
UNIT 7 ANATOMY OF LIDS AND LACRIMAL SYSTEM

Structure

- 7.0 Objectives
- 7.1 Introduction
- 7.2 Description of Eye Lids and Lacrimal System
- 7.3 Let Us Sum Up
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7.0 OBJECTIVES

By the end of this unit, you should be able to understand:

- the anatomy of lid, different layers of lid, its glands and its blood supply;
- the anatomy of lacrimal fluid; and
- anatomy of lacrimal drainage system.

7.1 INTRODUCTION

Eye lids are movable folds which act as shutters protecting eye from external environment. It regulates entry of light into the eye along with pupil. Whenever any object come towards the eye, eye lid reflexly closes and protects the eyeball. In some diseases eye lid particularly affecting its nerve supply may not close perfectly during sleep in which case because of exposure permanent damage occur to cornea and conjunctiva. Eye lid helps to keep the cornea moist.

7.2 DESCRIPTION OF EYE LIDS AND LACRIMAL SYSTEM

Brief structure of the eye lids and lacrimal system is described as under:

Anatomy of Eye Lid

There are two eye lids—upper eye lid and lower eye lid in each eye.

Layers of the Eye Lid

From anterior to posterior

- 1) Skin
- 2) Muscular Layer
- 3) Fibrous Layer—Tarsal plate
- 4) Mucous membrane Layer—Conjunctiva

Skin of the Eye Lid

Skin of the lid is the thinnest in the body. It is less than 1mm thickness. It is almost transparent. It is loosely attached to underlying structures. At the margin of the eye lid skin layer ends. There is no subcutaneous fat in eye lid. Skin of the lid contain sweat gland and sebaceous gland.

