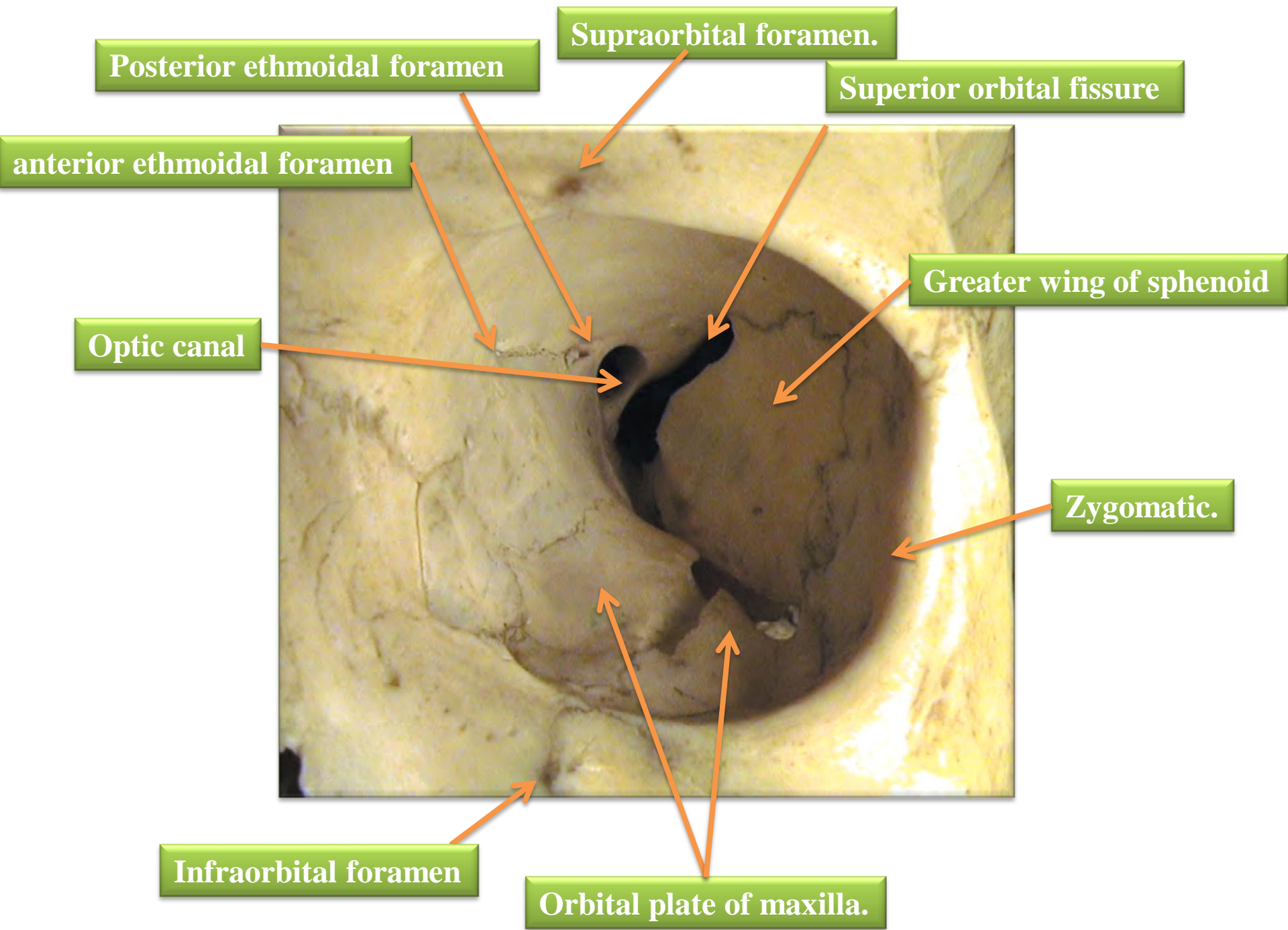
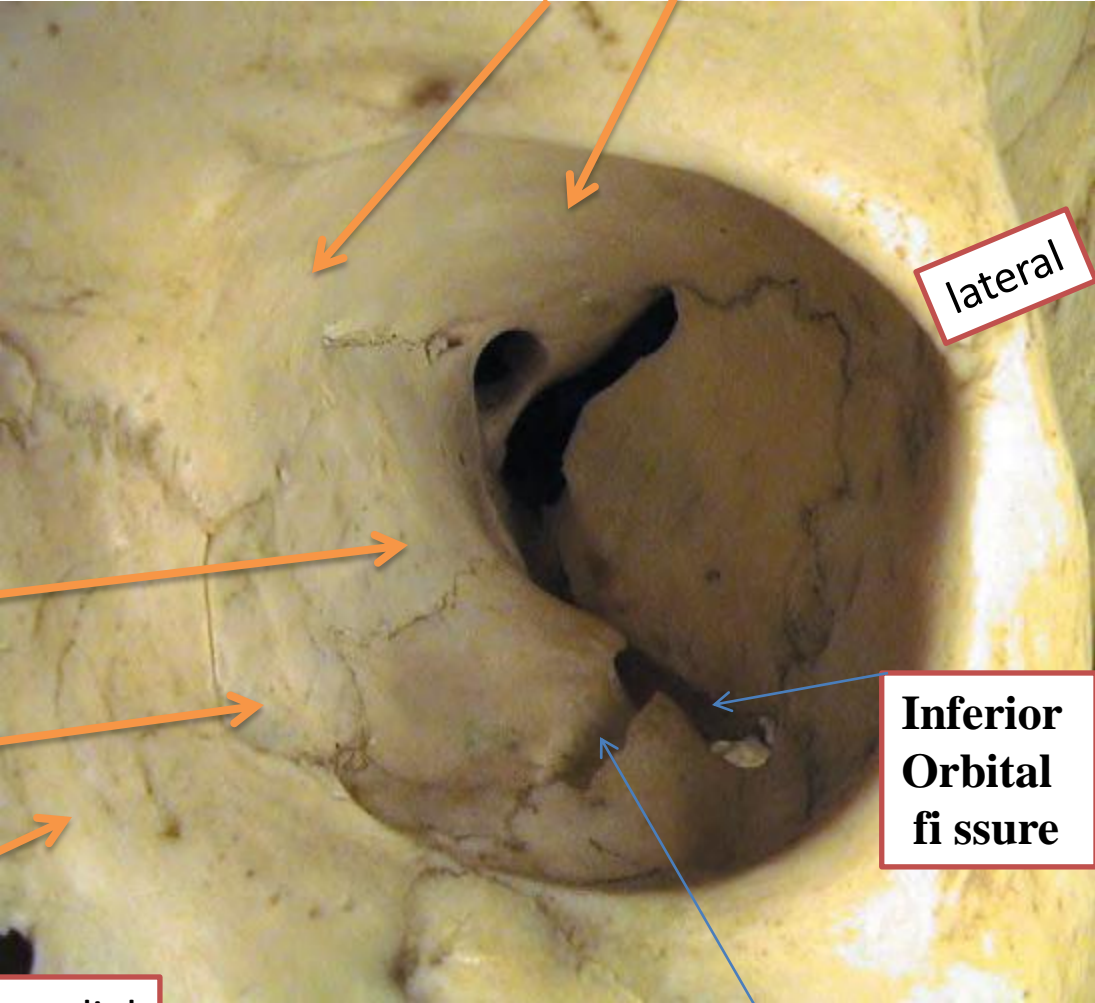


THE ORBIT



Orbital plate of frontal bone



lateral

Orbital plate of ethmoid

Lacrimal bone

The frontal process of the maxilla

Inferior
Orbital
fi ssure

Nose, medial

Infraorbital groove

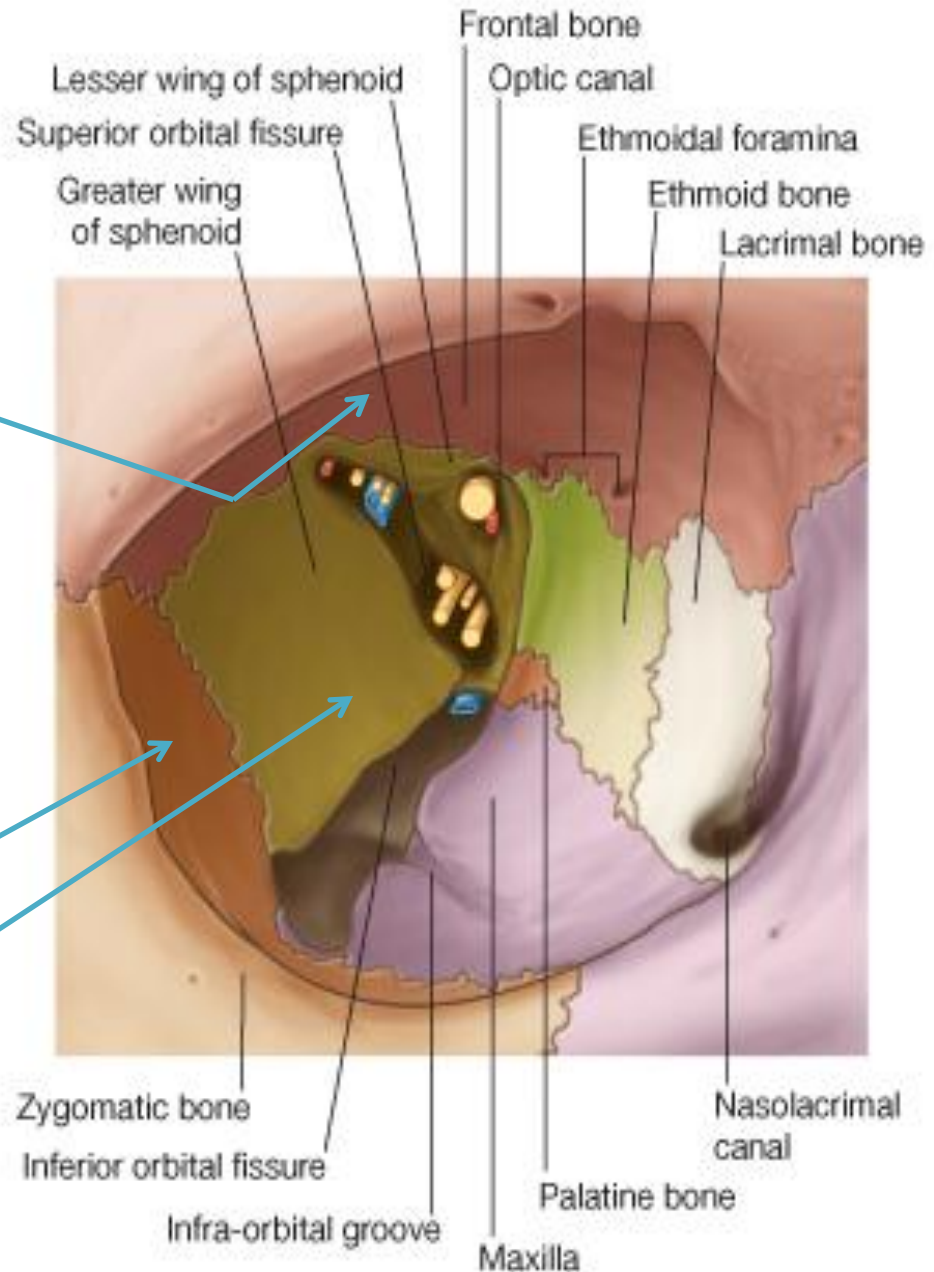
Bony orbit

Roof: Formed by:

- ❖ **The orbital plate of the frontal bone**, which separates the orbital cavity from the anterior cranial fossa and the frontal lobe of the cerebral hemisphere

Lateral wall: Formed by :

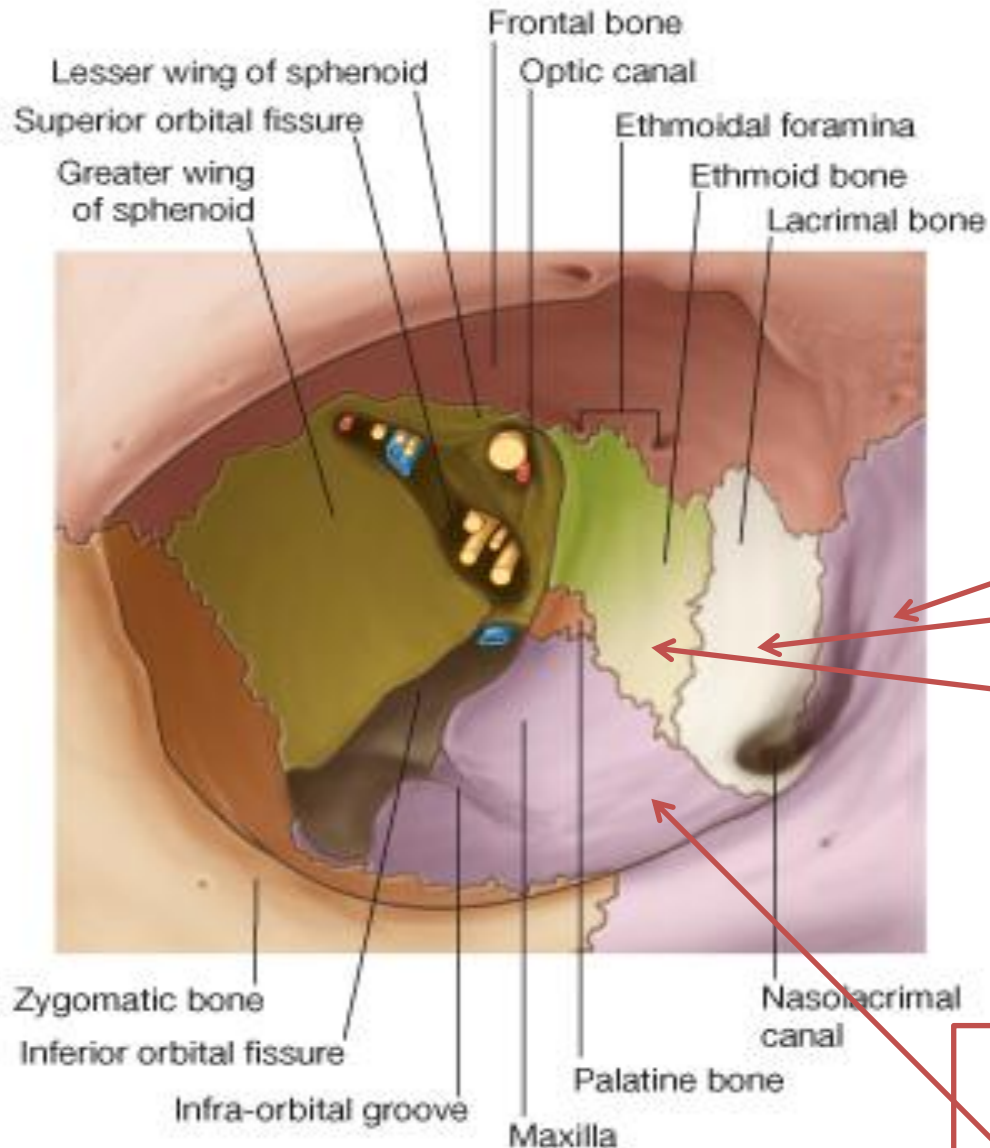
❖ the zygomatic bone and the greater wing of the sphenoid



of the orbit is formed principally by the orbital plate of the ethmoid bone

This paper thin,

rectangular plate covers the middle and posterior ethmoidal air cells, providing a route by which infection can spread into the orbit



Medial wall: Formed from before backward by:

The frontal process of the maxilla

The lacrimal bone

The orbital plate of the ethmoid (which separates the orbital cavity from the ethmoid sinuses)

The body of the sphenoid

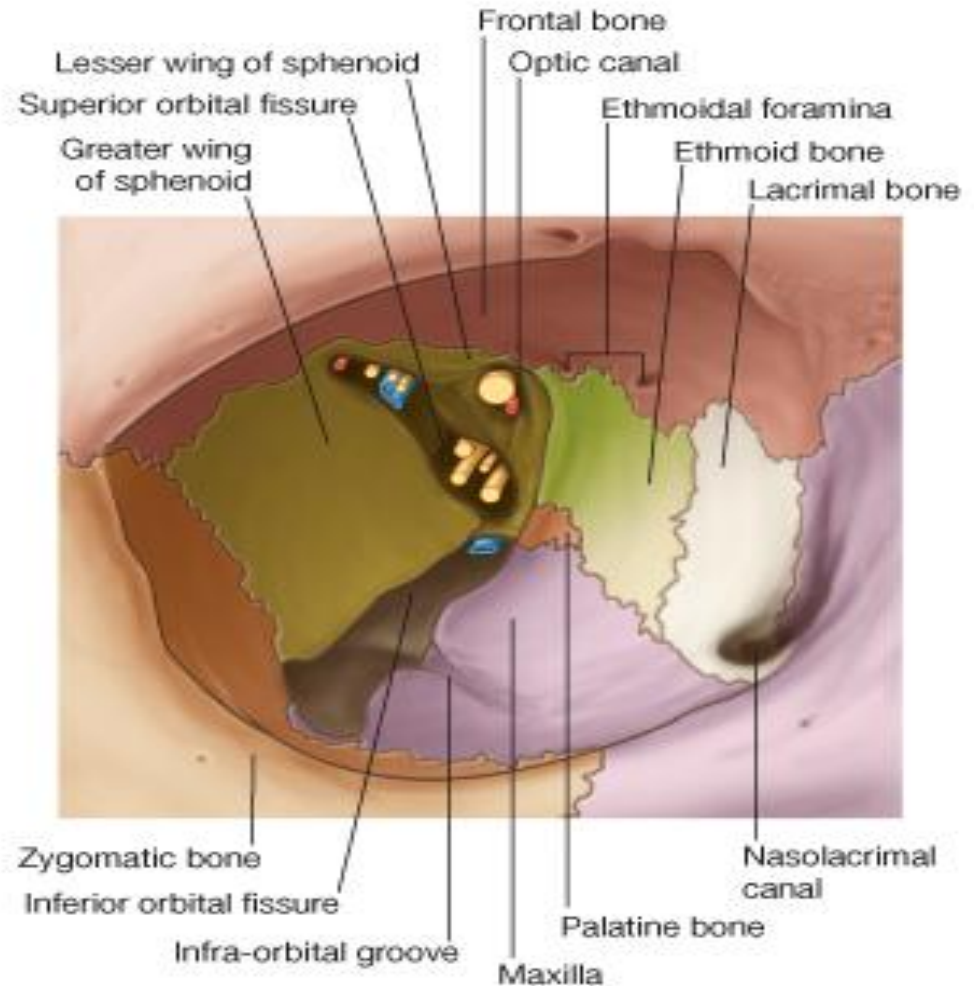
Floor : Formed by:
the orbital plate of the maxilla, which separates the orbital cavity from the maxillary sinus

Openings Into the Orbital Cavity

1-Supraorbital notch (Foramen):

It transmits the supraorbital nerve and blood vessels

2-Infraorbital groove and canal: Situated they transmit the infraorbital nerve (a continuation of the maxillary nerve) and blood vessels.



