The Orbit

Orbital cavity is **protective bony socket** for globe with optic nerve, ocular muscles, nerves, blood vessels, and lacrimal gland. The orbital cavity is **shaped like a pyramid** whose base opens to the face and apex opens towards the back.

The six ocular muscles originate at apex of funnel around optic nerve and insert into globe. The globe moves within the orbital cavity as in a joint socket.

The orbit functions to protect, support, and maximize function of eye

The orbit holds the eye in correct position.

The orbit also protects eye because bones surrounding eye “stick out” further than the eye, objects tend to hit orbit and not the eye.
Orbital Bony Socket

The base of the funnel, which opens in the face, has four borders which consist of:

**Superior margin**: frontal bone

**Inferior margin**: maxilla and zygomatic

**Medial margin**: frontal, lacrimal and maxilla

**Lateral margin**: zygomatic and frontal

The apex lies near medial end of superior orbital fissure and contains **optic canal** which communicates with middle cranial fossa.
Orbital bony socket

The Apex (Posterior area)

**Roof:** formed by frontal & sphenoid (lesser wing).

**Floor:** maxilla, Zygomatic & palatine.

**Lateral Wall:** Zygomatic & sphenoid (greater wing).

**Medial Wall:** maxilla, orbital plate of Ethmoid, lacrimal & sphenoid (small part of the body of the sphenoid)

**The optic foramen:** which contains optic nerve and large ophthalmic artery, is at nasal side of the apex, while a larger entry, the superior orbital fissure, through which veins, motor nerves, and non-visual sensory nerves (e.g., those for pain), among other fissures.

The orbit has 5 openings:

1. Optic Foramen (C.N II & ophthalmic artery)
2. Superior Orbital Fissure (C.N III, C.N IV, C.N V1, C.N VI, ophthalmic vein & sympathetic fibers)
3. Inferior Orbital Fissure (C.N V2, infraorbital vessels and ascending branches from sphenopalatine ganglion)
4. Supraorbital Foramen (supraorbital nerve, supraorbital vessels)
5. Lacrimal Fossa (lacrimal gland)
NOTE; The orbit provides: 1 protection to the globe; 2 attachments which stabilize ocular movements; 3 foramina for the transmission of nerves and vessels. Despite the number of different tissues present in the orbit, the expression of diseases due to different pathologies is often similar.
## Differential diagnosis of orbital disease

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Dysthyroid Eye Disease

- **Autoimmune disorder** with orbital involvement frequently associated with thyroid dysfunction.
- **Pathogenesis:** Disorders of the thyroid gland can be associated with an infiltration of the extraocular muscles with lymphocytes and the deposition of glycosaminoglycans in the tissues, leading to proptosis, exposure of the globes and limitation of eye movements. The condition occurs particularly in **hyperthyroidism** but also in hypothyroidism. An immunological process is suspected but not fully determined. The ocular muscles are particularly severely affected. Fibrosis develops after the acute phase.

- 90% of the patients have hyperthyroidism, 6% normal TFT, 3% Hashimoto, 1% hypothyroidism.

- 90% occurs in smokers.

- The eye symptoms may appear long before the thyroid gland becomes hyperactive, however, about 10% of patients with dysthyroid eye disease never develop hyperthyroidism.
Dysthyroid Eye Disease

The patient may sometimes complain of:

- a **red painful eye** (associated with exposure caused by **proptosis**) – if the redness is limited to part of the eye only it may indicate active inflammation in the adjacent muscles
- **double vision**;
- **reduced visual acuity** (sometimes associated with optic neuropathy).

**on examination:**

- There may be **proptosis** of the eye (the eye protrudes from the orbit, also termed **exophthalmos**).
- The conjunctiva may be **chemosed**.
- The **upper lid may be retracted** so that sclera is visible (due in part to increased sympathetic activity stimulating the sympathetically innervated smooth muscle of levator). This results in a characteristic **stare**.
- The **upper lid may lag** behind the movement of the globe on downgaze (lid lag).
- There may be **restricted eye movements** or squint (also termed restrictive thyroid myopathy, exophthalmic ophthalmoplegia, dysthyroid eye disease or Graves disease).

