infected sac)
→ Mucocoele (mucous collection); painless

- **Treatment** : systemic Abs
- DCR may be necessary to prevent recurrence.

Thank you