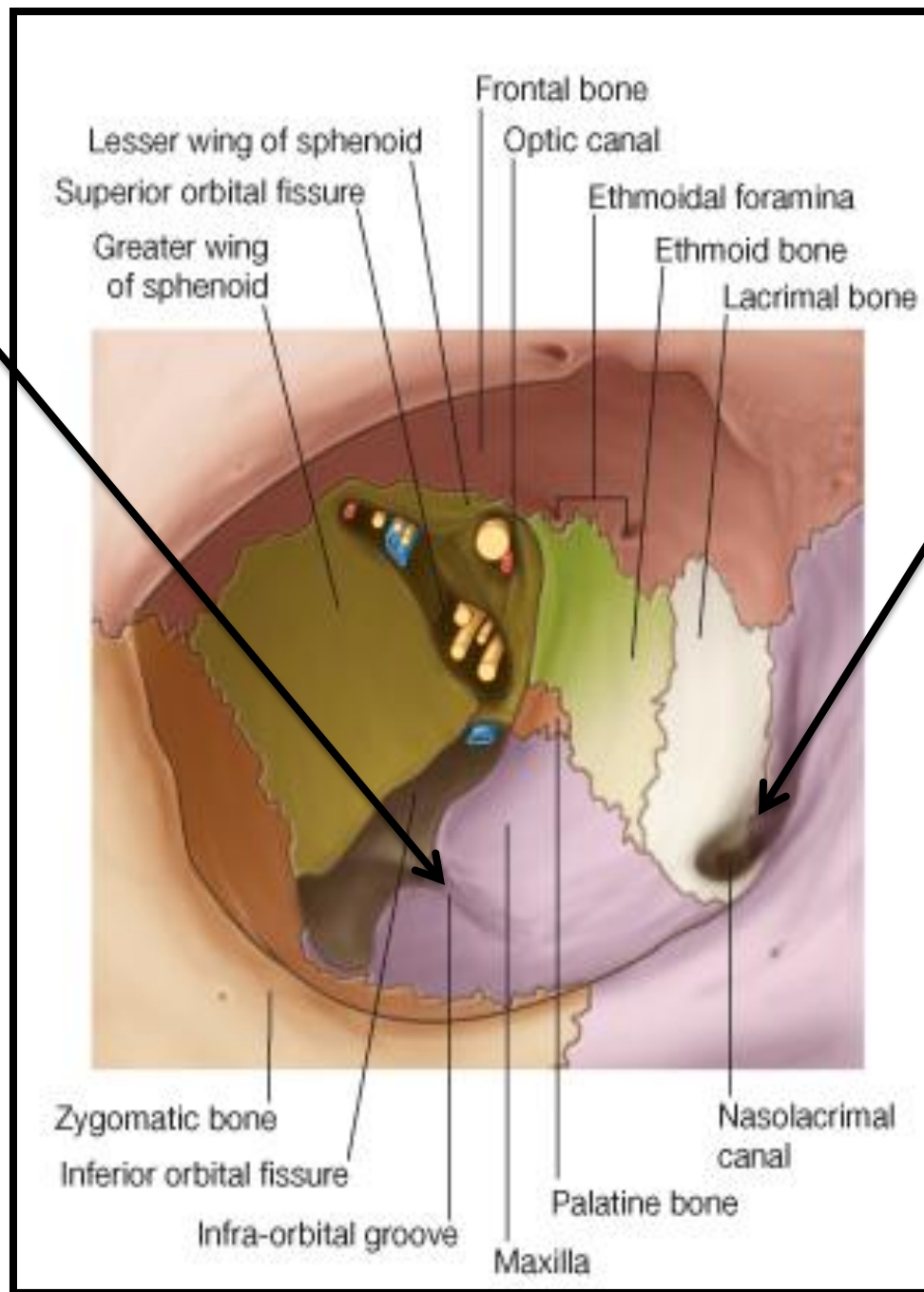
3-Inferior orbital fissure:

Located posteriorly between the maxilla and the greater wing of the sphenoid it communicates with the pterygopalatine fossa.

It transmits

1-the maxillary nerve and its zygomatic branch

2-the inferior ophthalmic vein and sympathetic nerves.



4-Nasolacrimal canal:

Located anteriorly on the medial wall; it communicates with the inferior meatus of the nose

It transmits the nasolacrimal duct.

5-Superior orbital fissure:

Located between
the greater and lesser wings of the sphenoid
it communicates with the
middle cranial fossa.

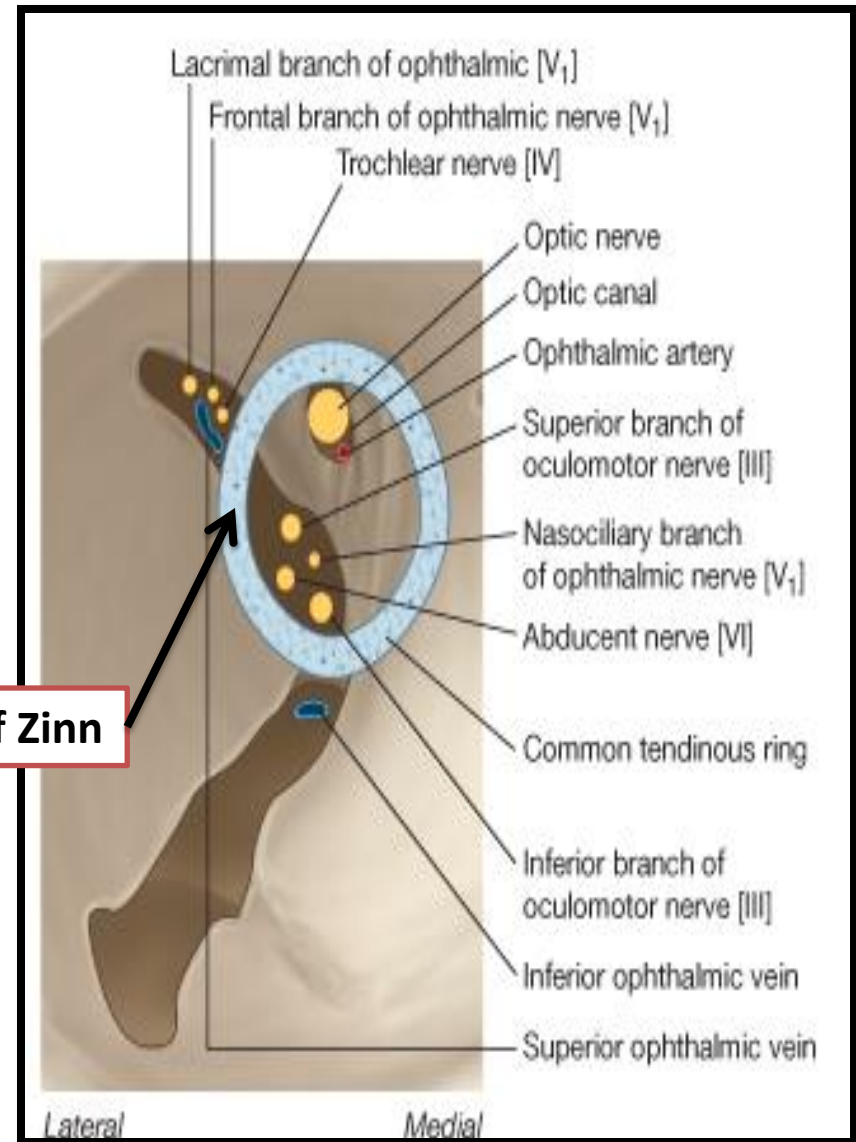
It transmits
the lacrimal nerve
the frontal nerve
the trochlear nerve
the oculomotor nerve
(upper and lower divisions)
the abducent nerve, the nasociliary nerve
the superior ophthalmic vein.

The **annulus of Zinn**

6-Optic canal:

Located in the lesser wing of
the sphenoid
it communicates with the
middle cranial fossa.

It transmits the optic nerve
and the ophthalmic artery



The common tendinous ring

is a fibrous ring which surrounds the optic canal and part of the superior orbital fissure at the apex of the orbit, and gives origin to the four recti

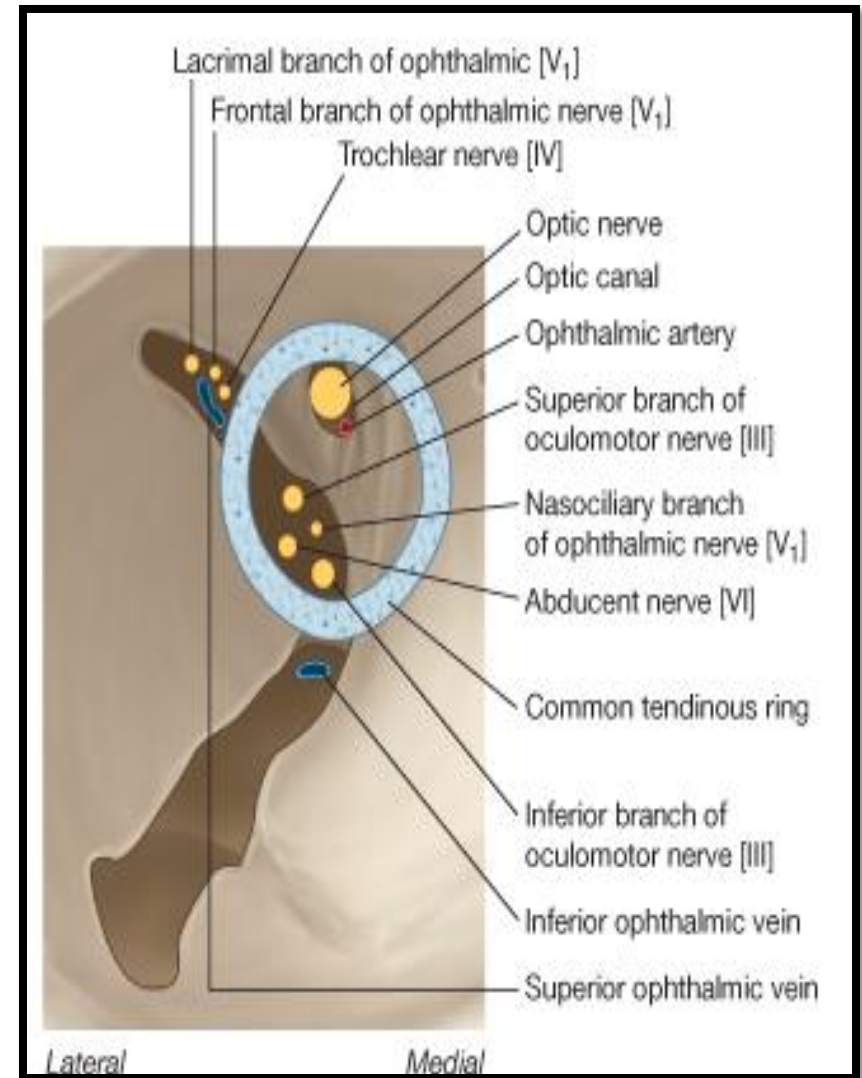
lie within the common tendinous ring

The optic nerve ophthalmic artery

enter the orbit via the optic canal, and so lie within the common tendinous ring

The superior and inferior divisions of the oculomotor nerve The nasociliary branch of the ophthalmic nerve

The abducens nerve
also enter the orbit within the common tendinous ring, but they do so via
The superior orbital fissure



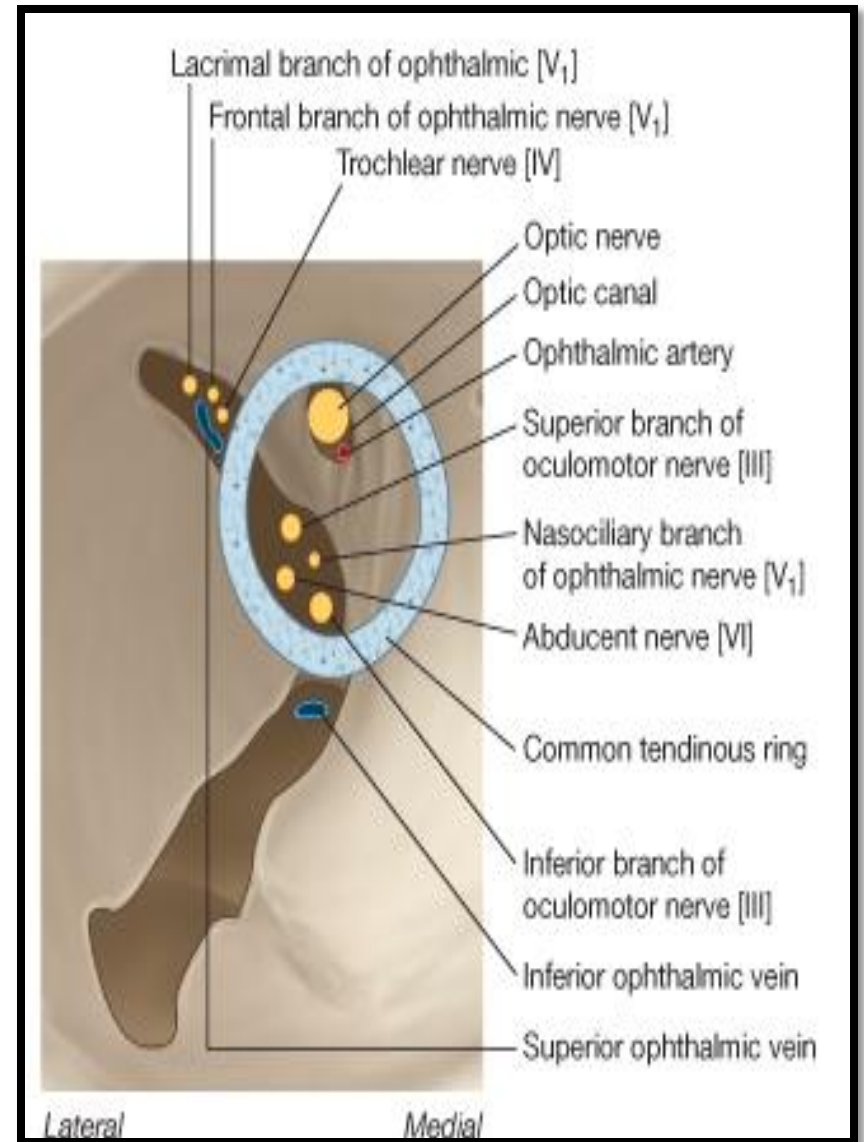
lie outside the common tendinous ring

The trochlear nerve

The frontal

lacrimal branches of the ophthalmic nerve

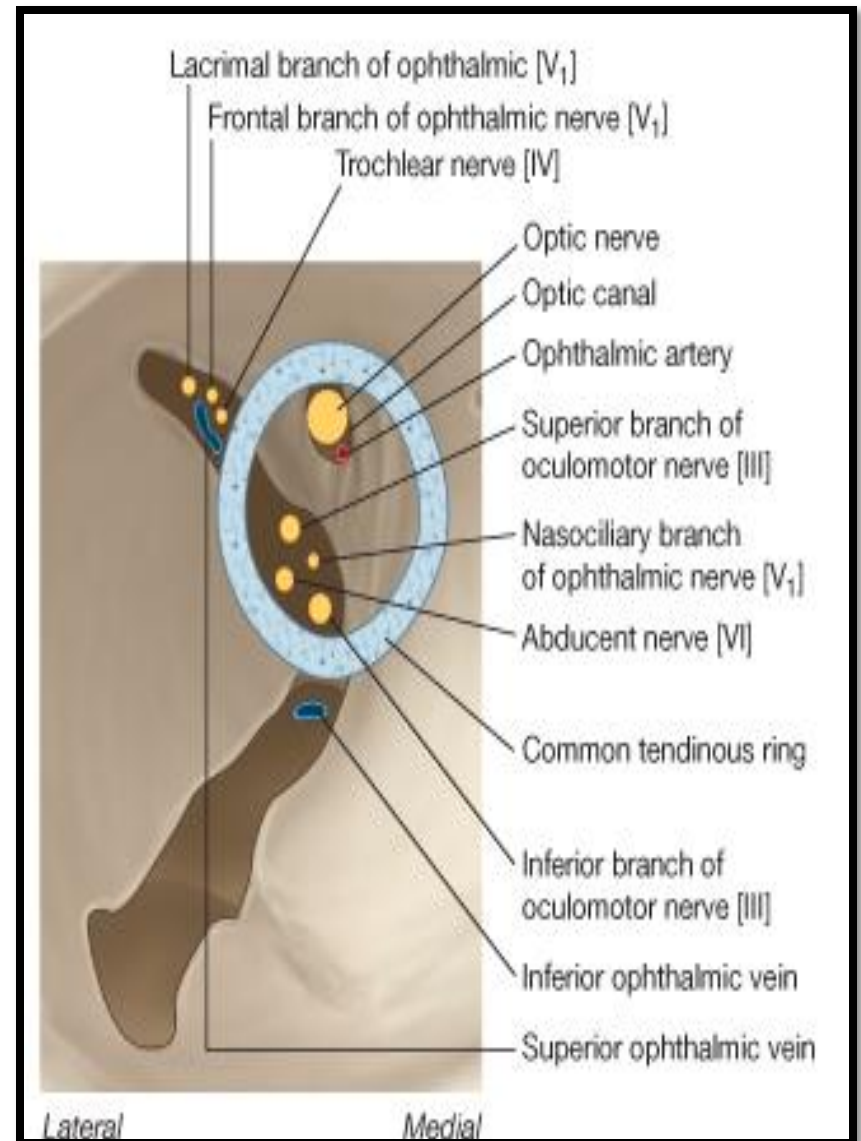
all enter the orbit through the superior orbital fissure but lie outside the common tendinous ring

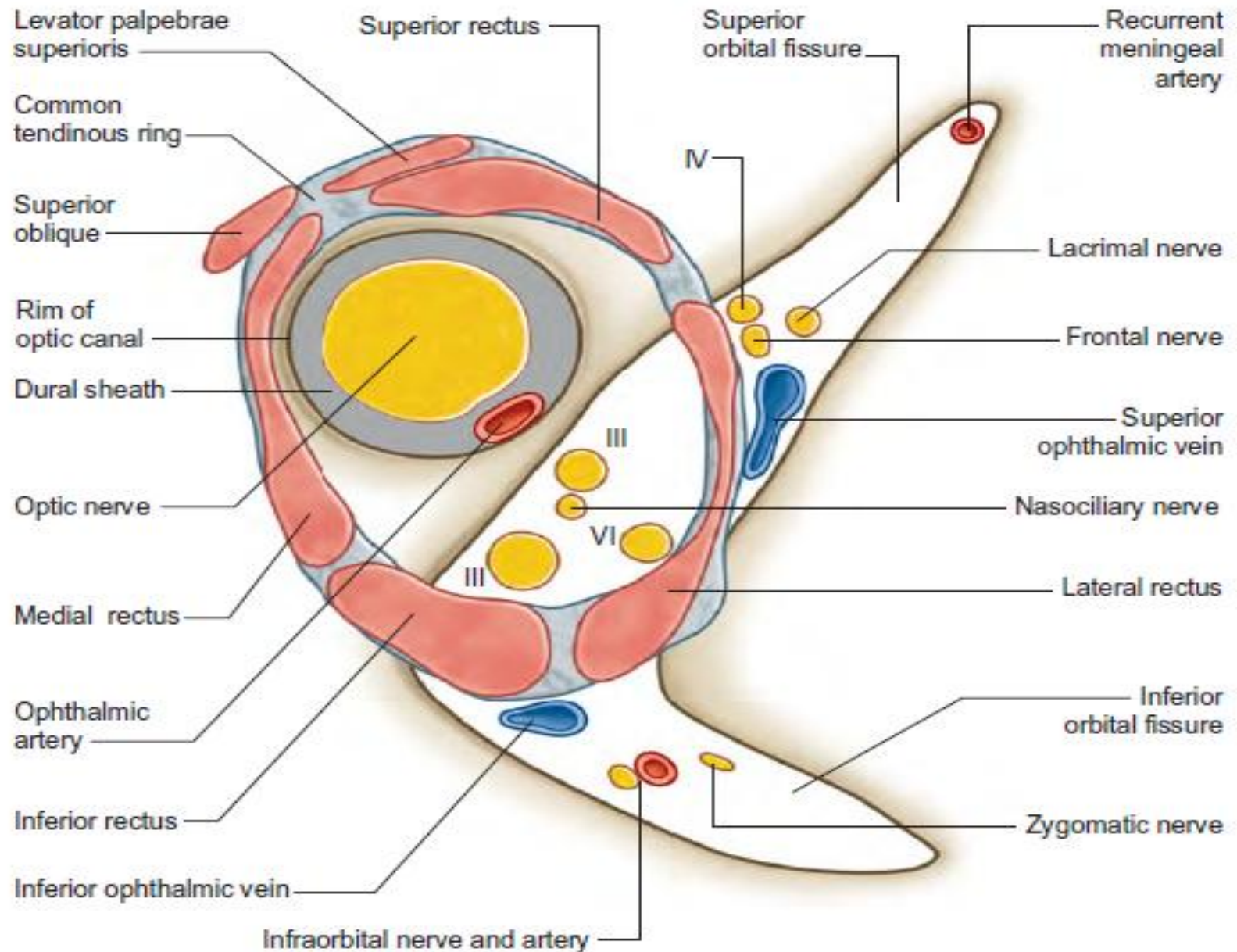


Structures which enter the orbit through the inferior orbital fissure lie outside the common tendinous ring.

note

The close anatomical relationship of the optic nerve and other cranial nerves at the orbital apex means that lesions in this region may lead to a combination of visual loss from optic neuropathy and ophthalmoplegia from multiple cranial nerve involvement