**Figure 15.10** Dysthyroid eye disease: (a) clinical appearance; (b) a CT scan demonstrating muscle thickening.

The **inferior rectus is the most commonly affected muscle**. Its movement becomes restricted and there is mechanical limitation of the eye in upgaze. Involvement of the **medial rectus** causes mechanical limitation of abduction, thereby mimicking a sixth nerve palsy.
Dysthyroid Eye Disease

**Investigation**
- Thyroid function tests;
- Anti-thyroid antibodies.
- Orbital CT & MRI (to assess the E.O.M involvement at the orbital apex, which may lead to blindness)

**Complications**
1. Excessive exposure of the conjunctiva and cornea with the formation of chemosis (oedematous swelling of the conjunctiva), and corneal ulcers due to proptosis and failure of the lids to protect the cornea. The condition may lead to corneal perforation.
2. Compressive optic neuropathy due to compression and ischemia of the optic nerve by the thickened muscles. This leads to field loss and may cause blindness.

**Management**
- *Emergency* (corneal problem & pressure of optic nerve) is managed by systemic steroids, surgical orbital decompression & radiotherapy.
- The long term management aims to restore E.O.M function & cosmetic.
  - The first step is the regulation of thyroid hormones levels
  - Artificial tears (prevent corneal drying and ulceration)
  - Glasses to correct any double vision
  - Guanethidine 5% drops may reduce lid retraction
  - Eyelid surgery to overcome lid retraction
  - Stop smoking

**Prognosis**
- Visual acuity will remain good if treatment is initiated promptly.
- In the postinflammatory phase, exophthalmos often persists despite the fact that the underlying disorder is well controlled.
- Men has a worse prognosis than women.
This is an **inflammation** of the extraocular muscles associated with **pain and diplopia**, leading to a restriction in the movement of the involved muscle (similar to that seen in dysthyroid eye disease).

It is **not usually associated with systemic disease**, but thyroid abnormalities should be excluded.

The conjunctiva over the involved muscle is **inflamed**.

CT or MRI scanning shows a thickening of the muscle.

If symptoms are troublesome it responds to a short course of steroids.
**Infective disorder**

<table>
<thead>
<tr>
<th>Pathogenesis</th>
<th>Orbital cellulitis</th>
<th>Orbital cellulitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma/bacteremia</td>
<td>Sinusitis</td>
<td>Sinusitis</td>
</tr>
<tr>
<td>Age</td>
<td>21 months</td>
<td>12 years</td>
</tr>
<tr>
<td>Clinical finding</td>
<td>Periorbital, erythema, tenderness</td>
<td>Proptosis, chemosis, ophthalmoplegia, decreased visual acuity</td>
</tr>
<tr>
<td>Bacteria</td>
<td>Staphylococcus/ Streptococcus/ strep pneumonia</td>
<td>Haemophilus inf بالاطفال , strep pneumonia</td>
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</table>
Inflammation and infection of the orbital soft tissues posterior to the orbital septum.

It is called Post Septal Cellulitis

The infection often arises from an adjacent ethmoid sinus, reflecting that the medial wall of the orbit is extremely thin.

Most common causative organisms are Staphylococcus and Streptococcus.

The patient presents with:
- painful, proptosed eye;
- conjunctival injection;
- periorbital inflammation and swelling;
- reduced eye movements;
- possible visual loss;
- systemic illness and pyrexia.

Serious complications:
- Brain abscess
- Cavernous sinus thrombosis
- Meningitis

It can cause blindness if left untreated esp. in children.

Diagnosis:
- 1. Mainly by clinical evaluation
- 2. MRI (CST)
- 3. CT Scan (ascertain precipitating sinus involvement, identify orbital abscess)

Treatment:
- Admission & Broad spectrum IV antibiotics.
- Surgical intervention (draining the abscess)
- Orbital decompression
- ENT and neurosurgical help.

Figure 4.2 (a) The clinical appearance of a patient with right orbital cellulitis. (b) A CT scan showing a left opaque ethmoid sinus and subperiosteal orbital abscess.
PERIORBITAL CELLULITIS

- Involves the tissues anterior to the orbital septum, mostly affecting the lid structure alone.
- It presents with preorbital inflammation and swelling.
- No other ocular features of the orbital cellulitis.
- Eye movement is not impaired.

