THE LID

Anatomy of the lid:

* Check movie "anatomy of the lid model"

The eyelids are two movable muco-cutaneous folds which protect the eye on closure. They are joined temporarily at the outer canthus and nasally at the inner canthus, hosted in between them is the palpebral fissure: An oval opening which allows the eye receive images for external world. On closure of palpebral fissure, the eye ball is protected by the lids.

The lids are covered anteriorly by skin, posteriorly by the palpebral conjunctiva. The lids are continuous with the surrounding tissues of the face but has a free border (at the palpebral fissure), this free border is called the intermarginal strip.(fig.1)

\[ \text{Fig.1 : The palpebral fissure is an elliptical space formed when the lids are open. The angles of the fissure are called the canthi.} \]

\[ \text{Fig.2. Skin has been removed, orbicularis oculi muscle is seen.} \]
Fig. 3 The two tarsi are joined together and gain attachment to bone of the face medially through the medial palpebral ligament and laterally through the lateral palpebral ligament.

Fig. 4. The septum orbitale is a thin membrane that extends between the orbital margin to the tarsus. Tissues anterior to the septum belong to the lid while those posterior to the septum belong to the orbit.
Fig 5. The levator muscle originates back at the apex of orbit, runs forward horizontally, pierce septum orbitale and change its direction vertically to gain insertion into anterior surface of upper tarsus and also medial and lateral palpebral ligaments.

Fig 6. Embedded in the tarsus are 20-30 vertically arranged Meibomian glands. They open on the lid margin.
sagittal section in the upper lid shows:

1. **Skin** is thin and is loosely attached to the underlying tissues. It is devoided of fat.
2. **Sub-cutaneous Loose Connective Tissue**
3. **The Muscular layer** contains:
   - orbicularis oculi muscle: for closure of the palpebral fissure
   - levator palpebrae superioris: for opening of the palpebral fissure
   - the Muller's muscle: for opening of the palpebral fissure
4. **Sub-muscular layer**: loose connective tissue which contains the blood vessels and the nerves of the lid
5. **The tarsal plate** is the skeleton of the lids. It is D shaped with the straight side at the lid margin. The ends of the two tarsal plates are fixed to the orbital bones by the lateral and the medial palpebral ligaments. The tarsus is made of dense fibrous tissue. Embedded in the tarsus are 20-30 vertically arranged Meibomian glands. They open on the lid margin.

- **The septum orbitale** is a membrane attached to the orbital margin at one end and the border of the tarsus at the other end. If we incise the septum orbitale, we get inside the orbit.

6. **The palpebral conjunctiva**: is thin and vascular and is firmly adherent to the tarsus. Two millimeters above the lid margin it shows a horizontal groove--- the sulcus subtarsalis

**Muscles of the lid:**

1. **The orbicularis oculi muscle(fig.2)**:
   - **origin**: medial palpebral ligament and adjacent bones
   - **insertion**: lateral palpebral raphe
   - **Nerve supply**: facial nerve (7th c.n.)
   - **action**: closure of the lids

The orbicularis oculi muscle is divided into 4 parts:

- **Orbital part**: surrounds the orbital margin
- **Palpebral part**: located in the lid itself
- **Marginal part "Muscle of Riolan"**: found at the lid margin
- **Lacrimal part "Horner's muscle"**: is attached to the fascia of the lacrimal sac and continues with the palpebral fibres
2. **The levator palpebrae superioris muscle (fig 5):**

   **Origin:** Bone at the orbital apex above the common tendinous ring (which gives origin to the four recti muscles)

   The muscle runs anteriorly just below the roof of the orbit then pierces the septum orbitale and changes its direction into vertical one to **gain insertion into:**
   - skin
   - superior fornix
   - anterior surface of the tarsus
   - medial palpebral ligament
   - lateral palpebral ligament

   **Nerve supply:** 3rd c. n. (oculo-motor n.)

   **Action:** Elevation of the upper lid

3. **The Muller's muscle:**

   *Non striated muscle fibres, supplied by sympathetic fibres,* that run on the under surface of the levator. Its **origin** is among the levator fibres and its **insertion** is at the upper border of the tarsus. It helps widening of the palpebral fissure.