The Orbital Region

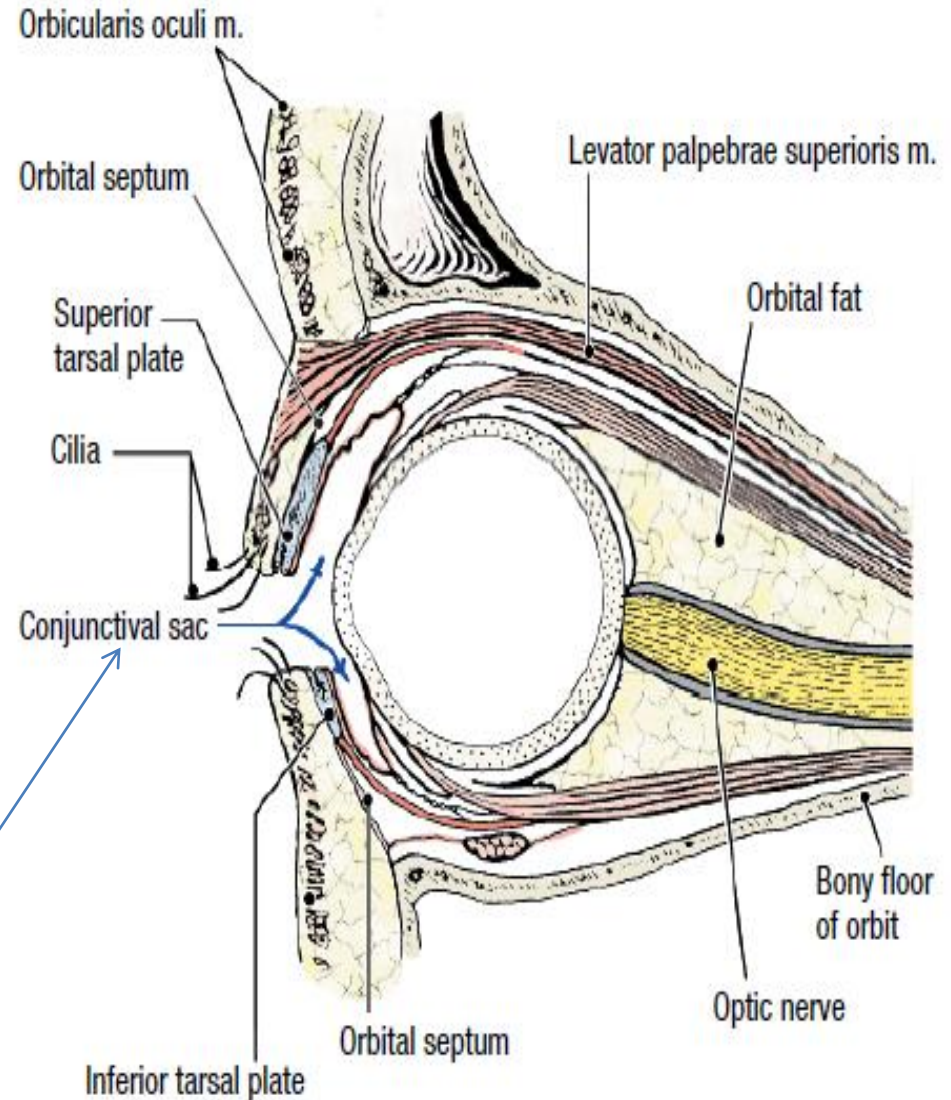
The orbits are a pair of bony cavities that contain the eyeballs

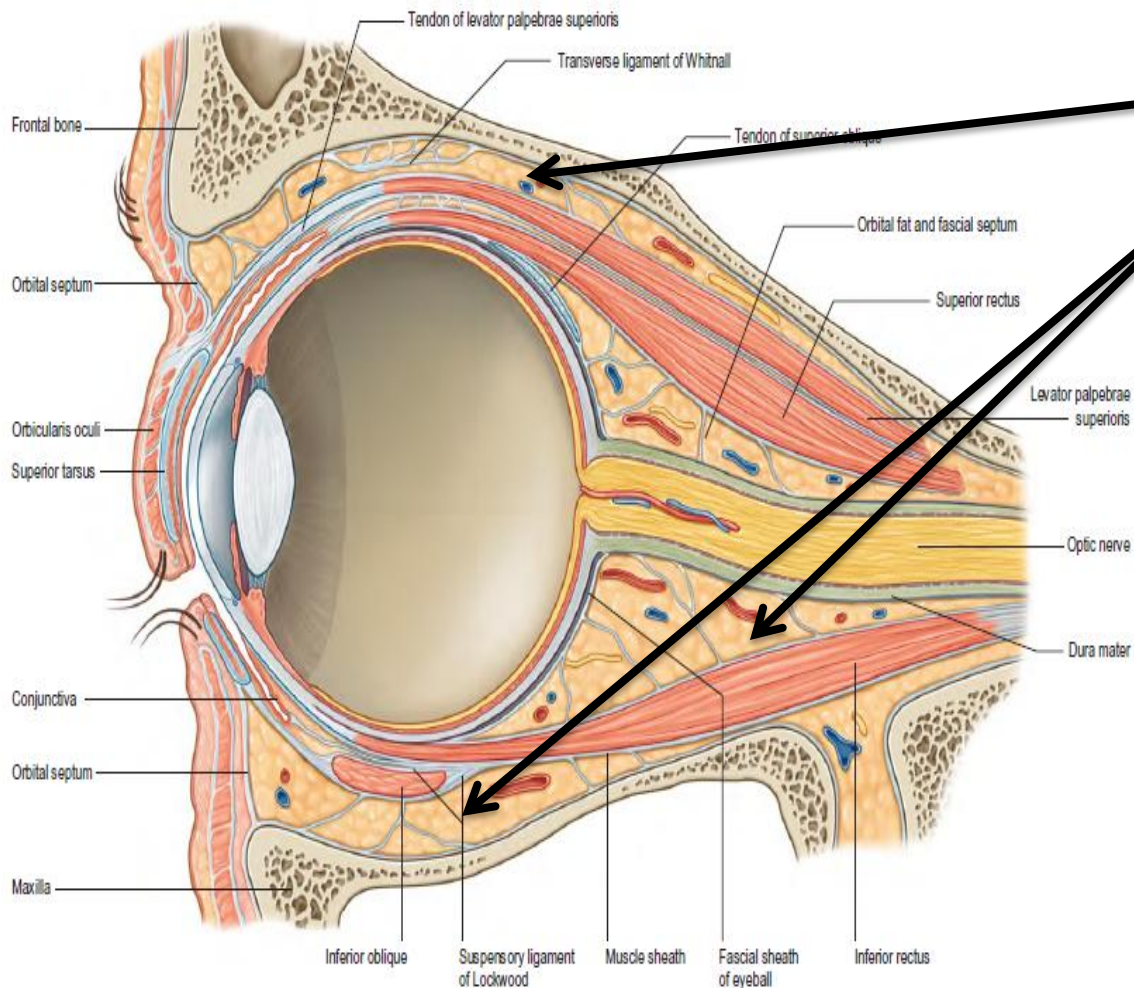
Eyelids

- ❖ The eyelids (they act like the curtains) protect the eye from injury and **excessive light** by their closure
- ❖ The upper eyelid ***is larger*** and ***more mobile*** than the lower because of its attachment to the

levator palpebrae superioris

- ❖ The upper and lower eyelids meet each other at ***the medial and lateral angles***.
- ❖ **The palpebral fissure** is the elliptical opening between the eyelids
- ❖ **The palpebral fissure** is the entrance into the **conjunctival sac**





ORBITAL FAT

➤ The spaces between the main structures of the orbit are occupied by fat,
 ➤ the fat helps to stabilize the position of the eyeball and also acts as a socket within which the eye can rotate.

Conditions resulting in an increased overall volume of orbital fat, e.g.

hyperthyroidism

(Graves' disease),

may lead to forward protrusion of the eyeball

exophthalmos

structure of the eye lids

1-skin: thin and can be easily become oedematous (with fluid or blood)

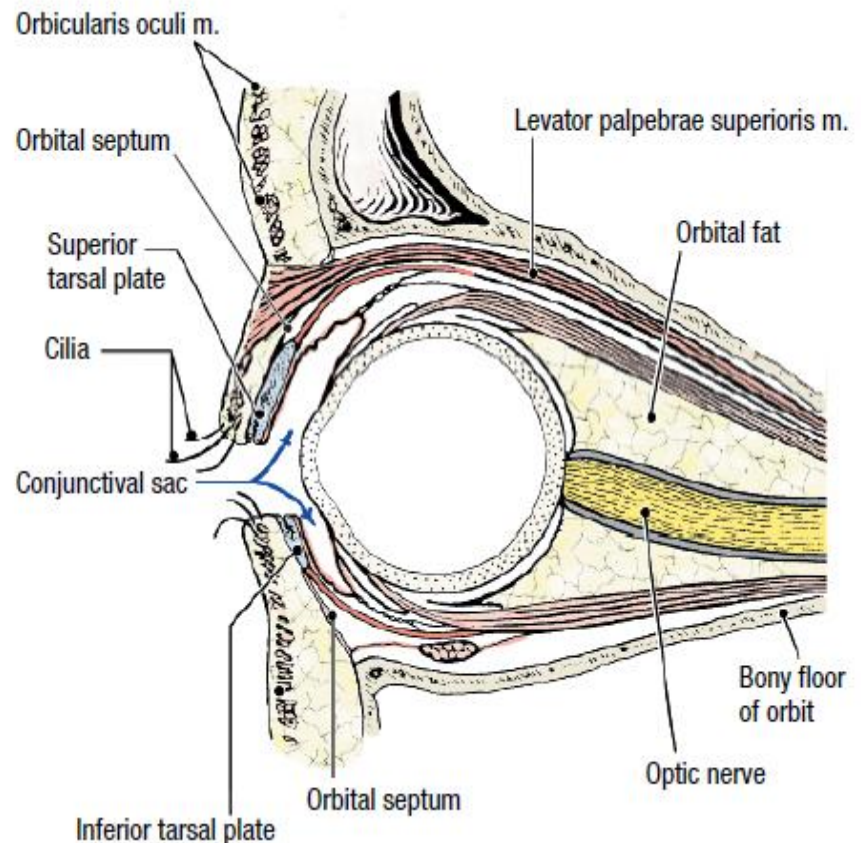
➤ Contains The sebaceous glands (glands of Zeis) open directly into the eyelash follicles.

➤ The ciliary glands (glands of Moll) are modified sweat glands that open separately between adjacent lashes

2- Superficial fascia:

❖ (remember we said earlier No fat)

❖ Contains the palpebral part of orbicularis oculi



3- Palpebral fascia

The framework of the eyelids is formed by a **fibrous sheet, the orbital septum**

The orbital septum

- is attached to the periosteum at the orbital margins.
- The orbital septum is thickened at the margins of the lids to form the superior and inferior

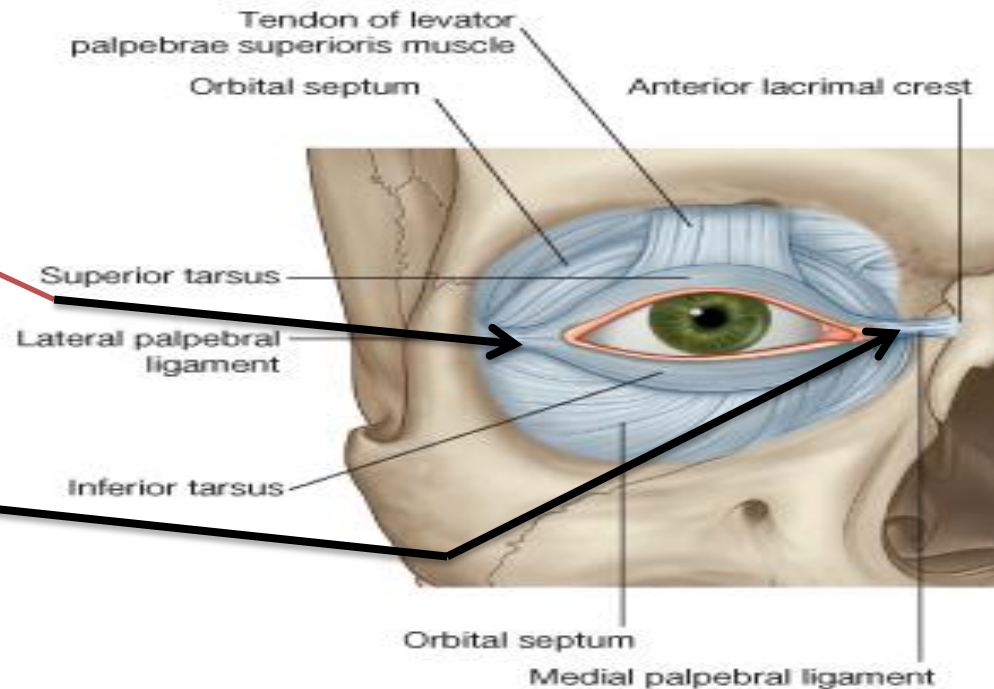
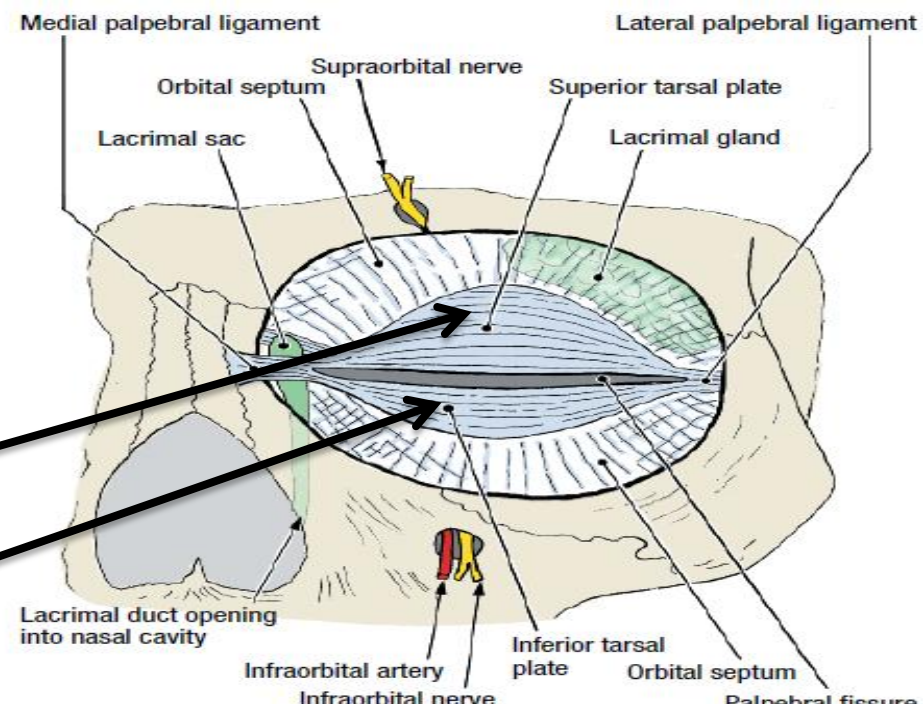
TARSAL PLATES.

The lateral ends of the tarsal plates are attached *by a band, the lateral palpebral ligament,* the orbital margin.

The medial ends of the plates are attached by a band, the medial palpebral ligament,

to the lacrimal bone

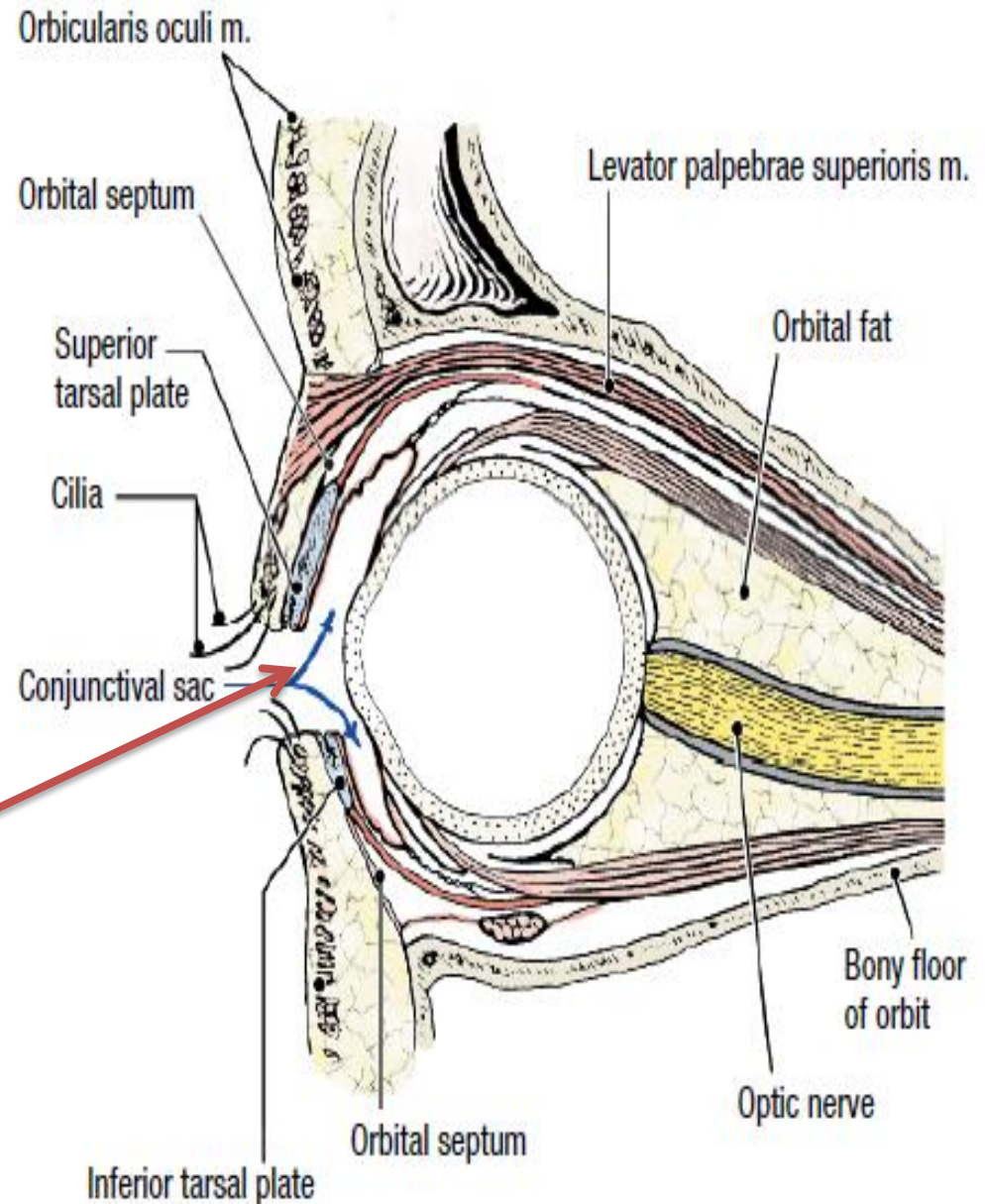
The tarsal glands are embedded in the posterior surface of the tarsal plates

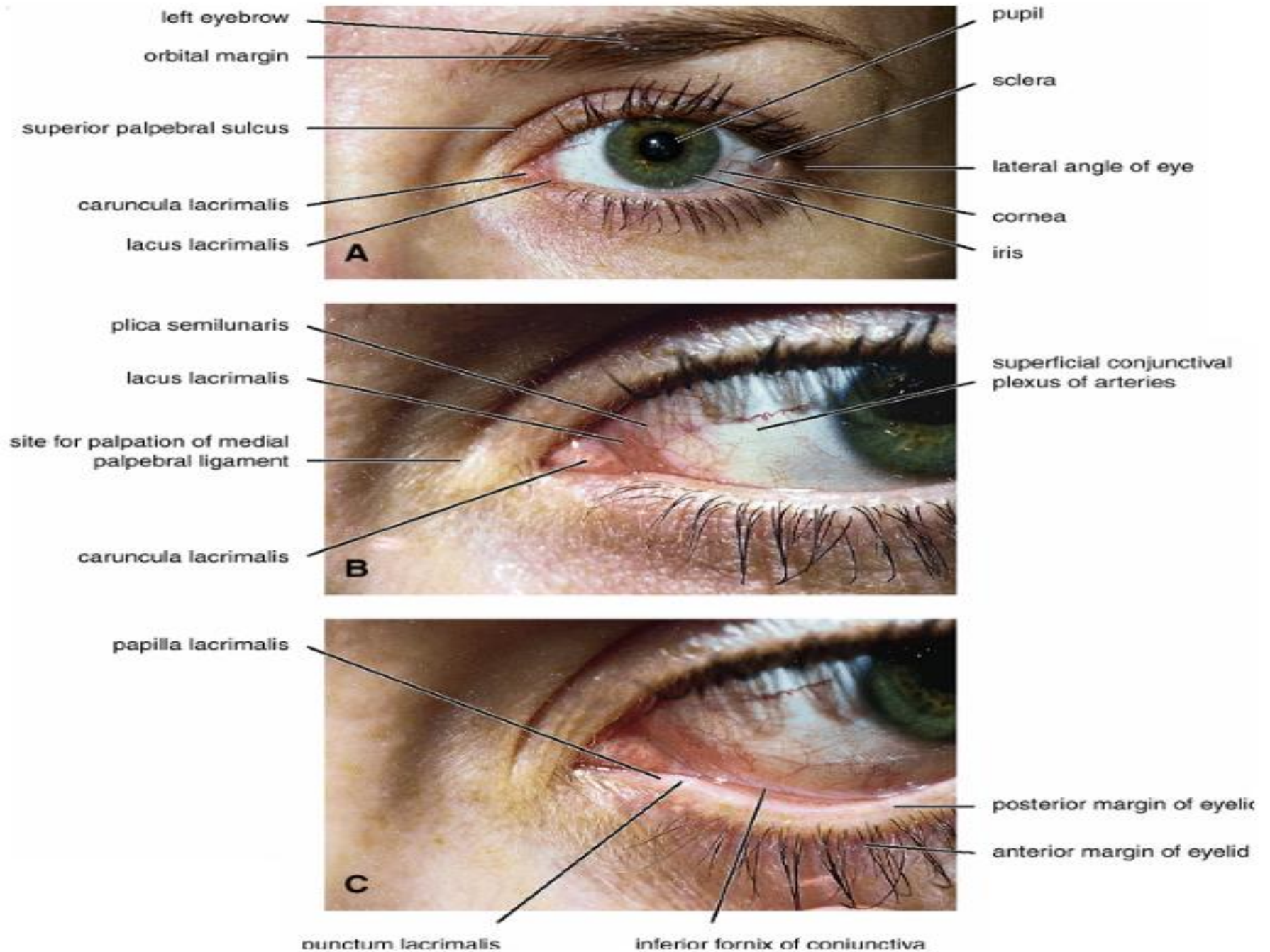


4-The conjunctiva

- is a thin mucous membrane that lines the eyelids
- It is reflected at **the superior and inferior fornices** onto the anterior surface of the eyeball

The upper lateral part of the superior fornix is pierced by the ducts of the lacrimal gland
The conjunctiva thus forms a potential space,
the conjunctival sac,
which is open at the palpebral fissure.