**Complications:**
1. Orbital abscess
2. Orbital mucocele (Arises from accumulated secretions within any of the paranasal sinuses, may need surgical treatment).
Vascular abnormalities

- Carotid cavernous fistula.
- Orbital varices.
- Capillary hemangioma.
CAROTICOCavernous FISTULA

- This is an abnormal connection between the carotid artery and the CS itself, causing abnormal arteriovenous shunting within the cavernous sinus, so the veins are exposed to a high intravascular pressure

**PRESENTATION:**
1. Dilated conjunctival veins & proptosed eyes
2. E.O.M engorgement leading to decreased eye movements
3. Increased pressure in veins draining the eye leading to increased IOP
4. Pulsatile tinnitus
5. Bruit might be heard over the eye

**DIAGNOSIS:** ANGIOGRAME

- Gross chemosis in a patient with a high-flow carotid-cavernous fistula
- Enlargement of the conjunctival and episcleral blood vessels in a patient with a low-flow carotid-cavernous communication
Capillary hemangiomas are one of the most common benign orbital tumors of infancy. They present as an extensive lesion of the orbit, affecting the skin of the lid.

They are benign endothelial cell neoplasms that lead to vessel growth stimulation.

- They are typically absent at birth and characteristically have rapid growth in infancy with spontaneous involution in the first 5 years of life.

Swelling of the upper lid may cause sufficient ptosis to cause amblyopia.

- Treated by local injections of steroids only when the size & position obstructs the visual axis risking the development of Amblyopia.

- Incisional surgical techniques also have had variable success.
Dilated orbital veins that causes intermittent proptosis when the venous pressure is raised due to a certain position or maneuver.

Usually unilateral & painless. The patient might complain from tightness across the eye & nose.

Treatment:
Avoid activities that cause the symptoms.
Surgery is indicated when the symptoms get worse by emobilizing the affected vein.
DERMOID CYST

Caused by overgrowth of ectodermal tissue beneath the surface.

Etiology:
- congenital defect that occurs during embryonic development when the skin layers do not properly grow together.

Commonly observed as a painless mass in the superior temporal area at the lateral portion of the eyebrow.

Clinical feature:
1) small, often painless
2) the lump may be skin-colored or slight yellow tinged.

If a dermoid cyst was more to the medial side, a possibility of encephalocele increases.

• Diagnosis by history & physical examination

• Treatment includes surgery to remove the cyst
  Excision is performed for cosmetic reasons and to avoid traumatic ruptured.
**Tumor**

**RHABDOMYOSARCOMA**
- Rapidly growing, malignant tumour of striated muscle.
- Chemotherapy is effective if the disease is localized to the orbit.
- **Commonest orbital tumor in children (sarcoma)**

**Optic nerve gliomas**
- may be associated with type1 neurofibromatosis
- They are difficult to treat but are often slow-growing and thus may require no intervention.

**Lacrimal gland tumor**
- malignant lacrimal gland tumours carry a poor prognosis.
- Benign tumours still require complete excision to prevent malignant transformation

**meningiomas**
- of the (optic nerve) are rare, and may also be difficult to excise
- they can be monitored over time and some may benefit from treatment with radiotherapy.
- Meningiomas arising from the middle cranial fossa may spread through the optic canal into the orbit

**lymphoma**
- The treatment of lymphoma requires a full systemic investigation to determine whether the lesion is indicative of widespread disease or whether it is localized to the orbit.
- In the former case the patient is treated with chemotherapy, in the latter with localized radiotherapy
- metastasis from other systemic cancers;
- (neuroblastomas in children)
- (the breast 40%, lung, prostate or gastrointestinal tract in adults).
Orbital Diseases

Clinical features are:

- Endophthalmos
- Exophthalmos (Proptosis)
- Eyelid and conjunctival changes
- Pain
- Diplopia
- Visual acuity disturbances
Exophthalmus (Proptosis)

- It is a **protrusion** of the eyeball caused by a space-occupying lesion, it may be unilateral or bilateral.