   In Horner's syndrome (cut of sympathetic innervation), their is **partial ptosis** (drooping of upper lid).
The lid margin:

**Fig 7:** the lid margin has the following landmarks from external toward the eyeball: anterior rounder border then rows of hair roots then the grayline then the white line (opening of meibomian glands) and lastly the sharp posterior border.

The lid margin is the free margin of the lid. It is 2-3 mm broad. It shows (fig. 7):

1. **The anterior border:**
   - is rounded and carries the cilia (lashes). The **lashes** are modified hairs arranged in 2-3 rows Upper lid: 150, are directed upwards, forwards & laterally Lower lid: 75, are directed downwards, forwards & laterally
   - Two types of glands are related to the lash follicles:
     a. **Zeis glands** are modified sebaceous glands, which lubricate the lashes.
     b. **Moll’s glands** are modified sweat glands whose ducts open into the hair follicle or on the lid margin.

2. **The gray line:**
   - lies in front of the ducts of the Meibomian glands. An incision in the gray line will open into the space of loose connective tissue between the orbicularis oculi muscle and the tarsus.

3. **The openings of the Meibomian glands (white line)**

4. **The posterior border**
   - of the lid margin is sharp and its sharpness is necessary for the spread of tears over the surface of the eye during blinking.
Surgical anatomy of the lid:
The lid is composed of two lamellae:
1. Anterior lamella: consists of skin and orbicularis. It carries the lashes at its distal end.
2. Posterior lamella: consists of tarsus and conjunctiva.

The junction between these two layers is marked on the lid margin by the grey line which lies between the lash line anteriorly and the white line (Meibomian gland orifices) posteriorly. At the grey line the lid can be split into its two surgical lamellae.
Fig 9. Shows the different parts of the orbicularis oculi muscle. Notice the normal position of the upper and the lower lid margins

**The lid position (fig.9):**
- Upper lid covers the upper 1/6 of the cornea
- Lower lid just touches the limbus

**Abnormal position of the lid:**
- Drooping of the upper lid: blepharoptosis
- Lid retraction: as in thyroid ophthalmopathy (upper or lower lid)
Functions of the lids:
1. **Protection** of the globe from trauma, excess light.
2. Meibomian glands: are modified sebaceous glands which secrete an oily substance that forms the superficial layer of the tear film. This oily layer prevents overflow of tears into the cheek and decrease the rate of evaporation of the aqueous layer of the tears.
3. **Blinking**: the upper lid descends every 3 seconds to come in contact with the tear film on the lower lid margin. As the lid margin of the upper lid goes up, its sharp posterior border, which lies in contact with the eye, will help spread of the tears to moisten the eye.
4. As the contraction of the orbicularis is conducted from lateral to medial part, the tears are forced to move to the inner canthus where drainage takes place. Tears go inside the lacrimal punctum into caniculi by capillarity. Contraction of the lacrimal part of the orbicularis creates a negative pressure inside the sac which helps suction of the tears.

Blood supply:

![Blood supply of lids](image)

**Arteries**:
1. Medial palpebral a from the ophthalmic artery
2. Lateral palpebral a from the lacrimal artery
3. branches from the facial vessels

In the upper lid, the vessels anastomose freely to form two arches; one along the upper border of the tarsus (peripheral arcade) and the second near the lid margin (marginal arcades). The lower lid has only one arcade as it is short in height compared to the upper one.
Veins: form two plexuses
- pretarsal plexus ------ to facial and temporal veins
- post-tarsal plexus ------ to ophthalmic veins

Blood supply of lid is extensive. This promotes healing after trauma and surgery and is a good defense against infections.
Nerve supply:

**Sensory:**

**Upper lid:**
- palpebral branch of lacrimal n.
- supra orbital nerve
- supra trochlear nerve
- infra trochlear nerve

**Lower lid:** infra orbital nerve

Motor supply to muscles of the lids:
- orbicularis: 7th cranial nerve
- levator: 3rd cranial nerve
- Muller's: sympathetic innervation

Lymphatic drainage:
- lateral part: pre-auricular LNs
- medial part: submandibular LNs