Movements of the Eyelids

The position of the eyelids at rest depends on the tone of :

- 1-The orbicularis oculi
- 2-The levator palpebrae superioris muscles
and the position of the eyeball.

The eyelids are closed by :

- 1-The contraction of the orbicularis oculi
and
- 2-The relaxation of the levator palpebrae superioris muscles

The eye is opened by:

THE LEVATOR PALPEBRAE SUPERIORIS
Raising the upper lid

the **superior tarsal muscle** which is part of the levator palpebrae superioris, helps maintain eyelid elevation and are innervated by postganglionic sympathetic fibers from **the superior cervical ganglion**

Loss of oculomotor nerve [III] function results in **complete ptosis or drooping of the superior eyelid**,
whereas loss of sympathetic innervation to the **superior tarsal muscle**
results in partial ptosis

Horner's syndrome

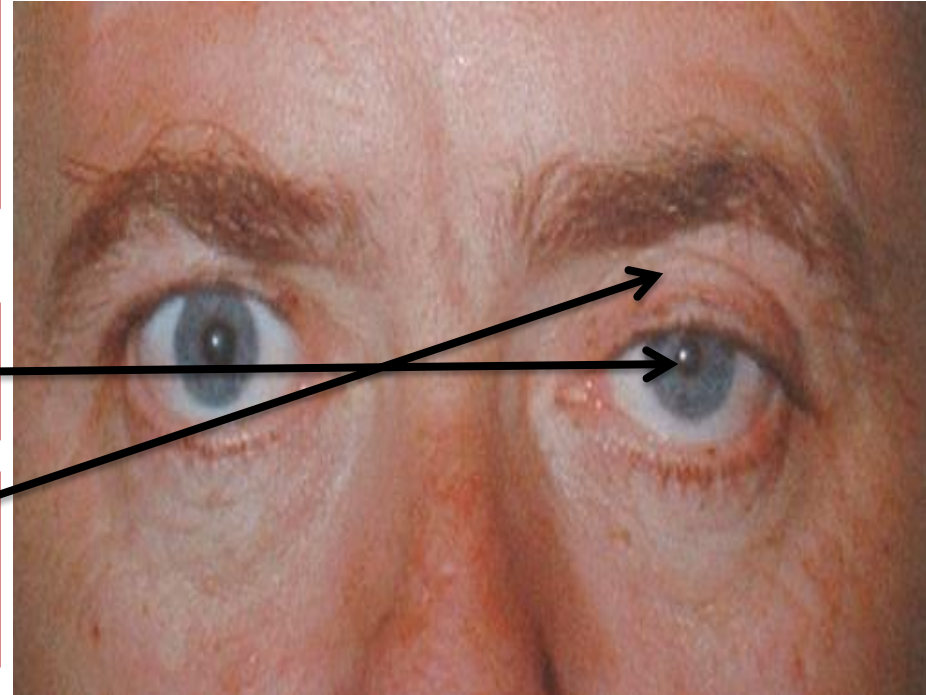
Horner's syndrome is caused by a lesion in the **sympathetic trunk** in the neck that results in sympathetic dysfunction.

It is characterized by three typical features:

1-Pupillary constriction due to paralysis of the dilator pupillae muscle;

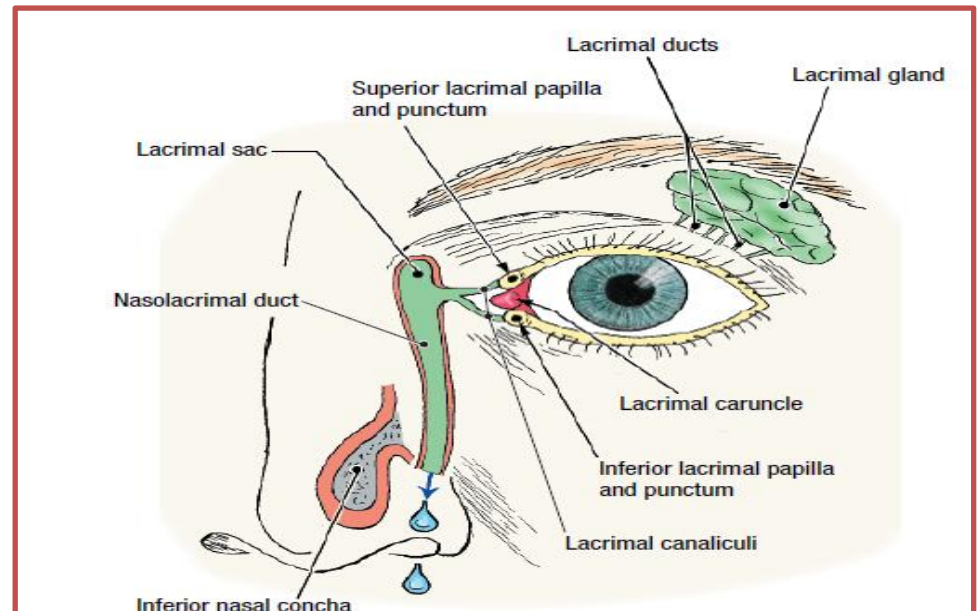
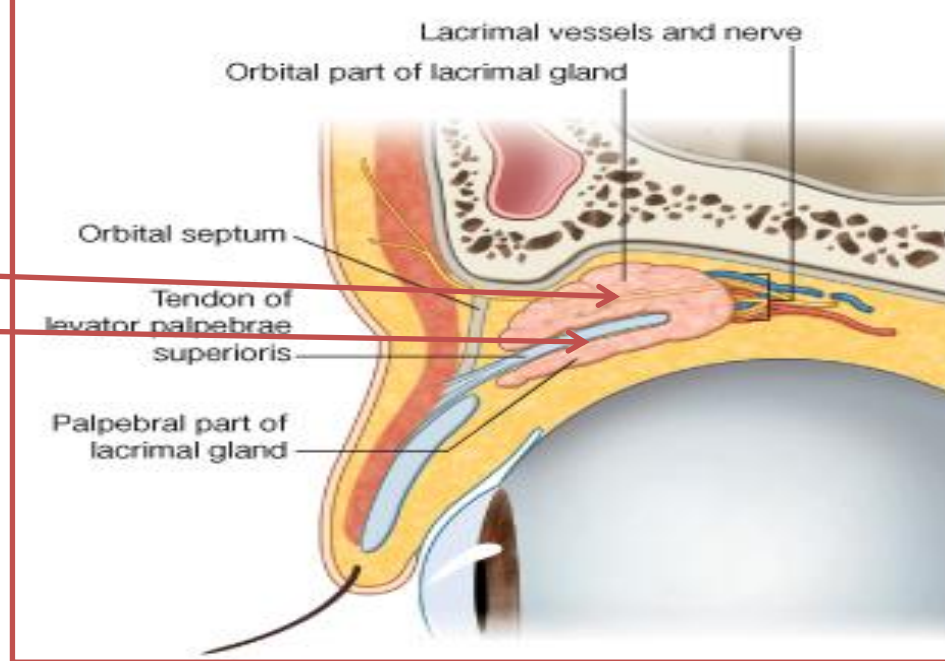
2-Partial ptosis (drooping of the upper eyelid) due to paralysis of the superior tarsal muscle of the levator palpebrae superioris;

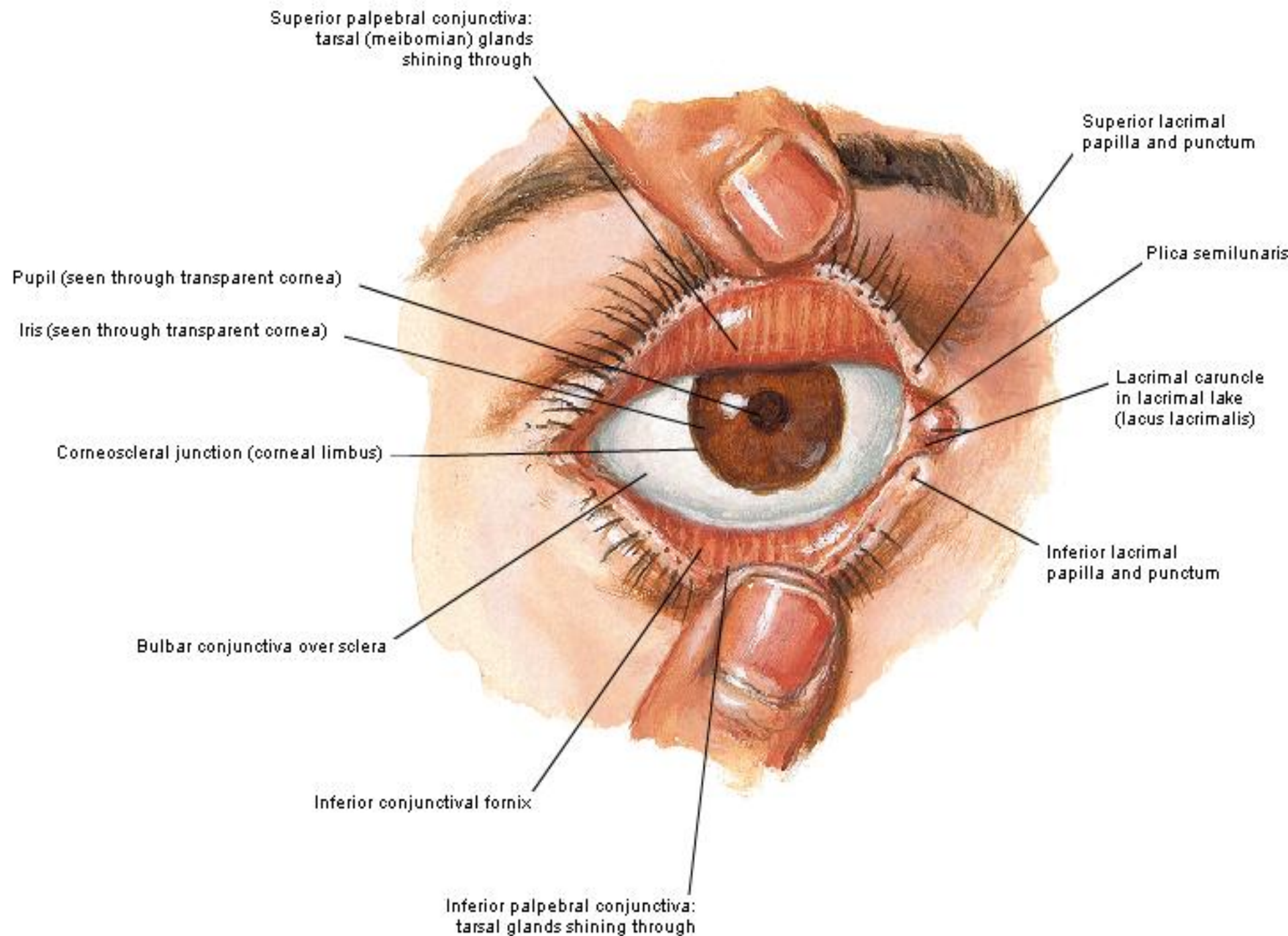
3-Absence of sweating on the ipsilateral side of the face and the neck due to absence of innervation of the sweat glands.



Lacrimal Gland

- The lacrimal gland consists of:
 - 1-a large ***orbital part***
 - 2- ***a small palpebral part***which are continuous with each other around the ***lateral edge of the aponeurosis of the levator palpebrae superioris.***
- It is situated above the eyeball in the anterior and upper part of the orbit posterior to the orbital septum
- The gland opens into the lateral part of the superior fornix of the conjunctiva by 12 ducts.





Lacrimal Ducts

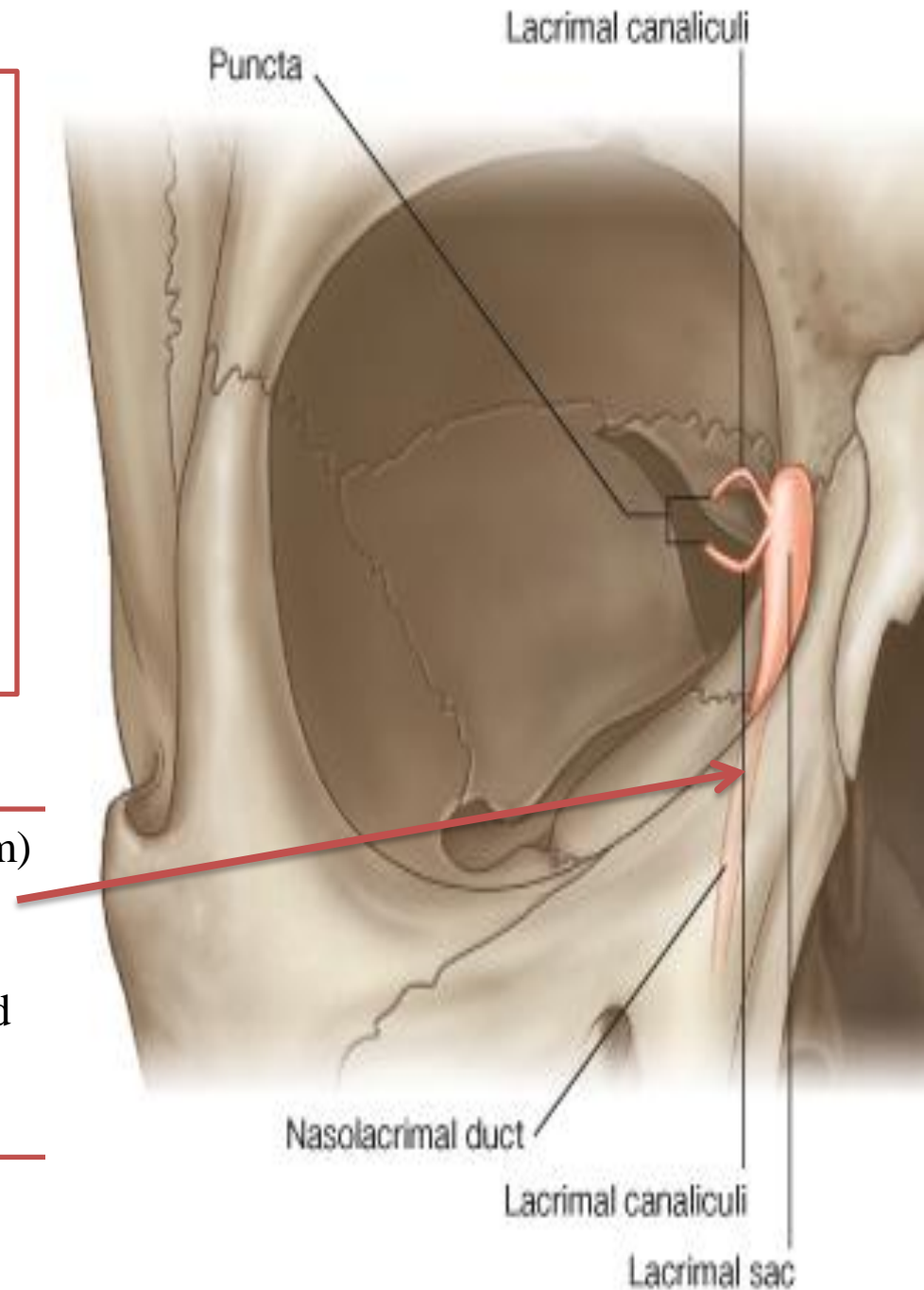
The tears circulate across the cornea and accumulate in the lacus lacrimalis.

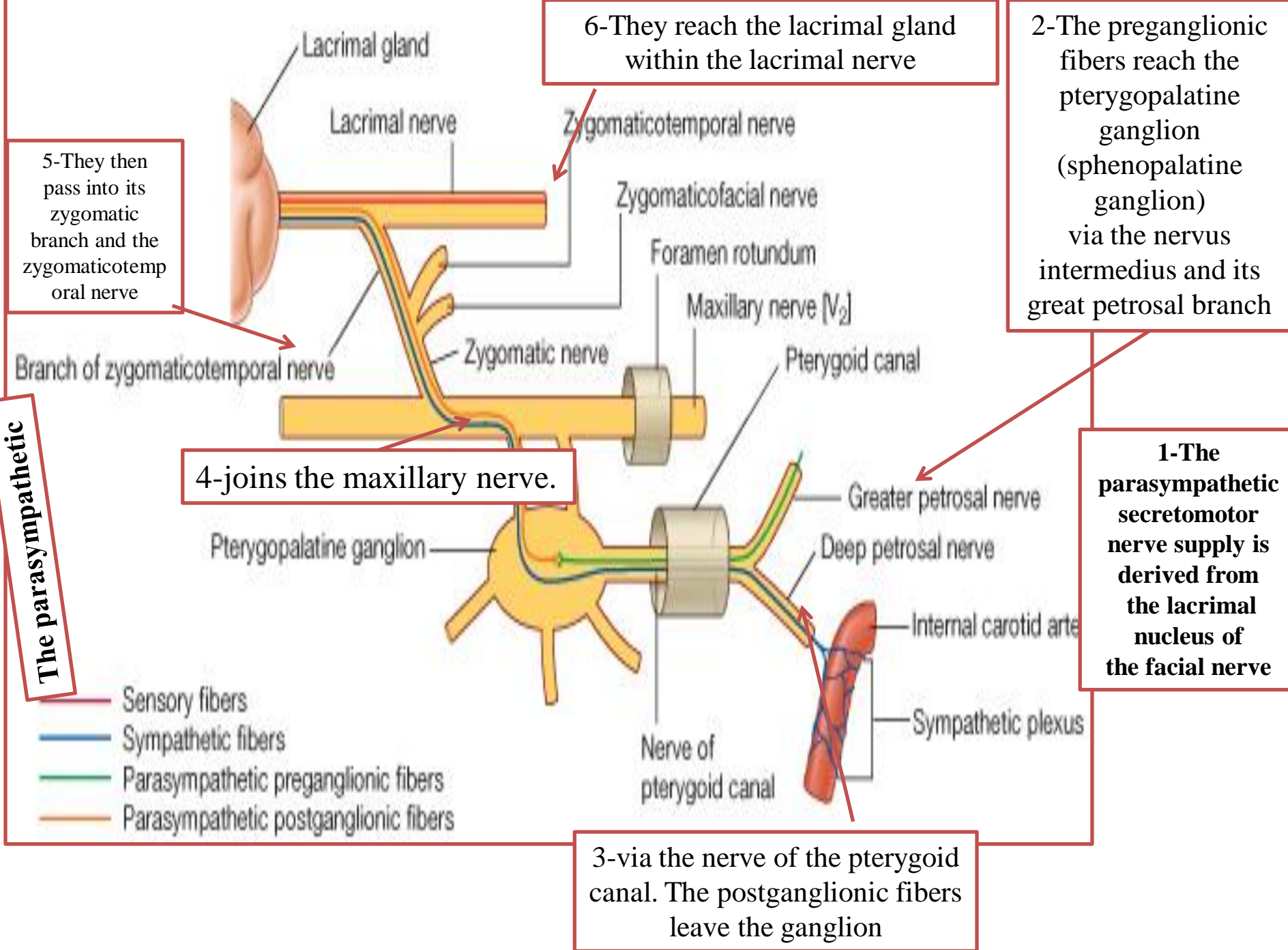
From here the tears enter the canaliculi lacrimales through the puncta lacrimalis.