  - Causes are classified into:

  1) **Intra-conal lesions**: the lesion lies within the cone formed by extra-ocular muscles, thus the eye globe is displaced directly forwards, e.g. most commonly:
   1. dysthyroid eye disease,
   2. others like Optic nerve sheath meningioma.

  2) **Extra-conal lesions**: the lesion is outside the cone, so the eye is displaced to one side, e.g. mostly **tumors**, tumor of the lacrimal gland displaces the globe nasally.
The most common cause is Graves disease, it usually causes bilateral proptosis.

Infections (Orbital cellulitis)

Orbital Inflammatory disease

Vasculitis (wegener’s granulomatosis)

Neoplastic (unilateral): Lacrimal, Lymphoma, Metastatic.

Orbital vascular disease (orbital varices...causes transient proptosis on valsalva manoeuvre)

Trauma

# Pseudoproptosis (pseudoexophthalmos):
* Buphthalmos (congenital open angle glaucoma)
* Contralateral enophthalmos (posterior displacement of the eye)
* Ipsilateral lid retraction

CAUSES OF PROPTOSIS

A. BILATERAL PROPTOSIS
1. Endocrine exophthalmos due to dysthyroid eye disease.
2. Cavernous sinus thrombosis.
3. Metastatic neuroblastoma.
4. Orbital myositis (due to causes other than thyroid dysfunction).

B. UNILATERAL PROPTOSIS:
1. Haemangioma.
2. Dermoid cyst.
3. Lymphangioma.
4. Rhabdomyosarcoma.

C. TRANSIENT PROPTOSIS
1. Arterio-venous malformations.
2. Orbital varices.

NOTE:
- Transient proptosis induced by increasing the cephalic venous pressure (by a Valsalva manoeuvre) is a sign of orbital varices.
- The speed of onset of proptosis may also give clues to the aetiology. A slow onset suggests a benign tumour whereas rapid onset is seen in inflammatory disorders, malignant tumours and caroticocavernous fistula.
- The presence of pain may suggest infection (e.g. orbital cellulitis).
Exophthalmos - Approach

**History**
- Duration, rate of onset.
- Complaints of foreign body sensation or dry gritty eyes.
- Associated ocular symptoms (pain, decreased visual acuity or field, diplopia, transient visual loss).

**Examination**
- Full ophthalmic & systemic examination.
- Exophthalmometer: normally 14-21 mm, if > 21 mm or >3mm difference between the two eyes is abnormal.

**Treatment**
- Depends on the underlying cause.

**Complication**
- 1. Failure of the eyelids to close, causing corneal ulcerations and damage.
- Compression on the optic nerve or ophthalmic artery leading to blindness.
- Restriction of eye movements.

- History of trauma
- Family history
Enophthalmos

- **Definition**: Relative recession (backward or downward displacement) of the globe into the bony orbit.
- **Presentation**: Presents clinically as a sunken appearance to the eye with pseudoptosis.
- **The three basic structures** that determine globe position are the bony orbits, the ligament and muscle system, and the orbital fat. Change in the volumetric relationship between the rigid bone cavity, the orbit, and its contents (predominantly the orbital fat and the eye).

It is a feature of an orbital (blowout fracture), when blunt injury to the globe and orbit fractures a thin orbital wall and displaces orbital contents into an adjacent sinus.
Enophthalmos

causes:

Primary (congenital)
- inadequate, orbital cavity development

Secondary (acquired)
- Blow out trauma
- **Horner's Syndrome

Post-surgical muscle shortening

Treatment
- Reconstruction of the bony orbit with restoration of bony orbital volume and repositioning of the globe

Complications
- Long-standing enophthalmos, especially associated with very extensive orbital trauma, may be associated with severe orbital scarring, and correction can be very difficult or impossible.

** this is really a pseudoenophthalmos due to narrowing of the palpebral fissure
- Pain; inflammatory conditions, infective disorders and rapidly progressing tumours cause pain. This is not usually present with benign tumours.

- Eyelid and conjunctival changes; Conjunctival injection and swelling suggest an inflammatory or infective process.