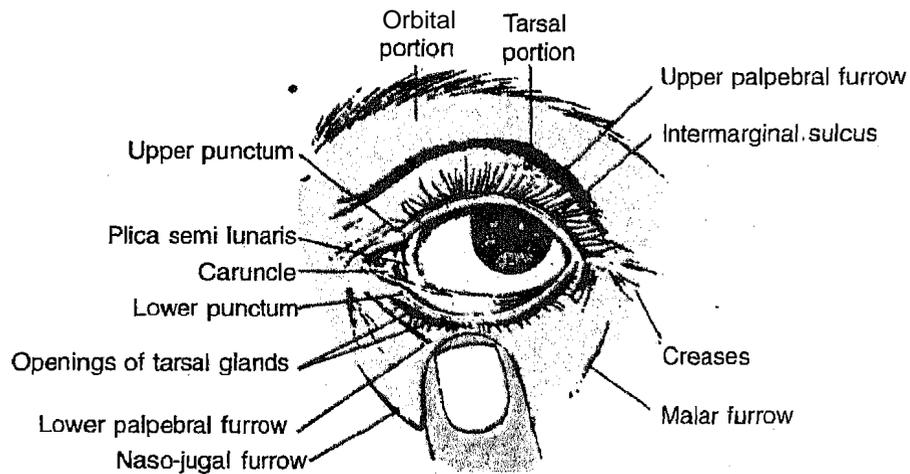


Fig. 7.1: The surface anatomy of the eye lids

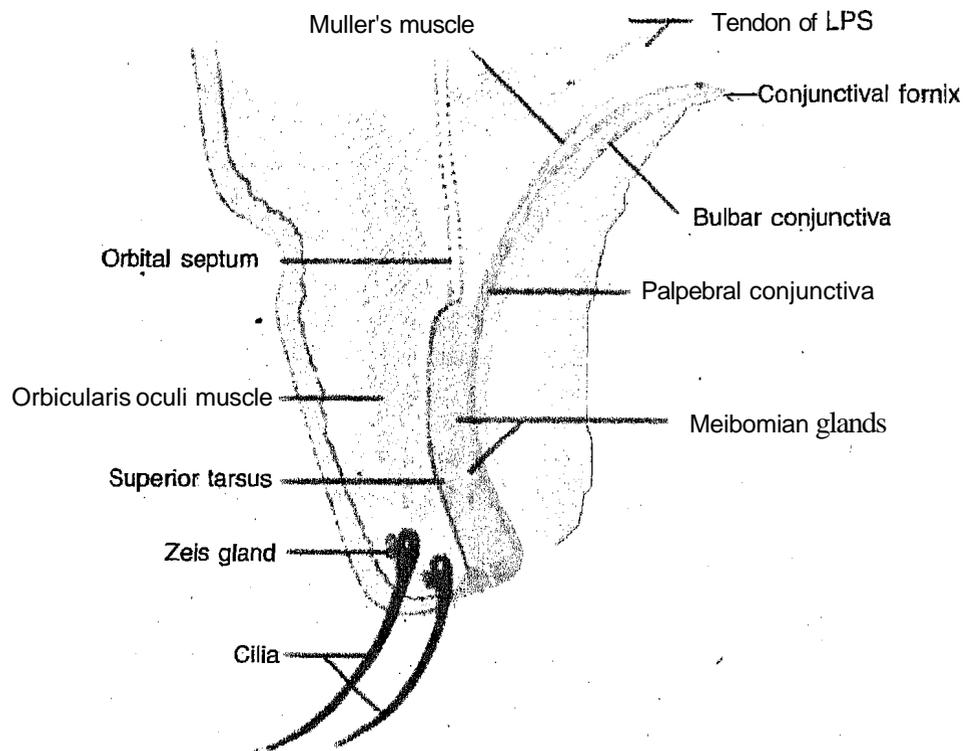


Fig. 7.2: Section of lid

Muscular Layer

Muscles present in eye lid include:

- 1) Orbicularis oculi
- 2) Levator palpebral superioris
- 3) Muller's muscle

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Orbicularis Oculi Muscle

This muscle containing concentric layers of muscle fibres covers the whole of the lid. **Parts** of orbicularis oculi are:

- 1) Orbital part
- 2) Palpebral part

Orbital Parts of Orbicularis Oculi Muscle

Origin: Medial orbital margin and nearby nose, from the medial palpebral ligament and from lacrimal crest.

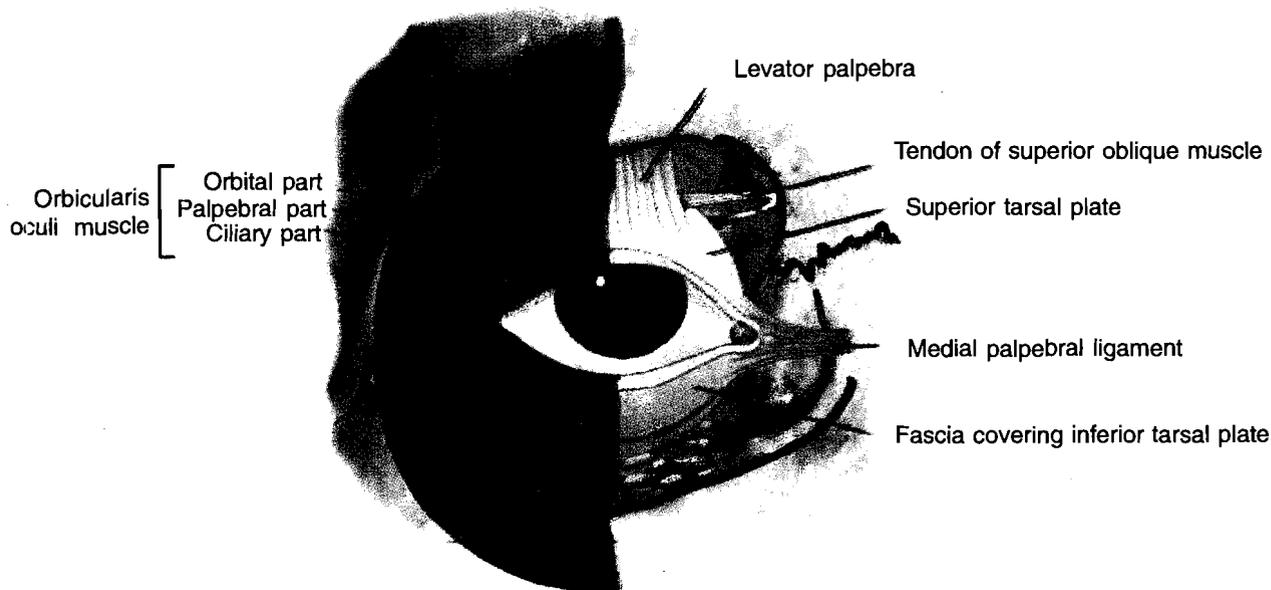


Fig. 7.3: Muscles of the eyebrow and eye lid

Palpebral Part of Orbicularis Oculi

Origin: Medial palpebral ligament and bone below and above it.