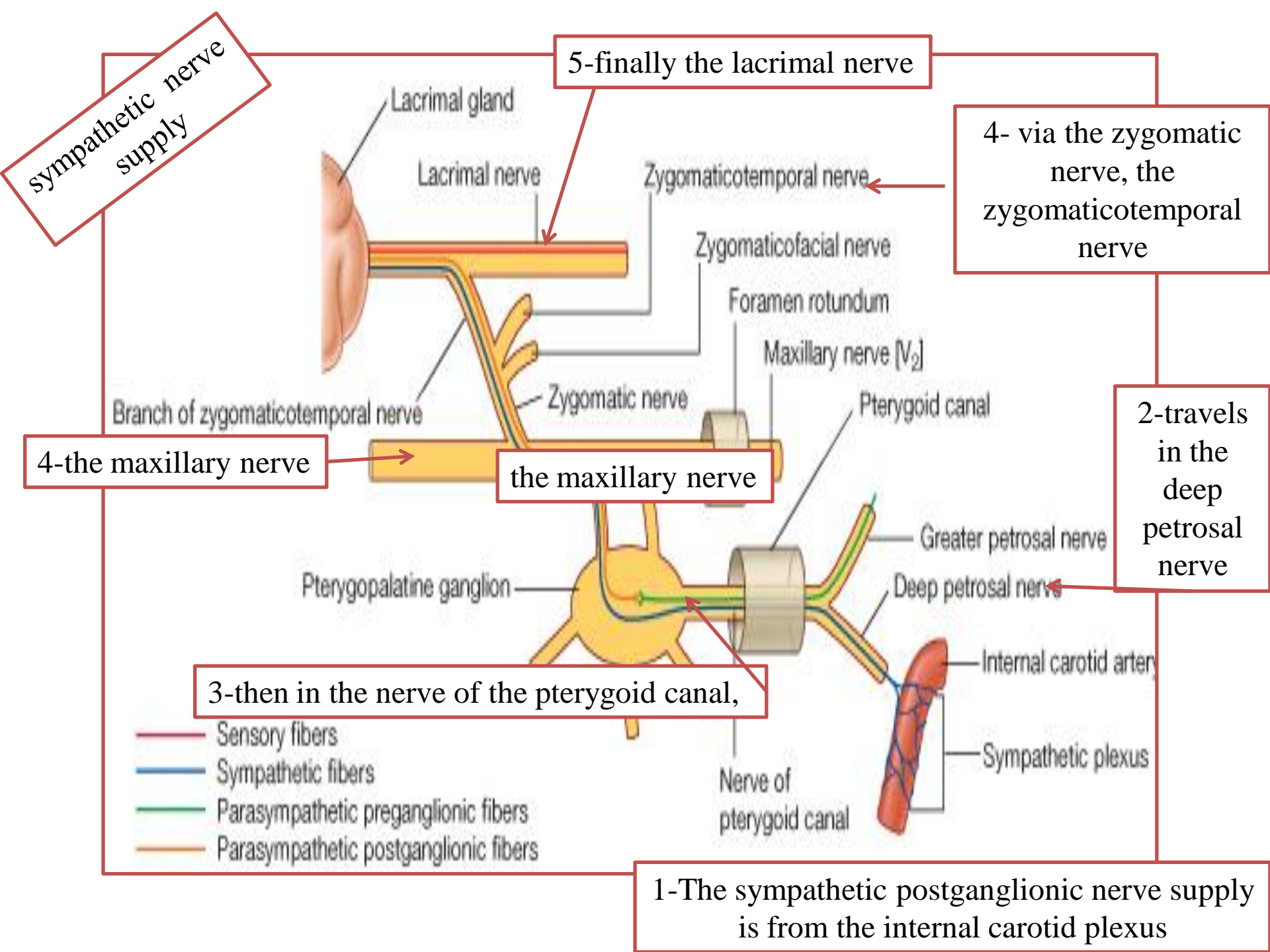
The canaliculi lacrimales pass medially and open into the lacrimal sac which lies in the lacrimal groove behind the medial palpebral ligament and is the upper blind end of the nasolacrimal duct.

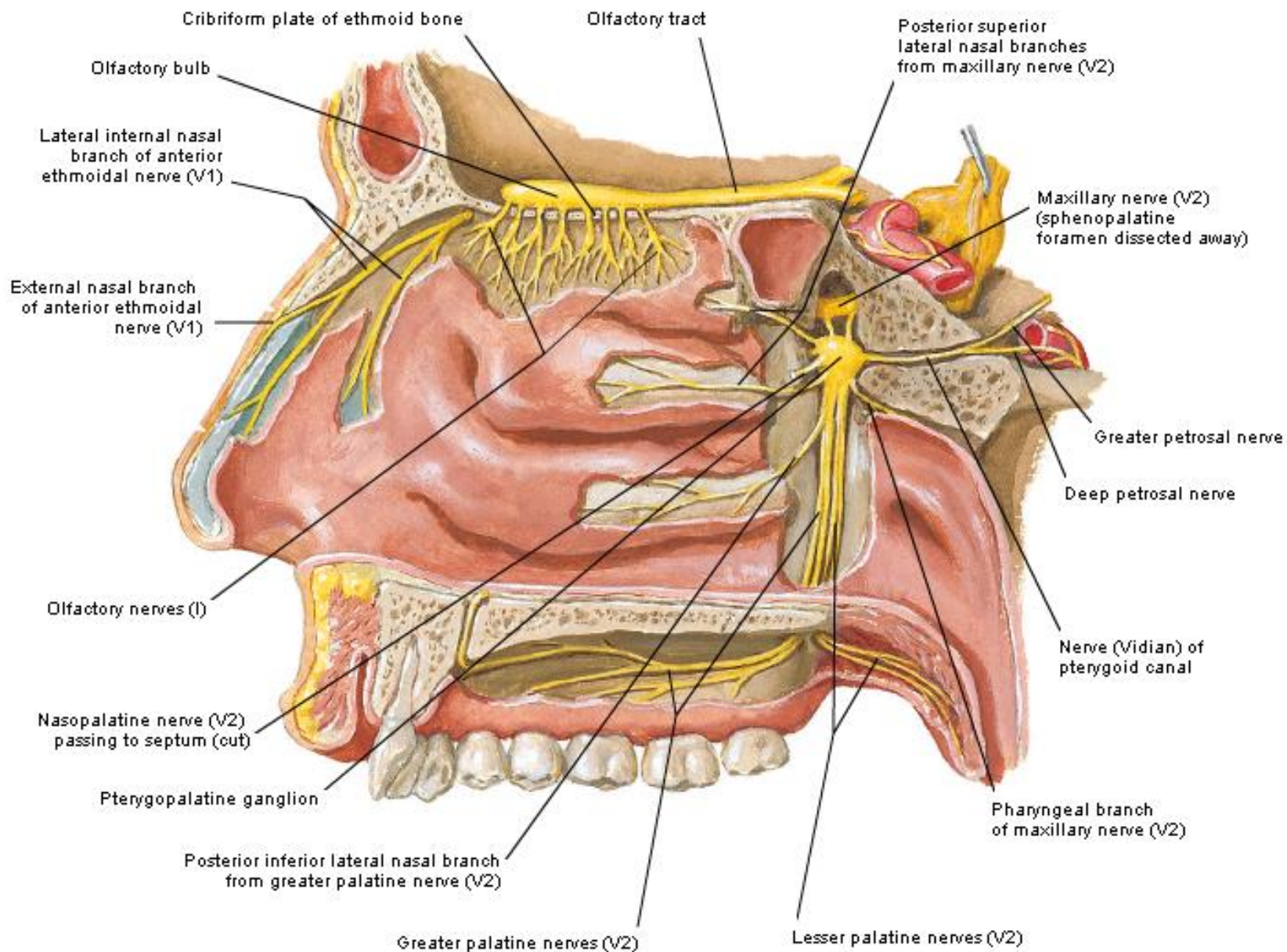
The nasolacrimal duct is about 0.5 in. (1.3 cm) long and emerges from the lower end of the lacrimal sac

The duct descends downward, backward, and laterally in a bony canal and opens into the inferior meatus of the nose.









Nerves of the Orbit

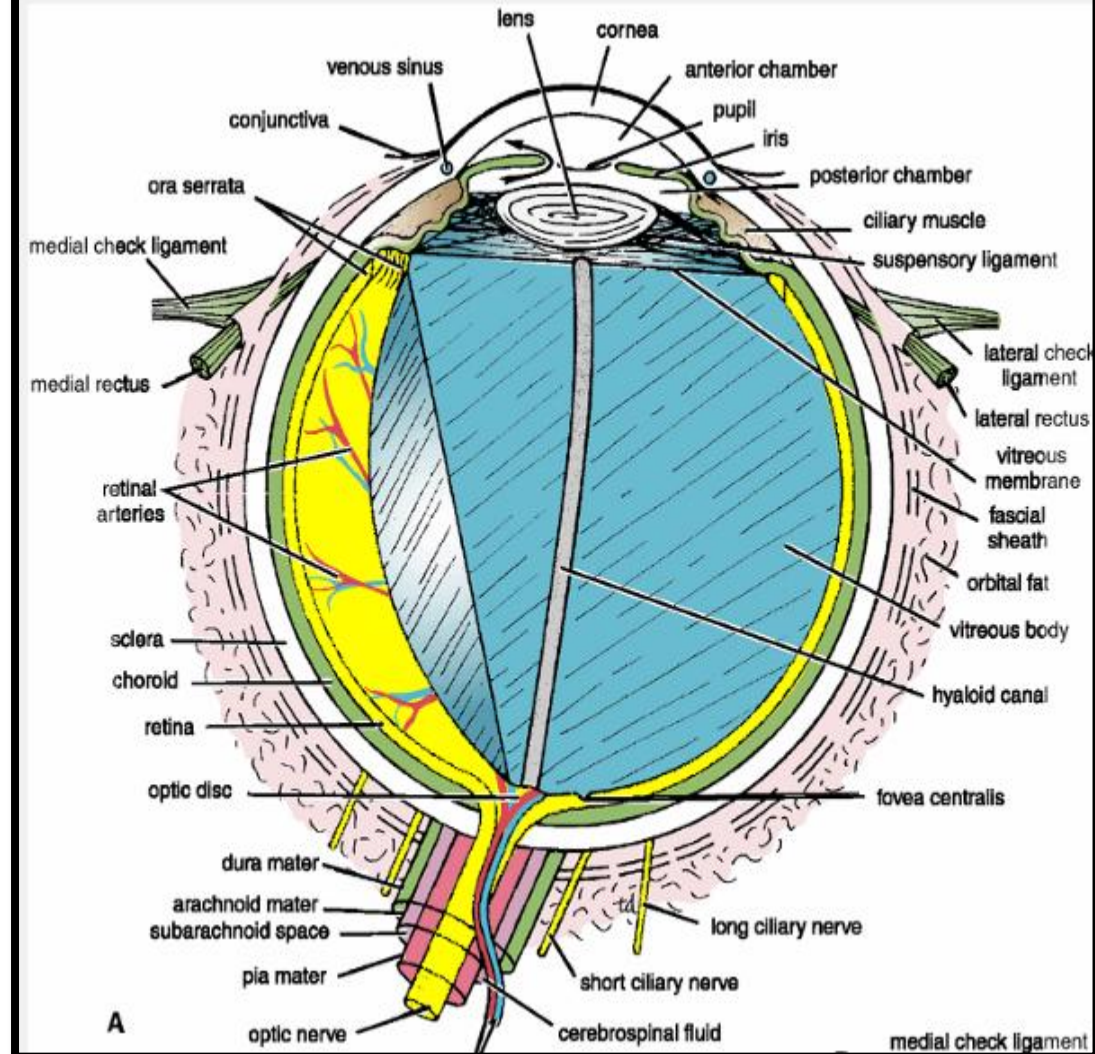
Optic Nerve

❖ The optic nerve enters the orbit from the middle cranial fossa by passing **through the optic canal**

❖ It is accompanied by the **ophthalmic artery**, which lies on its lower lateral side.

❖ The nerve is surrounded by sheaths of pia mater, arachnoid mater, and dura mater

❖ It runs forward and laterally within the cone of the recti muscles and pierces the sclera at a point medial to the posterior pole of the eyeball



Remember that the meninges fuse with the sclera so that the subarachnoid space with its contained cerebrospinal fluid extends forward from the middle cranial fossa, around the optic nerve, and through the optic canal, as far as the eyeball. A rise in pressure of the cerebrospinal fluid within the cranial cavity therefore is transmitted to the back of the eyeball.

Papilledema



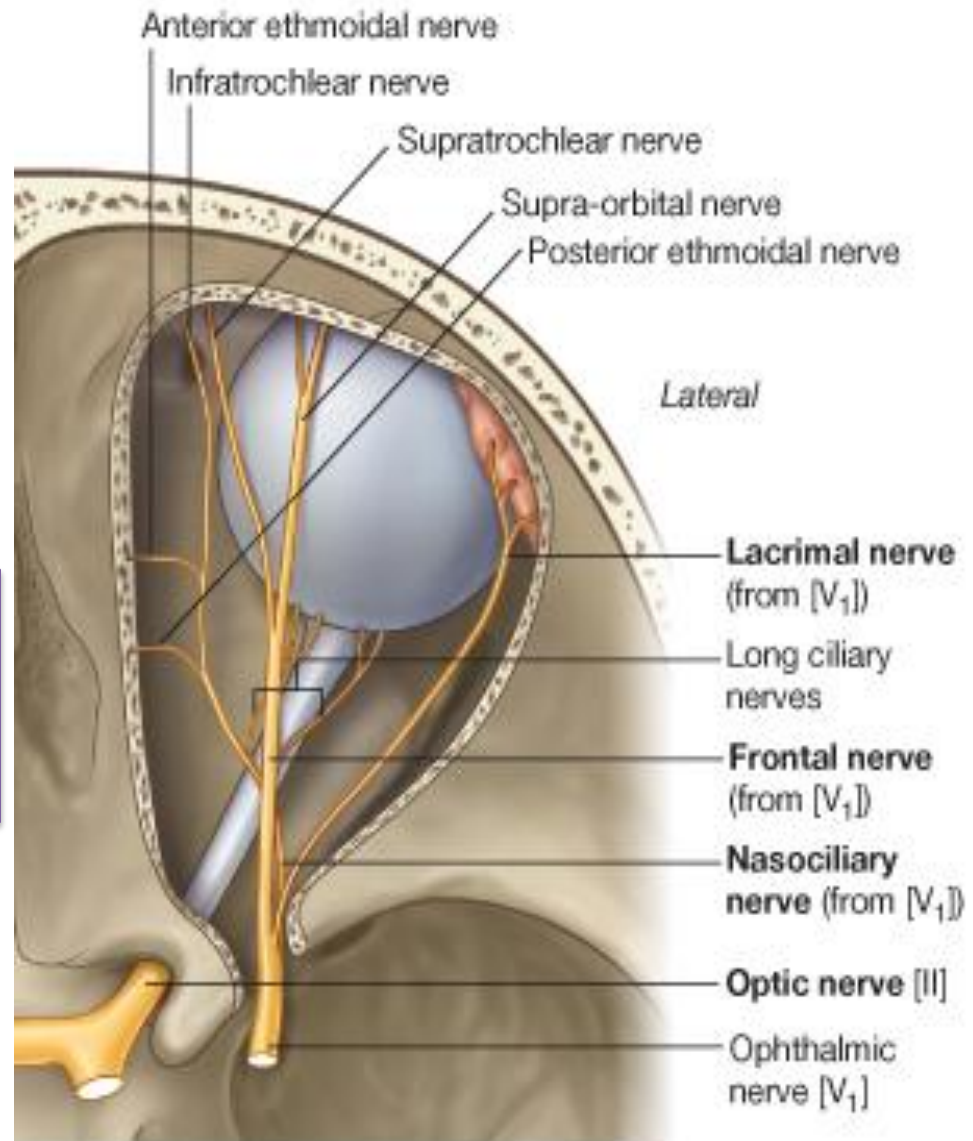
**Because the optic nerve sheath is continuous with the subarachnoid space of the brain, increased pressure is transmitted through to the optic nerve.
the anterior end of the optic nerve stops abruptly at the eye.**

Lacrimal Nerve

arises from
*the ophthalmic division of the
trigeminal nerve*

It enters the orbit through the
upper part of the superior orbital fissure
passes forward along the upper border of the
lateral rectus muscle

➤ It is joined by a branch of the
zygomaticotemporal nerve, which later
leaves it to enter the lacrimal gland

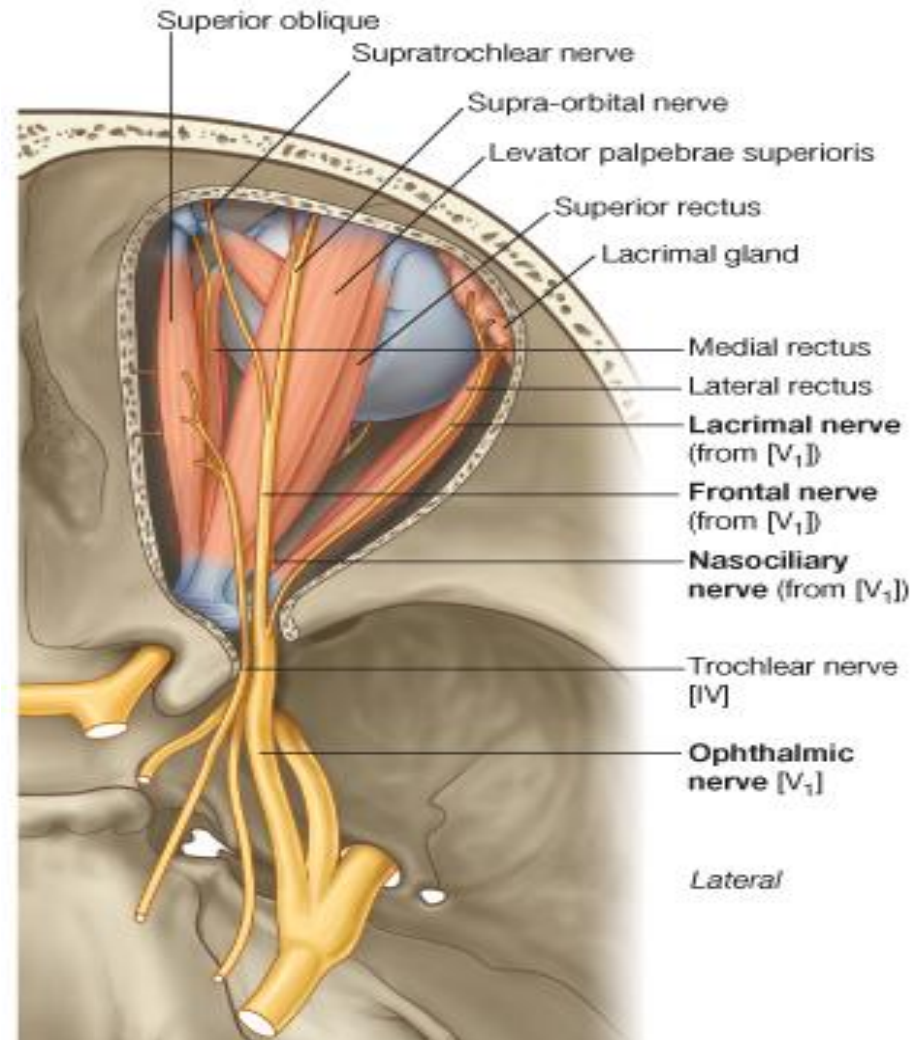


Frontal Nerve

➤ The frontal nerve arises from the ophthalmic division of the trigeminal nerve

It enters the orbit through the upper part of the superior orbital fissure and passes forward on the upper surface of the levator palpebrae superioris beneath the roof of the orbit

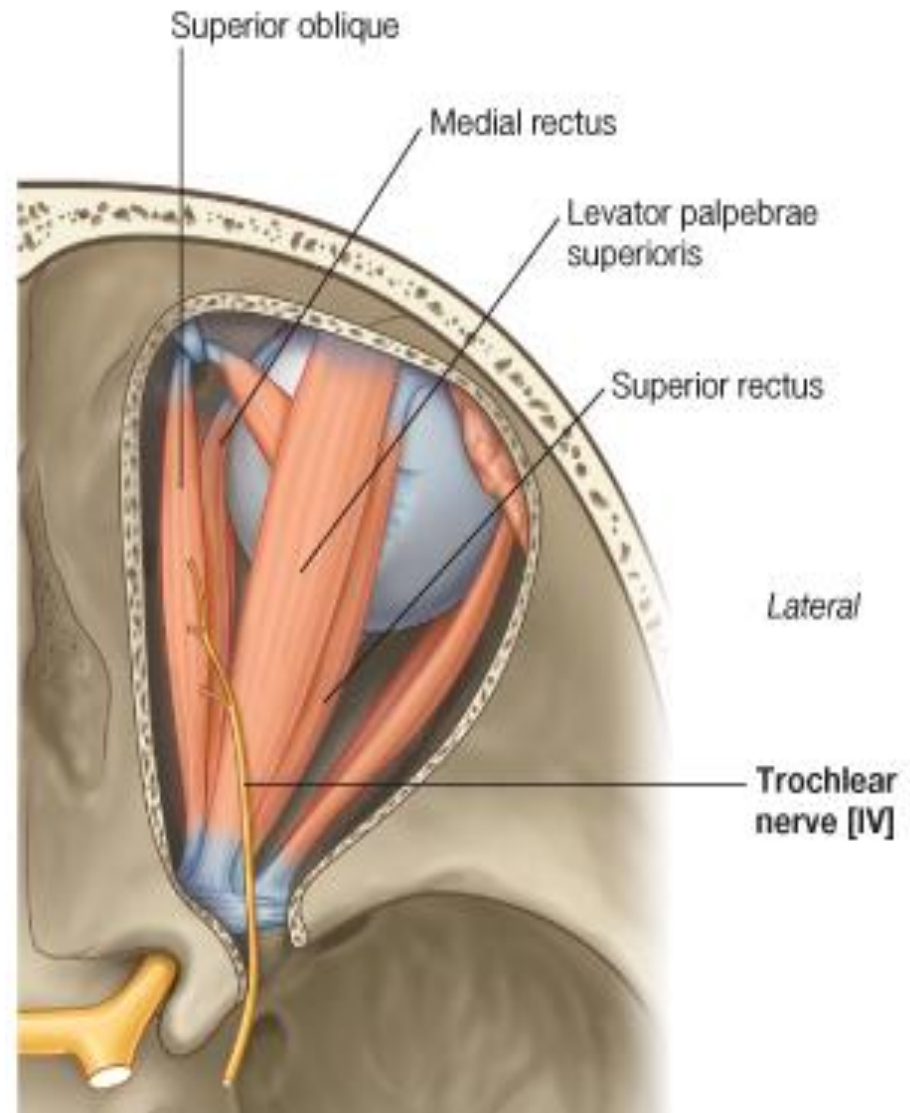
It divides into the supratrochlear and supraorbital nerves that wind around the upper margin of the orbital cavity to supply the skin of the forehead; the supraorbital nerve also supplies the mucous membrane of the frontal air sinus.