Infection is associated with reduced eye movements, erythema and swelling of the lids (orbital cellulitis).

With more anterior lid inflammation (preseptal cellulitis), eye movements are full and the globe is not inflamed, thus excluding the more serious, orbital cellulitis.

- Visual acuity: this may be reduced by:
  - Exposure keratopathy from severe proptosis, when the cornea is no longer protected by the lids and tear film;
Binocular diplopia occurs when only one of the two eyes is fixated on a target. Thus the image in the second eye does not fall upon the fovea. This can be due to:

- direct involvement of the muscles in myositis and dysthyroid eye disease (Graves’ disease). The eye appears to be tethered, so that eye movement is restricted in a direction away from the field of action of the affected muscle (e.g. if the inferior rectus is thickened in thyroid eye disease there will be restriction of upgaze).

- involvement of the nerve supply to the extraculcular muscles (paralytic squint. Here, diplopia occurs during gaze into the field of action of the muscle (e.g. palsy of the right lateral rectus produces diplopia in right horizontal gaze).
The eyelid is a thin fold of skin that covers and protects an eye, consist of four layers:

1. An anterior layer of skin and subcutaneous tissue.
2. Muscular layer that comprises the orbicularis oculi muscle, which is responsible for the closing of the lids.
3. Tarsal plate which is a tough collagenous layer that houses meibomian gland.
4. Tarsal (palpebral) conjunctiva.

The orbital septum represents the anatomic boundary between the lid tissue and the orbital tissue.
Disease of eyelid

- inflammation
- lid lumps
- abnormalities of the lashes

abnormal lid position

**EYELID MALPOSITION**

- **Ectropion** - Abnormal eversion of eyelid (usually the lower) away from the globe
- **Entropion** - Abnormal inversion of eyelid (usually lower) towards the globe
- **Ptosis** - Abnormally low position of the upper lid
- **Horner's Syndrome**
  (ptosis+meiosis+anhidrosis+enophthalmos)
Ptosis
This is an abnormally low position of the upper eyelid.

PATHOGENESIS  It may be caused by:

1. Mechanical factors:
   - (a) Large lid lesions pulling down the lid.
   - (b) Lid oedema.
   - (c) Tethering of the lid by conjunctival scarring.
   - (d) Structural abnormalities including a disinsertion of the aponeurosis of the levator muscle, usually in elderly patients.

2. Neurological factors:
   - (a) Third nerve palsy
   - (b) Horner’s syndrome, due to a sympathetic nerve lesion
   - (c) Marcus–Gunn jaw-winking syndrome

3. Myogenic factors:
   - (a) Myasthenia gravis
   - (b) Some forms of muscular dystrophy.
   - (c) Chronic external ophthalmoplegia.

Also called Trigemino-oculomotor Synkinesis
- Autosomal dominant
- In this congenital ptosis there is miswiring of the nerve supply to the pterygoid muscle of the jaw and the levator of the eye so that the eyelid moves in conjugation with movements of the jaw.
Ptosis

**SYMPTOMS**

Patients present because:
- They object to the cosmetic effect;
- Vision may be impaired;
- There are symptoms and signs associated with the underlying cause (e.g. asymmetric pupils in Horner's syndrome, diplopia and reduced eye movements in a third nerve palsy).

**Signs**

- There is a reduction in size of the interpalpebral aperture.

  The upper lid margin, which usually overlaps the upper limbus by 1–2mm, may be partially covering the pupil.

  The function of the levator muscle can be tested by measuring the maximum travel of the upper lid from upgaze to downgaze (normally 15–18mm). Pressure on the brow (frontalis muscle) during this test will prevent its contribution to lid elevation.

  If myasthenia is suspected the ptosis should be observed during repeated lid movement.

  Increasing ptosis after repeated elevation and depression of the lid is suggestive of myasthenia.

**Management**

- It is important to exclude an underlying cause whose treatment could resolve the problem (e.g. myasthenia gravis). Ptosis otherwise requires surgical correction.