Both the parts of the orbicularis oculi after covering whole of the lid unite at the lateral part of the lid by forming a structure which is known as lateral palpebral raphe.

Levator Palpebral Superioris

Origin: Common tendinous ring situated within the superior orbital fissure.

Insertion: After passing between the superior orbital margin and eyeball attached to the anterior 1/3rd of tarsal plate and skin of lid.

Muller's Muscle

It is a nonstriated muscle, different in the two lids – upper (superior) and lower (inferior).

Superior

Origin: As a thin band arises from tendon of levator palpebral superioris.

Insertion: Tarsal plate.

Inferior

Origin: Fascial sheath of inferior rectus.

Insertion: Bulbar conjunctiva and tarsal plate of lower lid.

Fibrous Layer Parts

- 1) Tarsus
- 2) Orbital septum

Tarsus

Tarsus is a thickened layer and this gives strength to the lids. It does not contain any cartilage or bone. It is a thickened fibrous tissue. The height of tarsus is about 1cm in upper lid and about 5 mm in the lower lid. Its thickness is about 1mm. Main function of tarsus is to give structural support to eye lid.

Orbital Septum

This is a membrane like structure which arises from the superior and inferior orbital margin. It is a flexible structure and follows the movement of the lid. Structures piercing orbital septum includes:

- Lacrimal vessels and nerves
- Supra-orbital vessels and nerves
- Supratrochlear nerve and artery
- Infratrochlear nerve
- Palpebral artery and levator palpebral superioris muscle.

Palpebral Tissue

The opened lids enclose an elliptical opening between their margins end is called palpebral fissure. The palpebral fissure meet at the medial and lateral part which are known as lateral angles or canthi.

The Canthi

There are two canthi:

- 1) Medial canthus
- 2) Lateral canthus

Mucous Membrane Layer (Conjunctiva)

Conjunctiva is a mucous membrane and cover the posterior aspect of the lid. (The anatomy of conjunctiva is discussed separately).

Glands in the Eye Lid		
Glands	Type of Gland	Location
1) Meibomian gland	Sebaceous gland	Within the tarsus
2) Zeis gland	Sebaceous gland	Lid margin
3) Moll	Sweat gland	Lid margin
4) Krause	Accessory lacrimal gland	Fornix of conjunctiva
5) Wolfring	Accessory lacrimal gland	Upper margin of tarsus

Blood Supply of Lids

- Mainly derived from
- 1) Ophthalmic Artery
 - 2) Lacrimal Artery

Venous Drainage

Veins of the lids drain into ophthalmic veins.

Lymphatics

Medial side of the lids goes to submandibular lymph nodes and lateral side drains into preauricular lymph nodes.

Nerve Supply

There are two types of nerve supply— motor and sensory.

Motor: Orbicularis muscle supplied by Facial Nerve.

Levator palpebral superior is by the 'oculomotor Nerves.

Sensory

Upper Lids: Supra Orbital Nerve

Infra and Supra Trochlear Nerve

Lower Lids: Infraorbital Nerve

Lacrimal System

Eye is constantly exposed to the external environment. Because of constant exposure to different types of environment there is danger to the external structures of the eye like cornea and conjunctiva. Even microorganisms in the