Trochlear Nerve

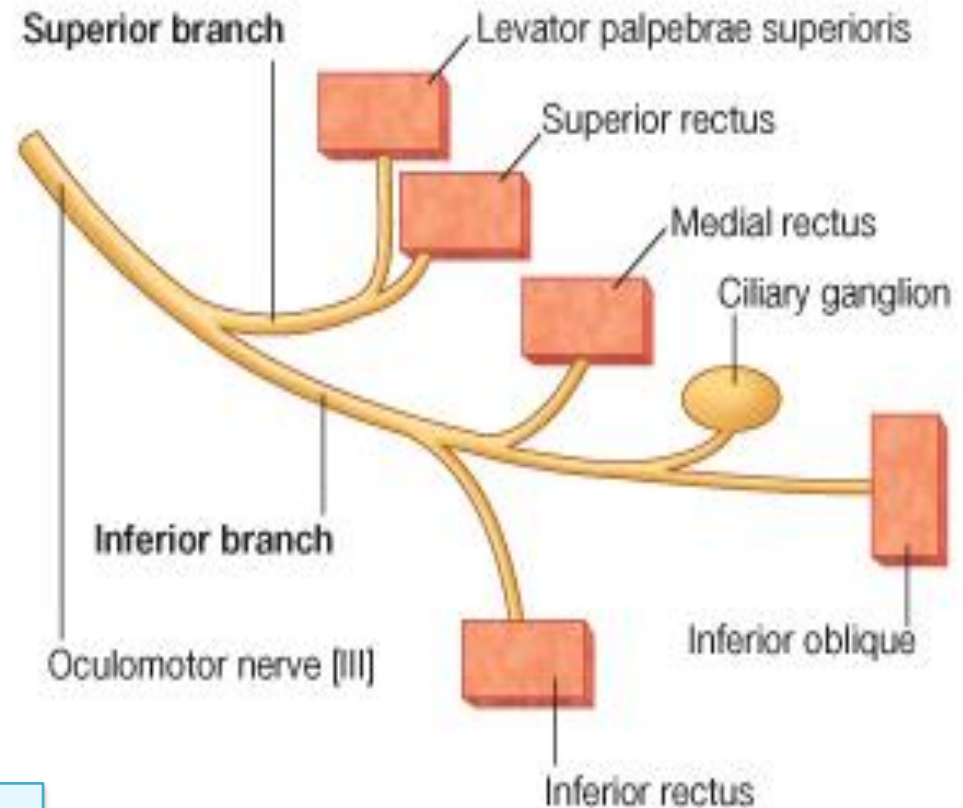
The trochlear nerve enters the orbit through the upper part of the superior orbital fissure

It runs forward and supplies
the superior oblique muscle



Oculomotor Nerve

The superior ramus of the oculomotor nerve enters the orbit through **the lower part** of the superior orbital fissure
➤ It **supplies the superior rectus muscle** then pierces it, and supplies the **levator palpebrae superioris muscle**



The inferior ramus of the oculomotor nerve enters the orbit in a similar manner and supplies **the inferior rectus, the medial rectus, and the inferior oblique muscles.**

The nerve to the inferior oblique gives off a branch that passes **to the ciliary ganglion** and carries parasympathetic fibers to the sphincter pupillae and the ciliary muscle

SO4 LR6

Nasociliary Nerve

- The nasociliary nerve arises from the ophthalmic division of the trigeminal nerve.
- It enters the orbit through the **lower part of the superior orbital fissure**
- It crosses above the optic nerve, runs forward along the upper margin of the medial rectus muscle, and ends by dividing into **the anterior ethmoidal and infratrochlear nerves**

Branches of the Nasociliary Nerve

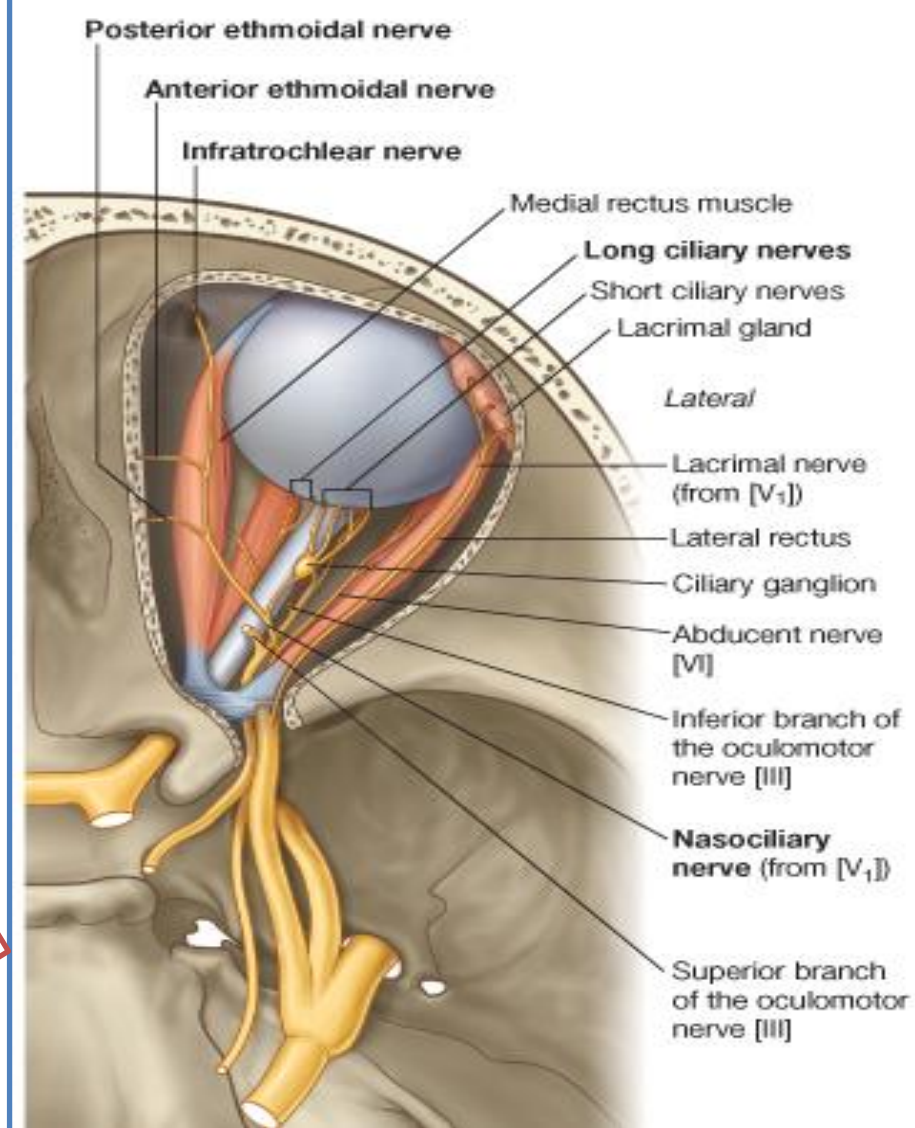
1-The communicating branch to the ciliary ganglion is a sensory nerve.

The sensory fibers **from the eyeball** pass to the ciliary ganglion via the short ciliary nerves without **interruption**, and then join the **nasociliary nerve** by means of the communicating branch.

Read only

2-The long ciliary nerves, two or three in number, arise from the nasociliary nerve as it crosses the optic nerve. They contain sympathetic fibers for the dilator pupillae muscle.

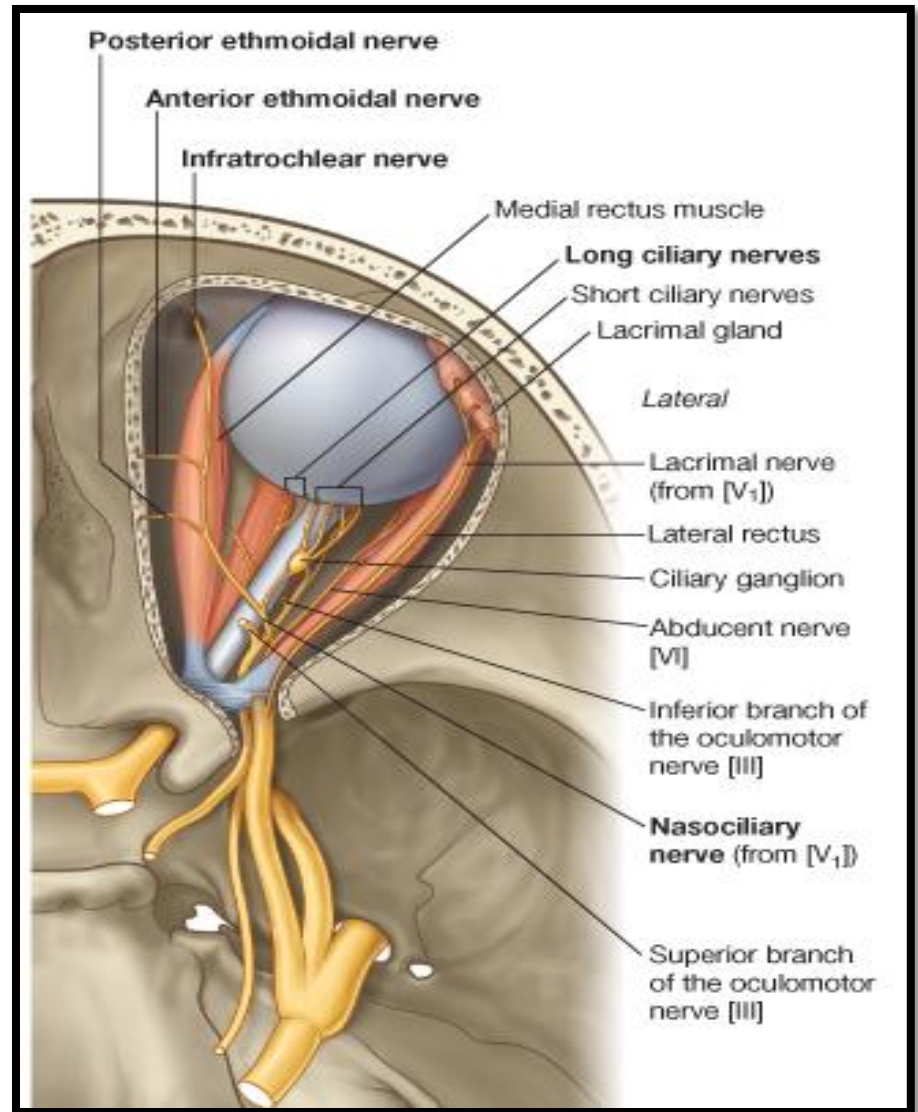
The nerves pass forward with the short ciliary nerves and pierce the sclera of the eyeball. They continue forward between the sclera and the choroid to reach the iris.



3-The posterior ethmoidal nerve
supplies **the ethmoidal and sphenoidal air sinuses**

4-The infratrochlear nerve
supplies the skin of the medial part of the upper eyelid and the adjacent part of the nose

5-The anterior ethmoidal nerve
passes through the **anterior ethmoidal foramen**
➤ After supplying an area of mucous membrane in the nasal cavity, it appears on the face **as the external nasal nerve at the lower border of the nasal bone**, and supplies the skin of the nose down as far as the tip

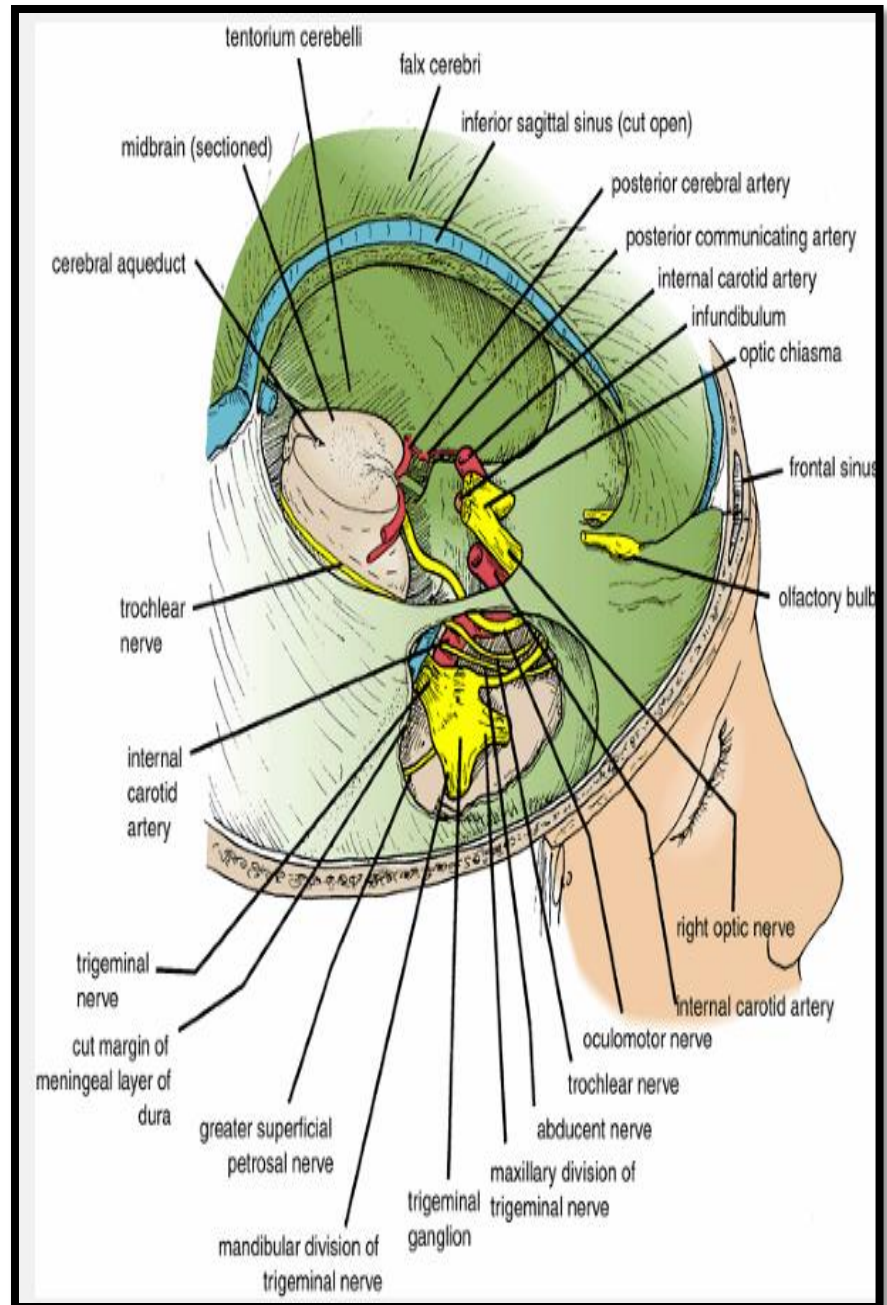


The Sixth Cranial nerve

ABDUCENT NERVE

The abducent nerve enters the orbit through **the lower part** of the superior orbital fissure

It supplies the lateral rectus muscle

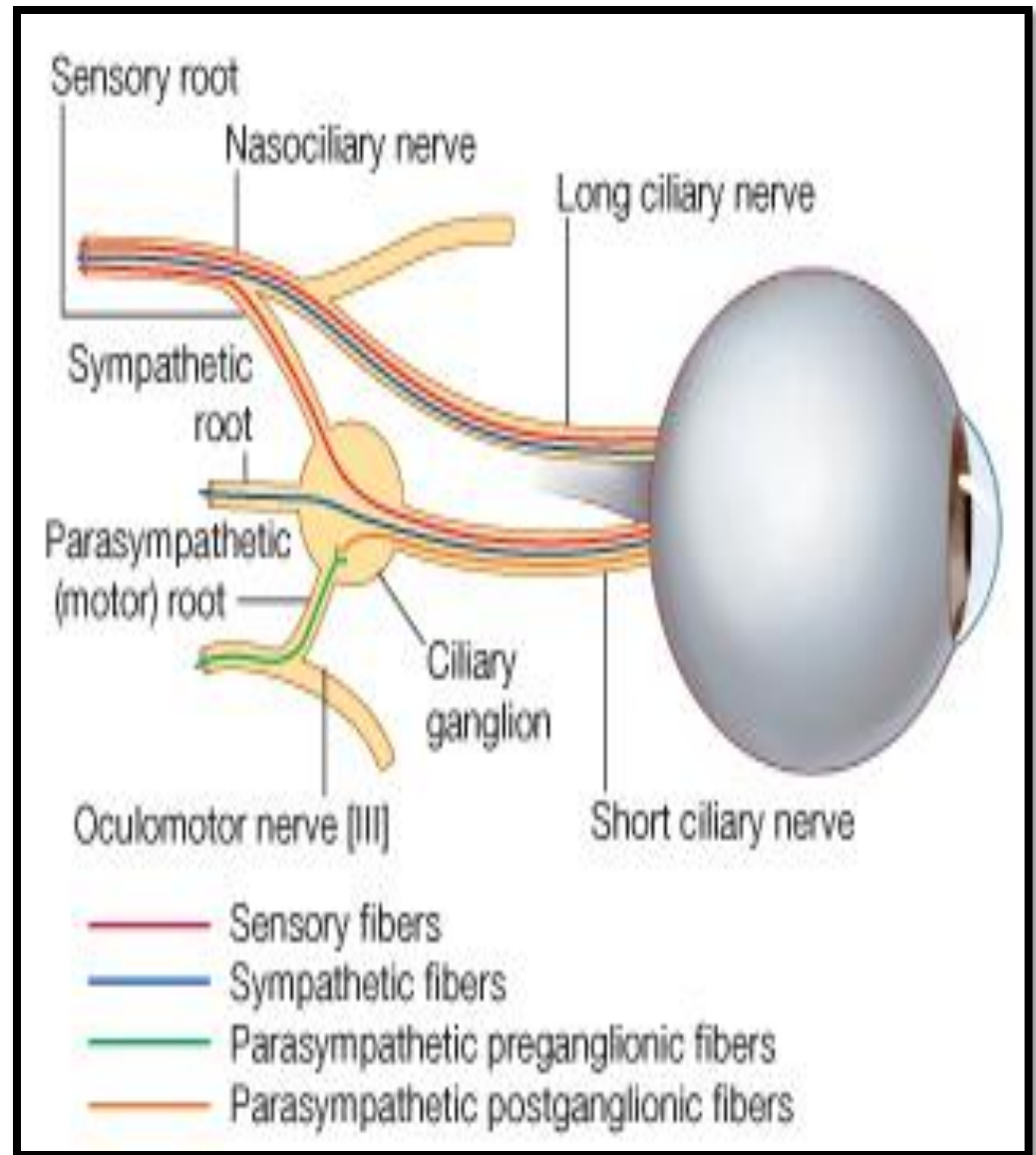


Ciliary Ganglion

- Is a parasympathetic ganglion
- About the size of a pinhead and situated in the posterior part of the orbit.