  In very young children this is usually deferred but may be speed up if pupil cover threatens to induce amblyopia.
Entropion - It is an inturning, usually of the lower lid towards the globe. - Patients present with irritation caused by eyelashes rubbing on the cornea. - More common in elderly, because orbicularis muscle become spasm. - It may also caused by Conjunctival scarring distorting the lid (cicatrical entropion)

- Treatment:
  - Short term: include the application of lubricants to the eye or taping of the eyelid to turn the lashes away from the globe.
  - Can be alleviated for a period by the injection of botulinum toxin into the palpebral part of the orbicularis muscle of the lower lid
  - Permanent: surgery

Ectropion - Eversion of the lid away from the globe.

- Causes:-
  - Age related orbicularis muscle laxity.
  - Facial nerve palsy.
  - Scarring of periorbital skin.

- Initial complaint of watery eye, because the mal position of the lids everts the punctum and prevents drainage of the tears leading to epiphora (overflow of tears leading to overflow over the cheeks).
- It also exposes the conjunctiva leading to irritable eye and dehydration.

- Treatment: surgical
LID INFLAMMATION

**Blepharitis**

- **Inflammation of the eyelid margins.**
- It is a chronic disease.
- Symptoms:
  - tired, itchy, sore eye, worse in the morning.
  - Crusting of the lid margin.
- Classified into: anterior and posterior.
- Both forms are strongly associated with seborrhoeic dermatitis, atopic eczema and acne rosacea.

**anterior blepharitis**

inflammation of the lid margin, skin and eyelash follicles

**Posterior blepharitis**

meibomian gland disease
**Anterior Blepharitis**

Is when the inflammation is located in the outside surface the lid margin, specifically in lash line.

- Signs are:
  - Redness and scaling of the lid margin.
  - Debris in the form of a collarette around the eyelashes.
  - Reduction in the number of eyelashes.
  - Some lash bases may ulcerated-sign of staphylococcal infection.
- In severe diseases the cornea is affected (blepharokeratitis)
- Small infiltrate ulcers may form in the peripheral cornea (marginal keratitis) due to immune complex response to staphylococcal exotoxins.

- treatment:
  1. Cleaning with a cotton bud wetted with bicarbonate or diluted baby shampoo to remove squamous debris from lash line.
  2. Topical steroid: used infrequently.
  3. Topical (fusidic acid) + systemic antibiotic in staphylococcal lid disease.

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**Posterior Blepharitis**

Have another name which is meibomian gland dysfunction.

- Signs are:
  - Obstruction and plugging of the meibomian orifices
  - Thickened, cloudy, expressed meibomian secretion.
  - Injection of the lid margin and conjunctiva.
  - Tear film abnormalities and punctuate keratitis.

- treatment:
  1. Hot compressors and lid massage.
  2. Oral tetracycline.
  3. Artificial tears to prevent dryness
LID LUMP

**Chalazion**
- It is a granuloma within the tarsal plate caused by obstructed meibomian gland.
- Painless.
- Symptoms are unsightly lid swelling which resolve within six months if the lesion persist we remove it surgically.

**Internal hordeolum**
- It is an abscess in meibomian gland.
- Painful.
- May respond to topical antibiotics but incision maybe necessary.

**External hordeolum**
- It is an abscess in eyelash follicle.
- Painful
- Most cases are self limiting.
- Treatment requires the removal of the associated eyelash and application of hot compresses.
LID LUMP

[Diagram of eye with labels: Meibomian Gland, Lash Follicle, Stye (External Hordeolum), Internal Hordeolum]
LID LUMP

MOLLUSCUM CONTAGIOSUM

- Is a viral infection of the skin or the mucous membranes, caused by pox virus.
- Can be presented with umbilicated lesion found on the lid margin.
- Cause irritation, redness, follicular conjunctivitis (small elevation of lymphoid tissue found on tarsal conjunctiva)
- Treatment requires excision of the lid lesion.

XANTHELASMA

- Lipid containing bilateral lesions.
- Usually associated with hyperlipidemia.
- Removed for cosmetic reasons.
LID LUMP

**Cysts**
- Sebaceous cysts are opaque. They rarely cause symptoms. They can be excised for cosmetic reasons.
- A cyst of Moll is a small translucent cyst on the lid margin caused by obstruction of a sweat gland.
- A cyst of Zeis is an opaque cyst on the eyelid margin caused by blockage of an accessory sebaceous gland. These too can be excised for cosmetic reasons.