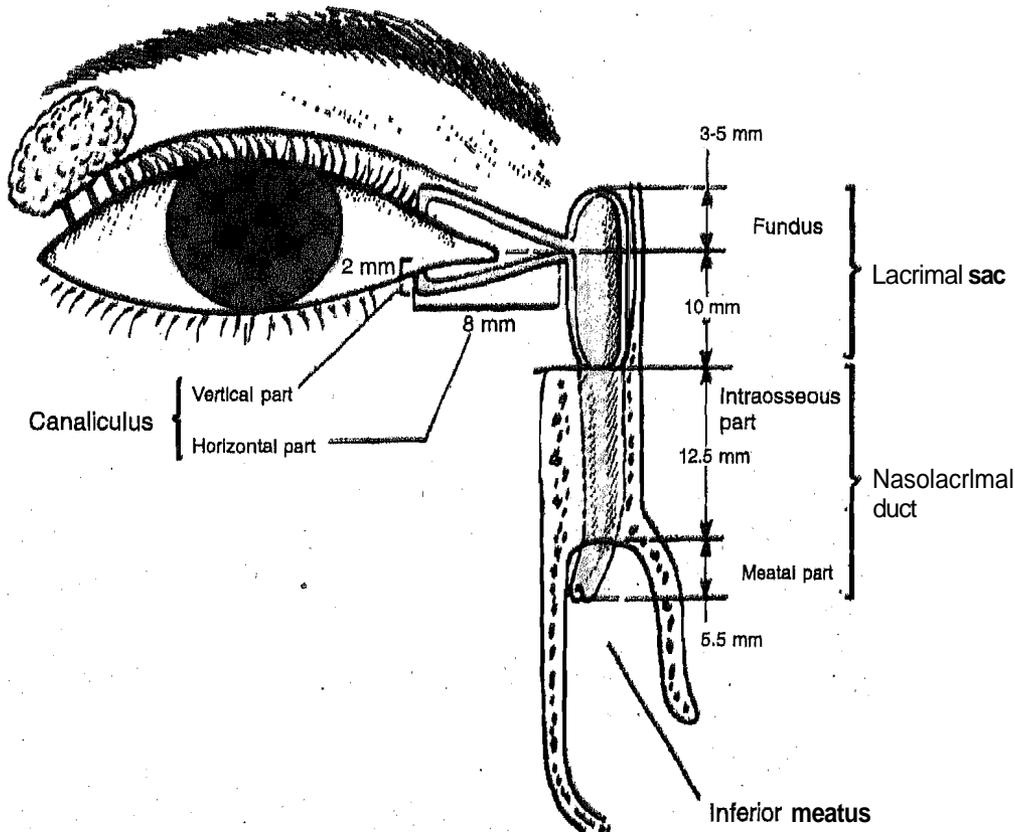


Fig. 7.4: Lacrimal Apparatus

environment can cause infection frequently. So as to avoid such bad external, effects on eye, a fluid layer cover the conjunctival and cornea which is known as tear film. The system of formation and drain of the tear film from the eye is known as lacrimal apparatus.

Lacrimal Apparatus

Lacrimal apparatus consists of two parts:

- 1) Tear production system
- 2) Tear drainage system

Tear Production System

Tear film is produced by lacrimal glands. There are two types of lacrimal glands:

- 1) Main lacrimal glands
- 2) Accessory lacrimal glands

Main Lacrimal Glands

Situation: Main Lacrimal gland is situated at the supertemporal aspect of the orbit. It has 6 to 12 ducts which drains into superior fornix. Histologically lacrimal gland is a tubuloacinar gland.

Function: Function of main lacrimal gland is to produce tear under reflex conditions. Whenever injury occurs to the external eye or any infection occur, tear is produced by the main lacrimal gland. This type of secretion is also known as reflex secretions.

Accessory Lacrimal Glands

There are two types of accessory Lacrimal glands:

- 1) Accessory lacrimal gland of Krause
- 2) Accessory lacrimal glands of Wolfring

Accessory lacrimal glands produce normal tear under basal conditions. Even if there is no stimulus, under normal conditions certain amount of tear secretion occurs. These tear secretions are caused by these type of glands. Deficiency tear secretion by these glands leads to a condition known as dry eye.

Lacrimal Drainage System

Lacrimal fluid is ultimately drained into the nose. The path through which lacrimal fluid passes is known as lacrimal drainage system.

Parts of Lacrimal Drainage System

- 1) Punctum
- 2) Canaliculus
- 3) Common canaliculus
- 4) Lacrimal Sac
- 5) Naso-Lacrimal duct

Punctum: It is an opening at the medial part of the eye lid margin. It is situated at about 6 mm from the medial canthus. Under normal circumstances punctum is not visible. Only when eye lid is pulled outwards punctum is visible. Tear film first enters the punctum and then goes to canaliculus.

Lacrimal Canaliculus: Each eye lid has one canaliculus.

There are two parts of Canaliculus:

- 1) Vertical Portion
- 2) Horizontal Portion

Vertical Portion: It is about 2 mm long. It starts from the punctum. It bends medially at almost 90° to become continuous as horizontal canaliculus. At the angle between vertical and horizontal part there is a dilation which is known as ampulla.

Horizontal Portion: It is about 8 mm. Upper canaliculus and lower canaliculus unite to form common canaliculus.

Common Canaliculus: Common canaliculus is formed by the joining of upper and lower canaliculi. It drains into the lacrimal sac.