- It receives its preganglionic parasympathetic fibers from the *oculomotor nerve* via the nerve *to the inferior oblique muscle*

The postganglionic fibers leave the ganglion in the *short ciliary nerves*, which enter the back of the eyeball and supply the *sphincter pupillae* and the *ciliary muscle*.



It receives its *sympathetic fibers* from the internal carotid sympathetic plexus in the orbit and run through the ganglion without interruption.

Ophthalmic Artery

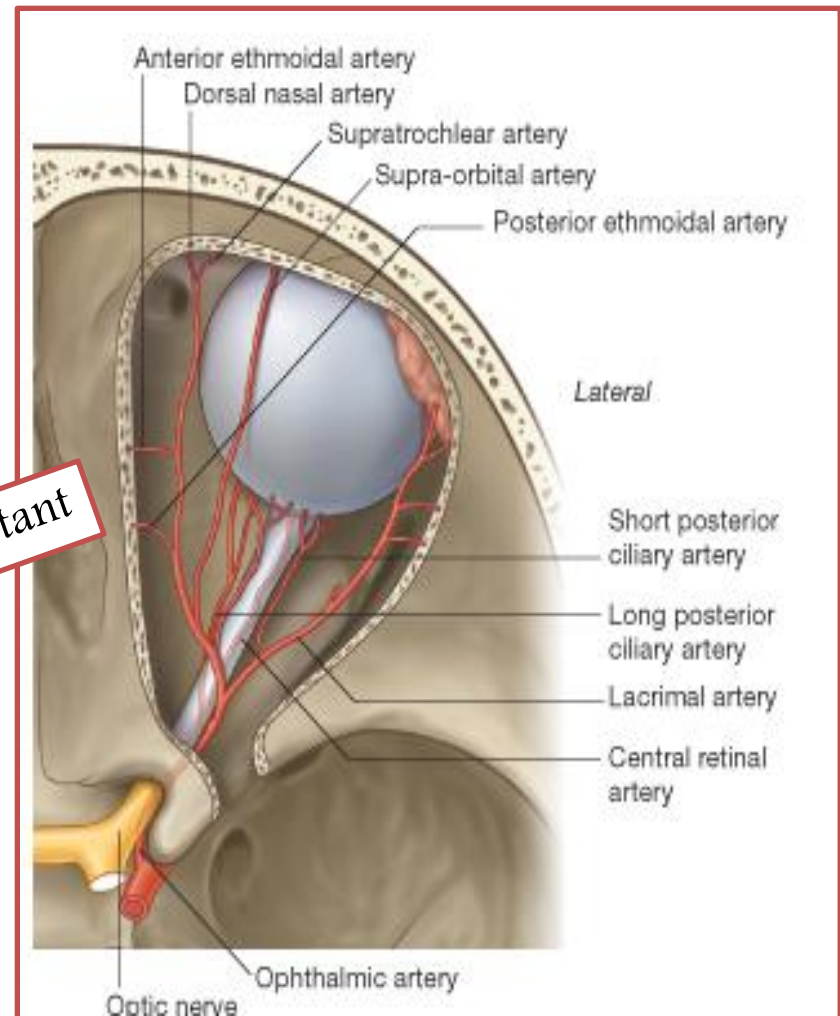
- is a branch of the ***internal carotid artery***
- It enters the orbit through the optic canal ***with the optic nerve***
- It runs forward and **crosses the optic** nerve to reach the medial wall of the orbit.
- It gives off numerous branches, which accompany the nerves in the orbital cavity

Branches of the Ophthalmic Artery

The central artery of the retina is a small branch that **pierces** the meningeal sheaths of the optic nerve to gain entrance to the nerve

- **It runs in the substance of the optic nerve** and enters the eyeball at the center of the optic disc. Here, it divides into branches, which may be studied in a patient through an ***ophthalmoscope***

important



The muscular branches (of the ophthalmic artery)

The ciliary arteries

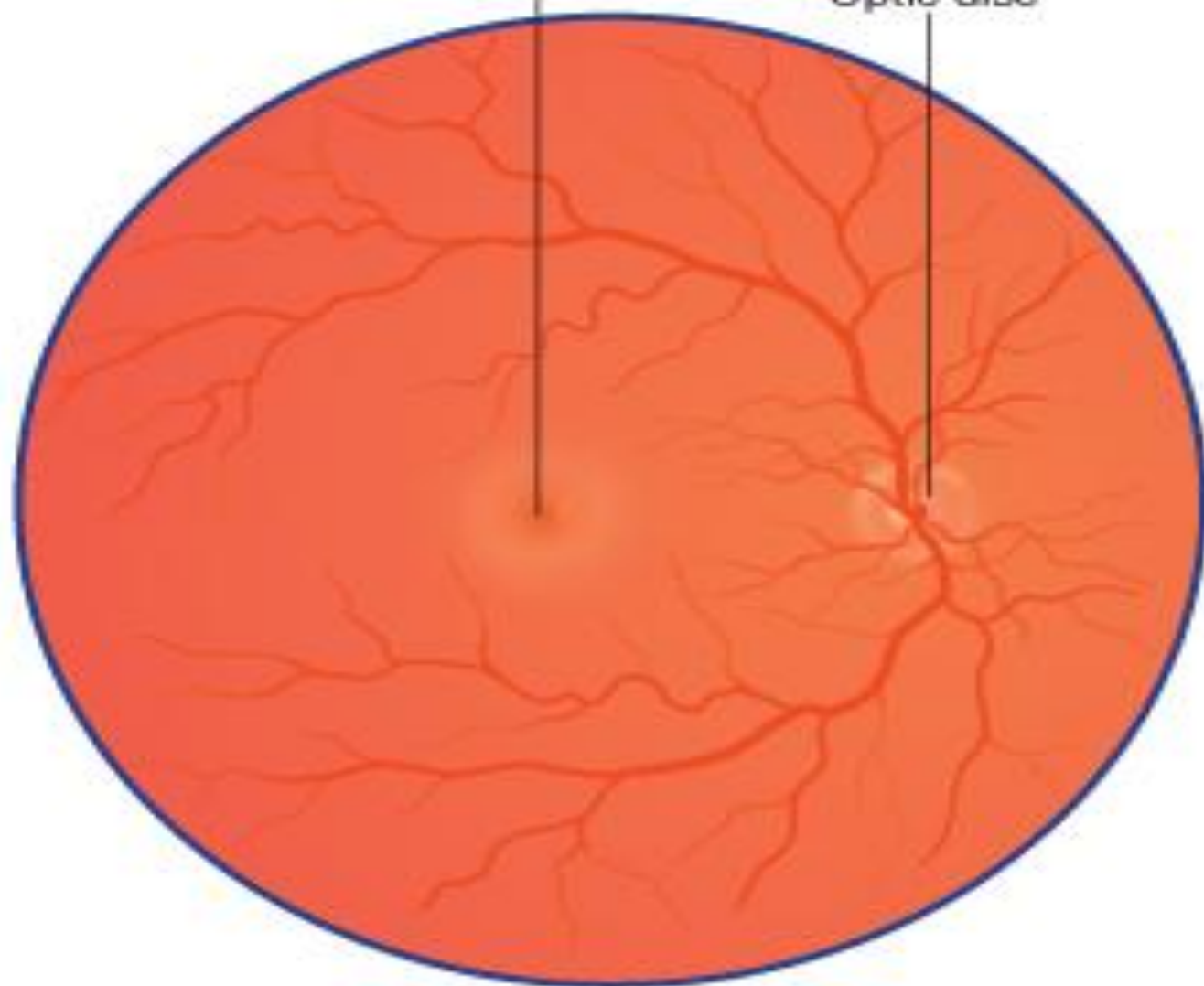
The lacrimal artery to the lacrimal gland

The supratrochlear and supraorbital arteries are distributed to the skin of the forehead

Read only

Macula lutea with fovea centralis

Optic disc

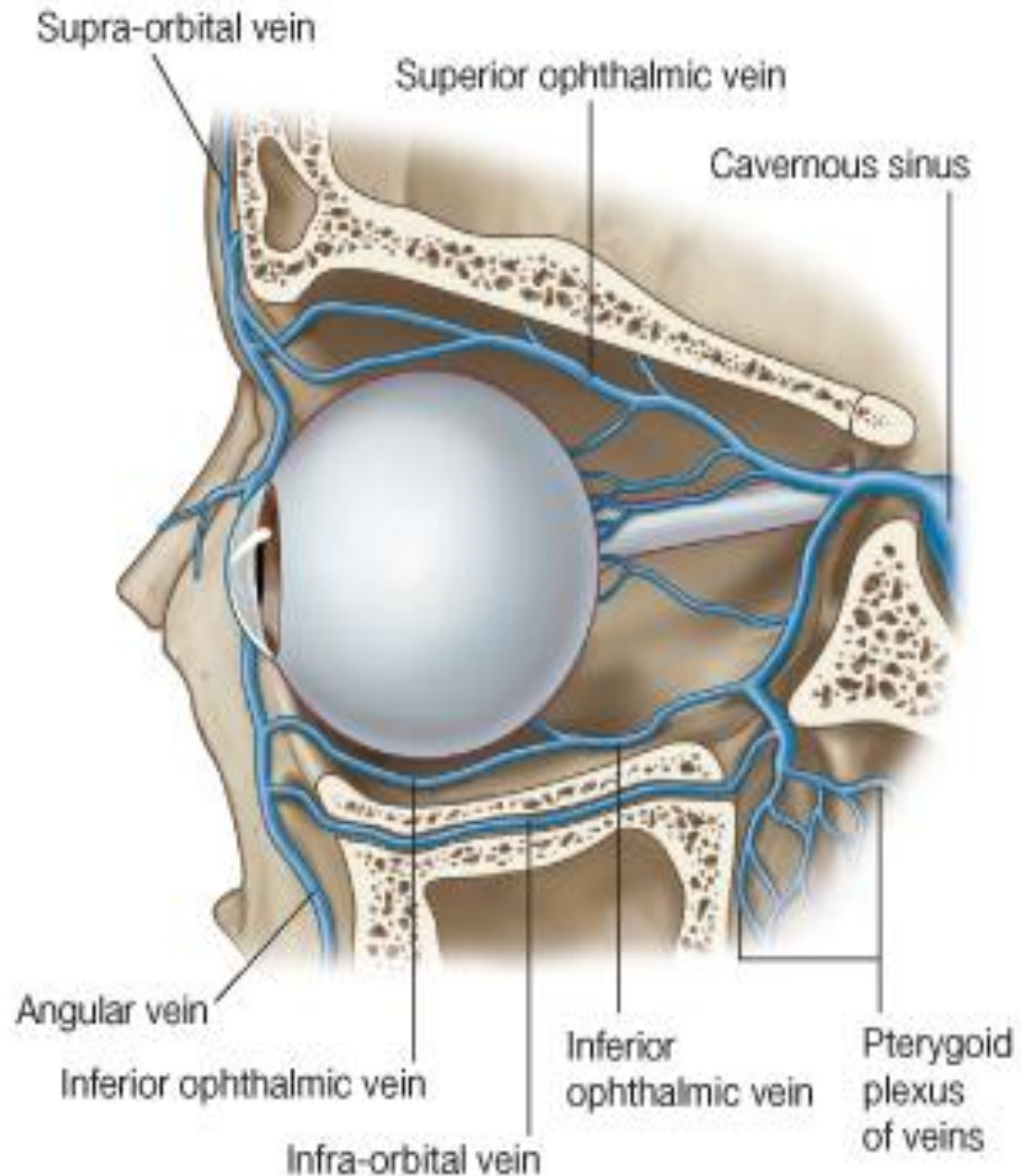


Ophthalmic Veins

The superior ophthalmic vein communicates in front with **the facial vein**

The inferior ophthalmic vein communicates through the inferior orbital fissure with the **pterygoid venous plexus**.

Both veins pass backward through the superior orbital fissure and drain **into the cavernous sinus**.



MUSCLES OF THE EYE

There are two groups of muscles within the orbit:

1-extrinsic muscles of eyeball (extra-ocular muscles) involved *in movements of the eyeball or raising upper eyelids*;

2-intrinsic muscles within the eyeball, which control the shape of the lens and size of the pupil.

The extrinsic muscles include

THE LEVATOR PALPEBRAE SUPERIORIS

SUPERIOR RECTUS

INFERIOR RECTUS

MEDIAL RECTUS

LATERAL RECTUS

SUPERIOR OBLIQUE

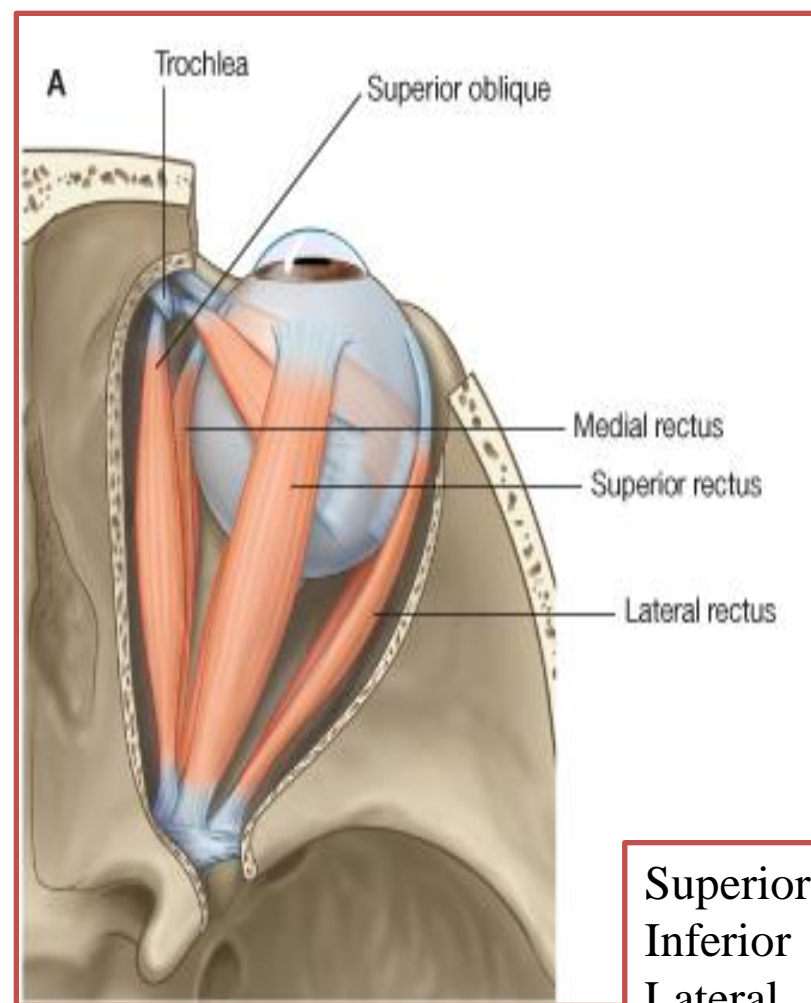
INFERIOR OBLIQUE

The intrinsic muscles include

THE CILIARY MUSCLE

THE SPHINCTER PUPILLAE

THE DILATOR PUPILLAE



7 muscles

6 muscles

4 recti muscles
2 oblique muscles

Superior
inferior

+ 1 levator palpebrae superioris

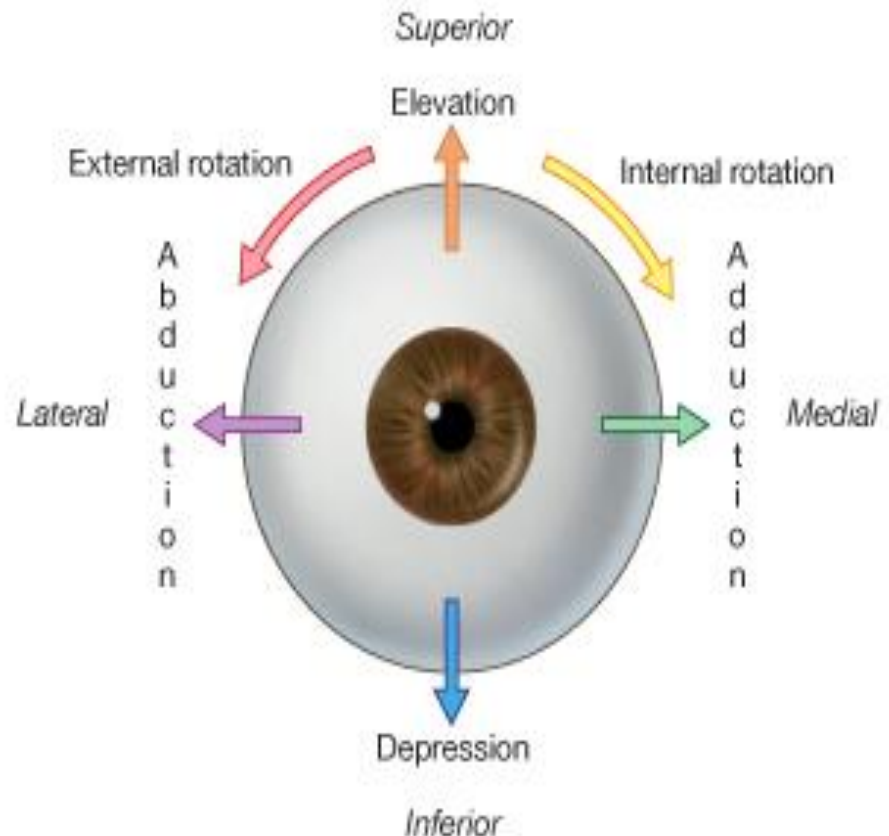
Extrinsic muscles

Of the seven muscles in the extrinsic group of muscles, one raises the eyelids, while the other six move the eyeball itself. The movements of the eyeball, in three dimensions are:

elevation-moving the pupil superiorly
depression-moving the pupil inferiorly
abduction-moving the pupil laterally
adduction-moving the pupil medially
internal rotation-rotating the upper part of the pupil medially (or towards the nose)
external rotation-rotating the upper part of the pupil laterally (or towards the temple)

the oculomotor nerve [III].

levator palpebrae superioris raises the upper eyelid.