**Squamous cell papilloma**
- This is a common, frond-like lid lesion with a fibrovascular core and thickened squamous epithelium. It is usually asymptomatic but can be excised for cosmetic reasons with cautery to the base.

**Keratoacanthoma**
- This is a brownish pink, fast-growing lesion with a central crater filled with keratin.
- Treatment is by excision.
- Careful histology must be performed as some may have the malignant features of a squamous cell carcinoma.

**Naevus (mole)**
- These lesions are derived from naevus cells (altered melanocytes) and can be pigmented or non-pigmented.
- No treatment is necessary.
ABNORMALITIES OF THE LASHES

**Trichiasis**

a common condition, Where the eyelashes will be directed backward towards the globe, against the cornea. It's distinct from entropion.

Complicated by corneal abrasion

Symptoms: The eye becomes red and irritated, foreign body sensation, tearing, sensitivity, and sometimes pain when exposed to light.

Causes:
- Infectious: Trachoma, Herpes zoster
- Autoimmune, Inflammatory
- Postsurgical (lower lid transconjunctival approach for floor fracture repair or blepharoplasty after ectropion repair)
- Chemical: Alkali burns to the eye / Medical drops (eg, glaucoma drops)
- Thermal burns to face/lids

Treatment:
- Epilation of the affected eyelashes with electrolysis, cryotherapy.
- An underlying abnormal lid position is treated surgically.

**Distichiasis**

is a rare disorder defined as the abnormal growth of lashes from the orifices of the meibomian glands on the posterior lamella of the tarsal plate.

Two types: acquired and congenital.

In the acquired form, most cases involve the lower lids. Lashes can be fully formed or very fine, pigmented or nonpigmented, properly oriented or misdirected.

The congenital form is autosomal dominant with complete penetrance. It can be isolated or associated with ptosis, strabismus, congenital heart defect, or mandibulofacial dysostosis.

This defect may be related to the epithelial germ cells failure to differentiate completely to meibomian glands, instead they become pilosebaceous units, pilo = hair.
ABNORMALITIES OF THE LASHES

**KEY POINTS**
- Blepharitis is a common cause of sore “tired” irritable eyes.
- A patient with an umbilicated lesion and a sore red eye may have molluscum contagiosum.
- Abnormalities of eyelid position can cause corneal disease.
- Always consider the possibility of malignancy in lid lesions.

**PAEDIATRIC OPHTHALMOLOGY**
- A ptosis in a child, if the visual axis is covered, may cause amblyopia.
The nasolacrimal drainage system serves as a conduit for tear flow from the external eye to the nasal cavity. Tears drain into the upper and lower puncta → upper and lower canaliculi → common canaliculus → lacrimal sac → nasolacrimal duct.

Tear drainage is an active process. Each blink will pump tears through the system.
Measuring tear secretion with Schirmer tear testing.

Structure of the tear film:

- **Oily layer (approx. 0.1 µm)**
  - Cholesterol esters
  - Cholesterol
  - Triglycerides
  - Phospholipids

- **Water layer (approx. 8 µm)**
  - 98-99% water
  - approx. 1% inorganic salts
  - approx. 0.2-0.5% proteins,
    globulins, and albumin
  - approx. 0.02-0.06% lysozyme
  - Rest: glucose, urea, neutral
    mucopolysaccharides (mucin), and acidic
    mucopolysaccharides

- **Mucin layer (approx. 0.8 µm)**
  - Epithelium with microwells
  and folds

Fig. 1.2 The tear film is composed of three layers:
- An oily layer (prevents rapid desiccation).
- A watery layer (ensures that the cornea remains clean and smooth for optimal transparency).
- A mucin layer (like the oily outer layer, it stabilizes the tear film).
Dry eye is a condition of the ocular surface due to a deficiency of tear quantity or composition or excessive evaporation, characterized by hyperosmolarity and leading to ocular surface damage, inflammation and symptoms of discomfort and visual loss. An alternative term is Keratoconjunctivitis sicca (CS).