Epithelium of canaliculus: Stratified squamous epithelium.

Lacrimal Sac: Lacrimal sac is situated at the medial and inferior wall of the orbit in a shallow depression which is called lacimal fossa. It acts as a reservoir for lacrimal fluid. Lacrimal sac drains into the naso-lacrimal duct. The sac, closed above and open below, is continuous with nasolacrimal duct.

Parts of the Lacrimal Sac: 1) Fundus, 2) Body

Naso-Lacrimal Duct: Naso-lacrimal duct is a downward continuation of lacrimal sac. It drains into the inferior meatus of the nose. This part of the lacrimal drainage system is more prone to damage because of its proximity to the nasal cavity.

Length: 15 mm.

Situation: Situated within a canal formed mainly by maxilla.

Opening: It opens into the inferior meatus of nose.

Valves of Hasner: Situated at the opening of the nasolacrimal duct.

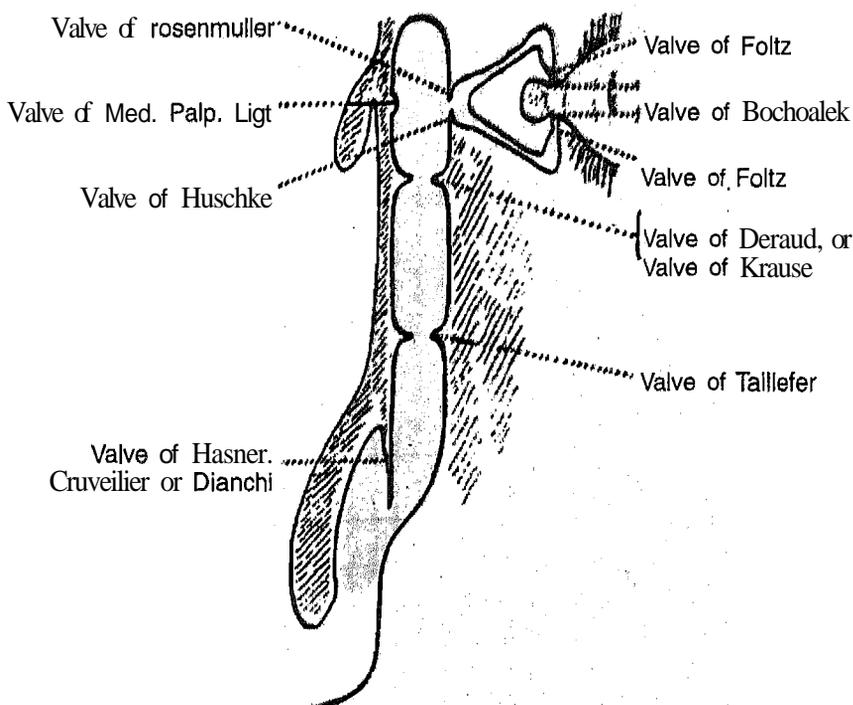


Fig. 7.5: Scheme of the so-called valves of the naso-lacrimal canal

Blood Supply

Palpebral branches of ophthalmic artery. .

- Infra-orbital artery

Lymphatics: Submandibular and deep cervical lymph nodes.

Nerves: Infratrochlear and anterior superior alveolar nerves:

Check Your Progress

- 1) What is the function of lid.

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- 2) Mention different layers of lid.

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- 3) Mention different glands present in the eye lid.

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- 4) Mention different parts of lacrimal drainage system.

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- 5) Nasolacrimal duct opens into which meatus of nose.

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7.3 LET US SUM UP

In this unit you have learnt that lid gives protection to eyeball. It has 4 layers. Muscles present in the lid are Orbiculus oculi, levator palpebrae superioris and muller's muscle. Eyeball is covered with a thin layer of tear film. Tear film is secreted by the lacrimal glands and is drained through nasolacrimal drainage system. When there is blockage of lacrimal drainage system watering occurs which is called epiphora. In next unit you will learn about anatomy of the orbit.

7.4 ANSWERS TO CHECK YOUR PROGRESS

- 1) Lid gives protection to eyeball.
- 2) Skin, muscle, tarsus, conjunctiva
- 3) Meibomian gland, Moll's gland, Zeiss gland
- 4) Punctum, canaliculus, common canaliculus, lacrimal sac, nasolacrimal duct
- 5) Inferior meatus