Aqueous Deficient dry eye

1. Deficiency of lacrimal secretion resulting in Keratoconjunctivitis sicca (KCS).
2. If associated with dry mouth or mucous membrane = Sjogren’s Syndrome is an autoimmune disease, Secondary Sjogren: when associated with connective tissue disease with Rheumatoid Arthritis as the commonest.

Symptoms
Grittiness, burning, and photophobia
Lids heaviness and ocular fatigue. May worse in evening
Visual acuity may be reduced

Signs
Small dots of fluorescence over exposed corneal & conjunctival surface.
Tags of abnormal mucus may attach to cornea causing pain. (filamentary keratitis)

Treatment
Supplementation of tears (artificial tear)
Humid environment around the eyes using shielded spectacles
Occlude the puncta with plug or surgery to conserve the tears
1. Abnormalities in tear flow and evaporation (DRY EYE)

ABNORMALITIES IN COMPOSITION

INADEQUATE MUCUS PRODUCTION

Stevens-Johnson’s Syndrome
Acute episodes inflammation causing macular target lesion on skin and discharging lesion on the eye, mouth and vulva. Causes conjunctival shrinkage with adhesion forming between the globe, aqueous and mucin deficiency. Similar symptoms to those seen in aqueous deficiency.
TX; Artificial Tear & Vit A supplement for Xerophthalmia

INADEQUATE MEIBOMIAN OIL DELIVERY

Extensive meibomian gland obstruction may result in a deficient tear film lipid layer and lead to increased water loss from the eyes. This results in tear hyper-osmolarity in its own right and also may exacerbate an existing aqueous Deficient dry eye.

MALPOSITION OF EYELID MARGIN

Causes:
- Ectropion
- Entropion
- Facial palsy
- Proptosis

All of these will cause unstable pre-ocular tear film.
2. DISORDERS OF TEAR DRAINAGE

Tear production exceed the capacity of drainage system. It may caused by:

1. Irritation of ocular surface, e.g. by foreign body (Lacrimation)
2. Occlusion of any part of drainage system (Epiphora)

SYMPTOMS
Watering eyes associated with stickiness
Eye is white.
Symptoms may get worse during windy or cold weather

SIGNS
Stenosed punctum may apparent on slit lamp examination
Obstruction may diagnosed by syringing the nasolacrimal system with saline → the system is patent if the patient taste the saline as it reached the pharynx.
Injecting radio-opaque dye to confirmed the exact location into the nasolacrimal system. Then, X-rays is used to follow the passage of the dye until we find the blockage.

TREATMENT
Treat the underlying cause.
SURGERY: Dacryocystorrhinostomy (DCR), connecting the mucosal surface of lacrimal sac to the nasal mucosa by removing the intervening bone.
Nasolacrimal duct is common site for tear drainage system to get Blocked.

The sac may become infected → accumulate as mucocele or causing dacrocystitis.

If epiphora persist, patency is achieved by passing probe via the punctum to open the obstruction.

**Congenital NLD obstruction**

Normally the NLD develops as a solid cord which completes canalization just before birth. Sometimes incomplete canalization occurs specially for the lower part. Leading to epiphora, mucocele formation and sometimes dacrocystitis (infection of the lacrimal sac).

Pressure on the sac will cause mucus to be expressed from punctia.

Alert: When seeing lacrimation in infant do not forget the most important cause congenital glaucoma.

Management:
Spontaneous opening occur in most of the cases.
If not, lacrimal sac massage can be tried.
Lacrimal sac syringing and probing can help in resistant cases.

Causes:
- Infection
- Trauma
- Tumour
- Radiation
3. INFECTION OF THE NASOLACRIMAL SYSTEM

DACRYOCYSTITIS
Infection of the sac cause by obstruction of the drainage system.
Organism involved usually Staphylococcus.

Symptoms
Painful swelling on medial side.
Enlarged and infected sac.
Could resulting in formation of mucocele
(accumulation of mucus in the lacrimal sac (not infected))

Treatment
Systemic antibiotic
DCR may be necessary to prevent recurrence.
Thank You!