1-LEVATOR PALPEBRAE SUPERIORIS

Origin: Lesser wing of sphenoid anterior to optic canal

Insertion: Anterior surface of tarsal plate; a few fibers to skin and superior conjunctival fornix

Nerve supply: Oculomotor nerve /superior branch

Actions: Elevation of upper eyelid

2-SUPERIOR RECTUS

Origin: Superior part of common tendinous ring

Insertion: Anterior half of eyeball superiorly

Nerve supply: Oculomotor nerve /superior branch

Function: Elevation, adduction, medial rotation of eyeball

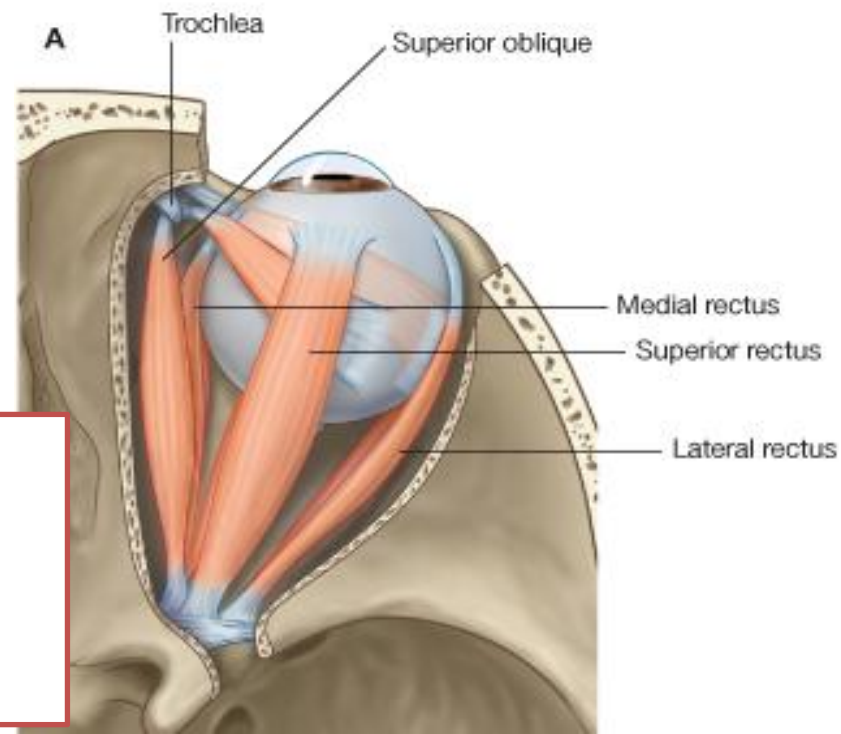
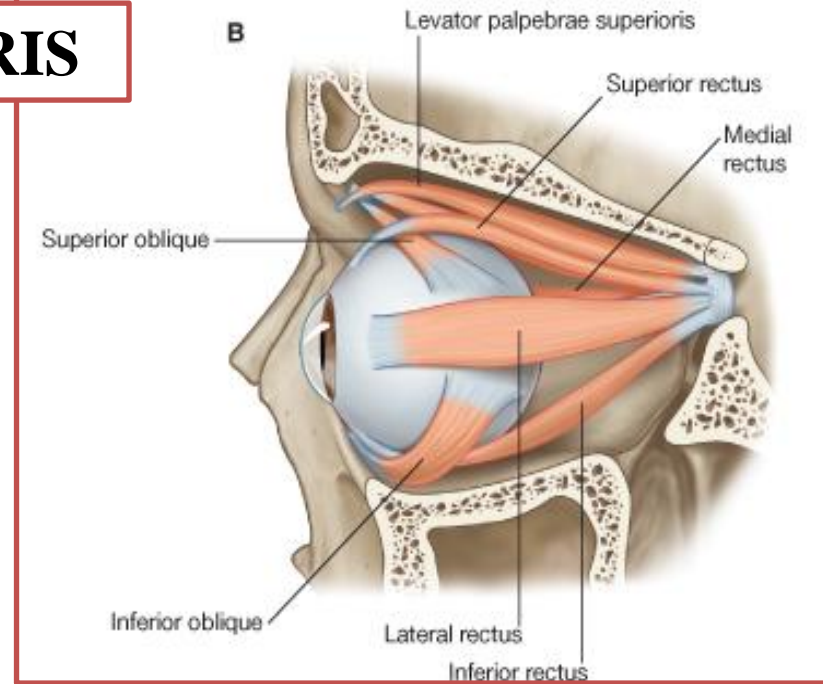
3-INFERIOR RECTUS

Origin: Inferior part of common tendinous ring

Insertion: Anterior half of eyeball inferiorly

Nerve supply: Oculomotor nerve /inferior branch

ACTION: Depression, adduction, lateral rotation of eyeball



4-MEDIAL RECTUS

Origin: Medial part of common tendinous ring

Insertion: Anterior half of eyeball medially

Nerve supply: Oculomotor nerve /inferior branch

Action: Adduction of eyeball

5-Lateral rectus

Origin: Lateral part of common tendinous ring

Insertion: Anterior half of eyeball laterally

Nerve supply: Abducent nerve [VI]

Action: Abduction of eyeball

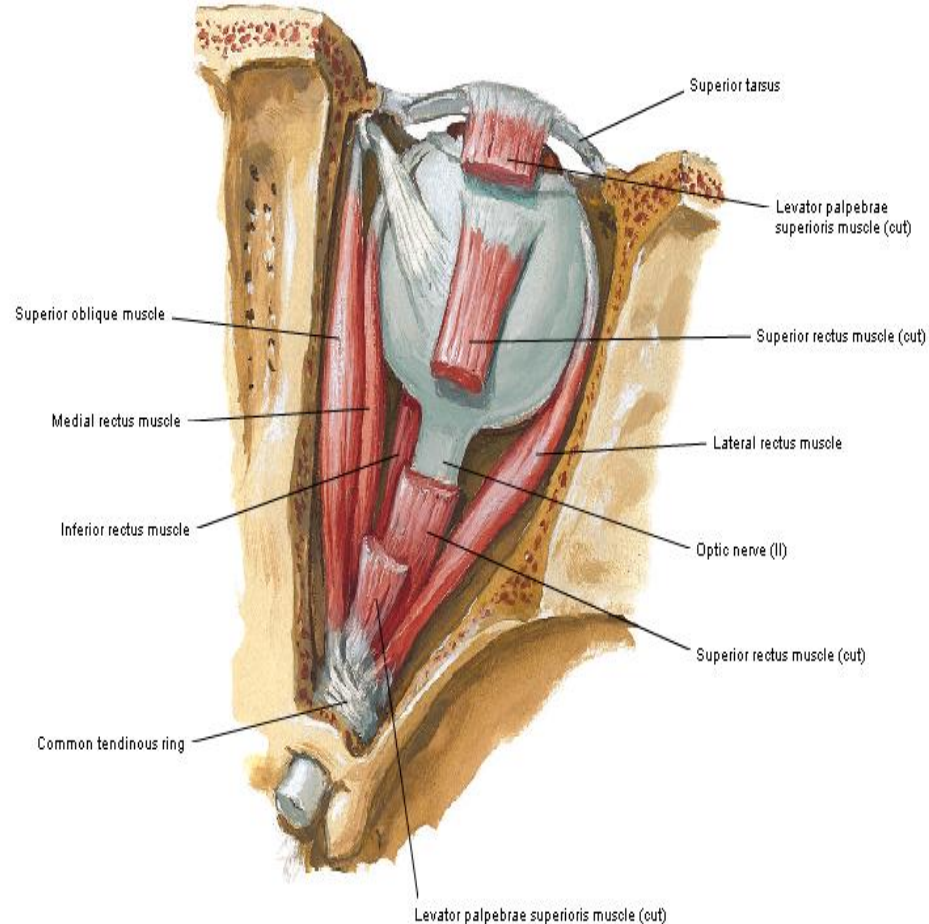
6-Superior oblique

Origin: Body of sphenoid, superior and medial to optic canal

Insertion: Outer posterior quadrant of eyeball

Nerve supply: Trochlear nerve

Action: Depression, abduction, medial rotation of eyeball



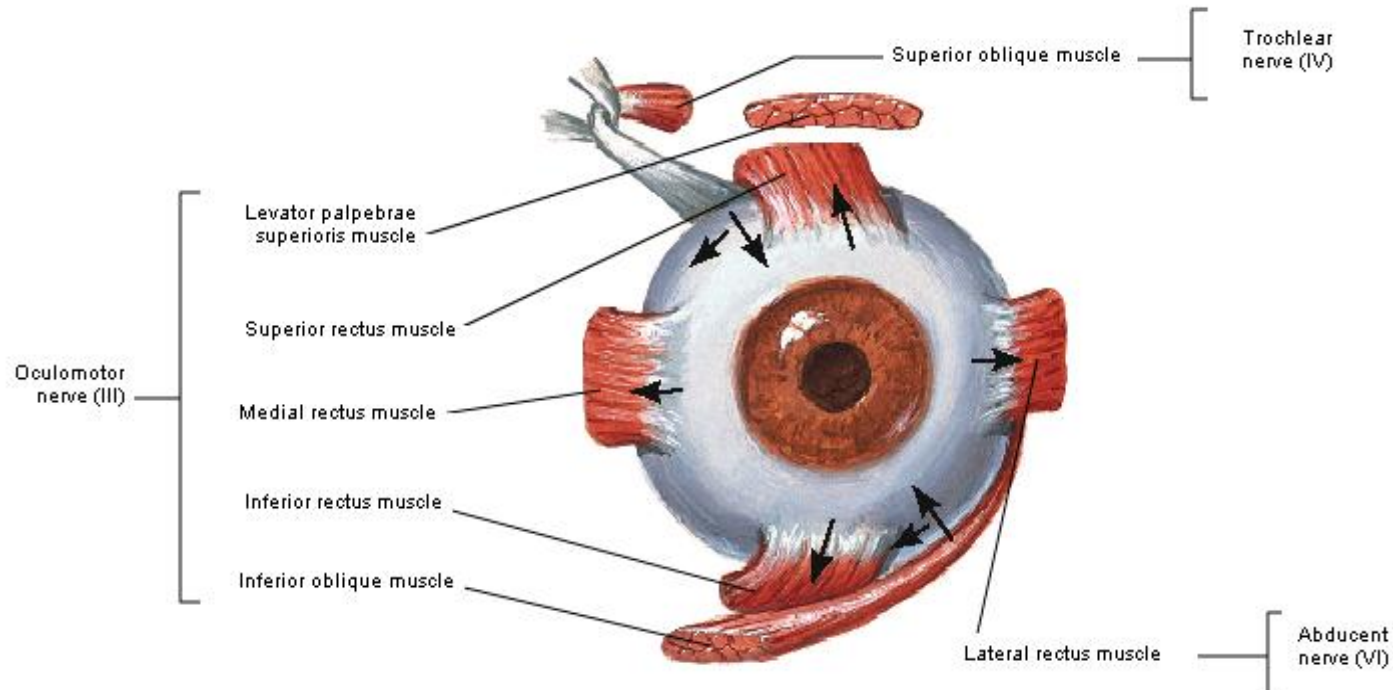
7-INFERIOR OBLIQUE

Origin: Medial floor of orbit posterior to rim;
maxilla lateral to nasolacrimal groove

Insertion: Outer posterior quadrant of eyeball

Nerve supply: Oculomotor nerve /inferior branch

Action: *Elevation, abduction, lateral rotation of eyeball*



Note: Arrows indicate direction of eye movement produced by each muscle

Superior orbital fissure

Lacrimal nerve

Frontal nerve

Trochlear
nerve [IV]

Superior rectus

**Levator palpebrae
superioris**

Optic nerve

Superior oblique

Ophthalmic artery

Medial rectus

Superior division of
oculomotor nerve [III]

Nasociliary nerve

Abducent nerve [VI]

Inferior division of
oculomotor nerve [III]

Inferior rectus

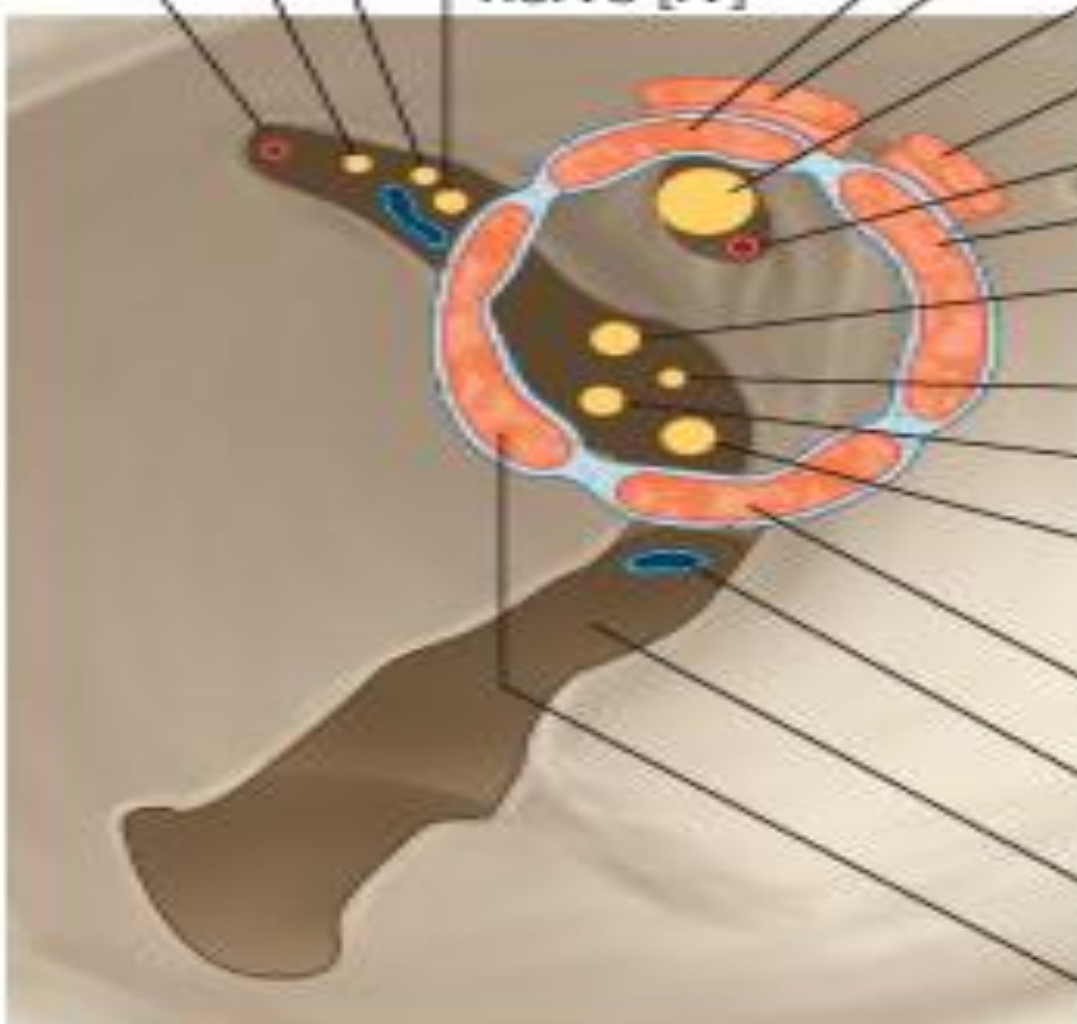
Inferior ophthalmic vein

Inferior orbital fissure

Lateral rectus

Lateral

Medial



Lacrimal branch of ophthalmic [V₁]

Frontal branch of ophthalmic nerve [V₁]

Trochlear nerve [IV]

Optic nerve

Optic canal

Ophthalmic artery

Superior branch of
oculomotor nerve [III]

Nasociliary branch
of ophthalmic nerve [V₁]

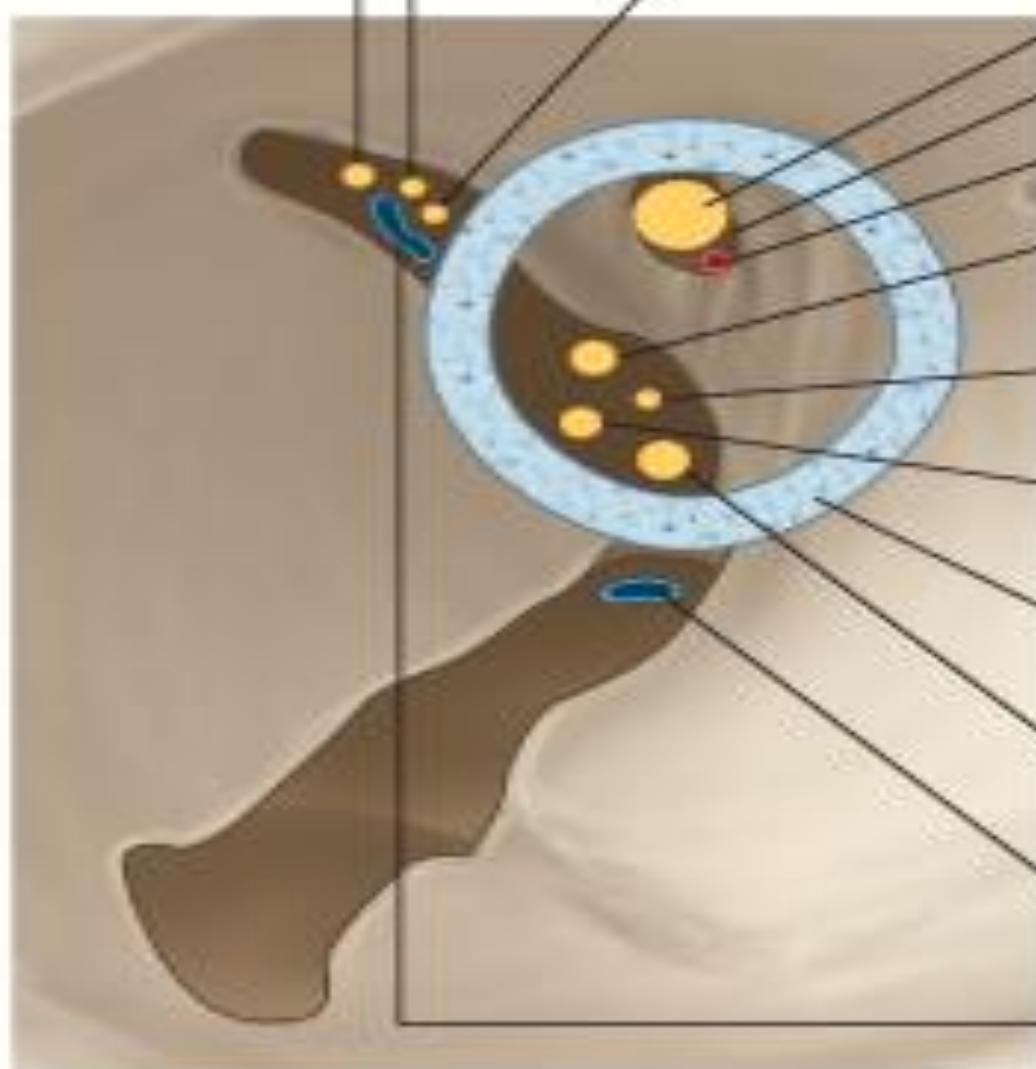
Abducent nerve [VI]

Common tendinous ring

Inferior branch of
oculomotor nerve [III]

Inferior ophthalmic vein

Superior ophthalmic vein



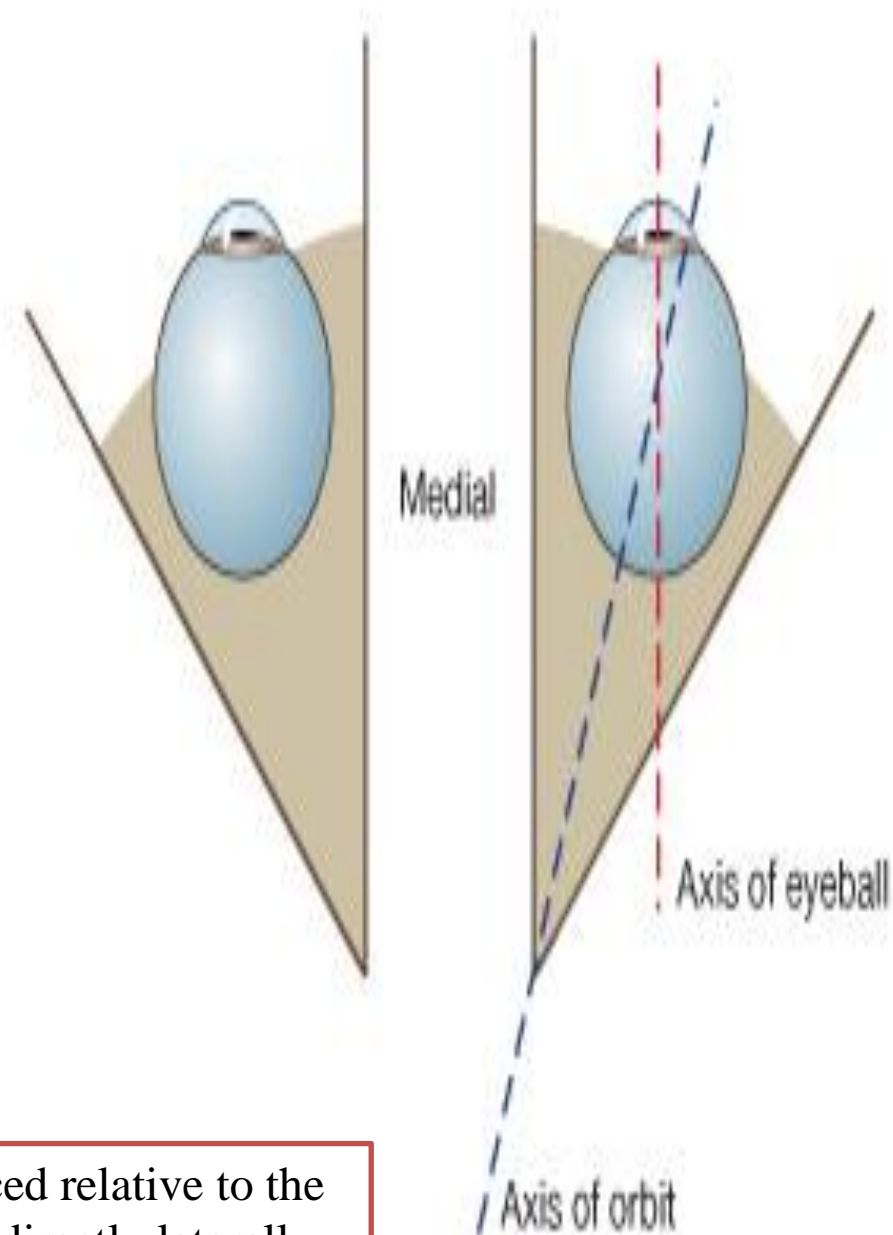
Lateral

Medial

The origins of the superior and inferior recti are situated about 23° medial to their insertions, and, therefore, when the patient is asked to turn the cornea laterally, these muscles are placed in the optimum position to raise (superior rectus) or lower (inferior rectus) the cornea

the superior and inferior oblique muscles can be tested. The pulley of the superior oblique and the origin of the inferior oblique muscles lie medial and anterior to their insertions. The physician tests the action of these muscles by asking the patient first to look medially, thus placing these muscles in the optimum position to lower (superior oblique) or raise (inferior oblique) the cornea.

Because the lateral and medial recti are simply placed relative to the eyeball, asking the patient to turn his or her cornea directly laterally tests the lateral rectus and turning the cornea directly medially tests the medial rectus



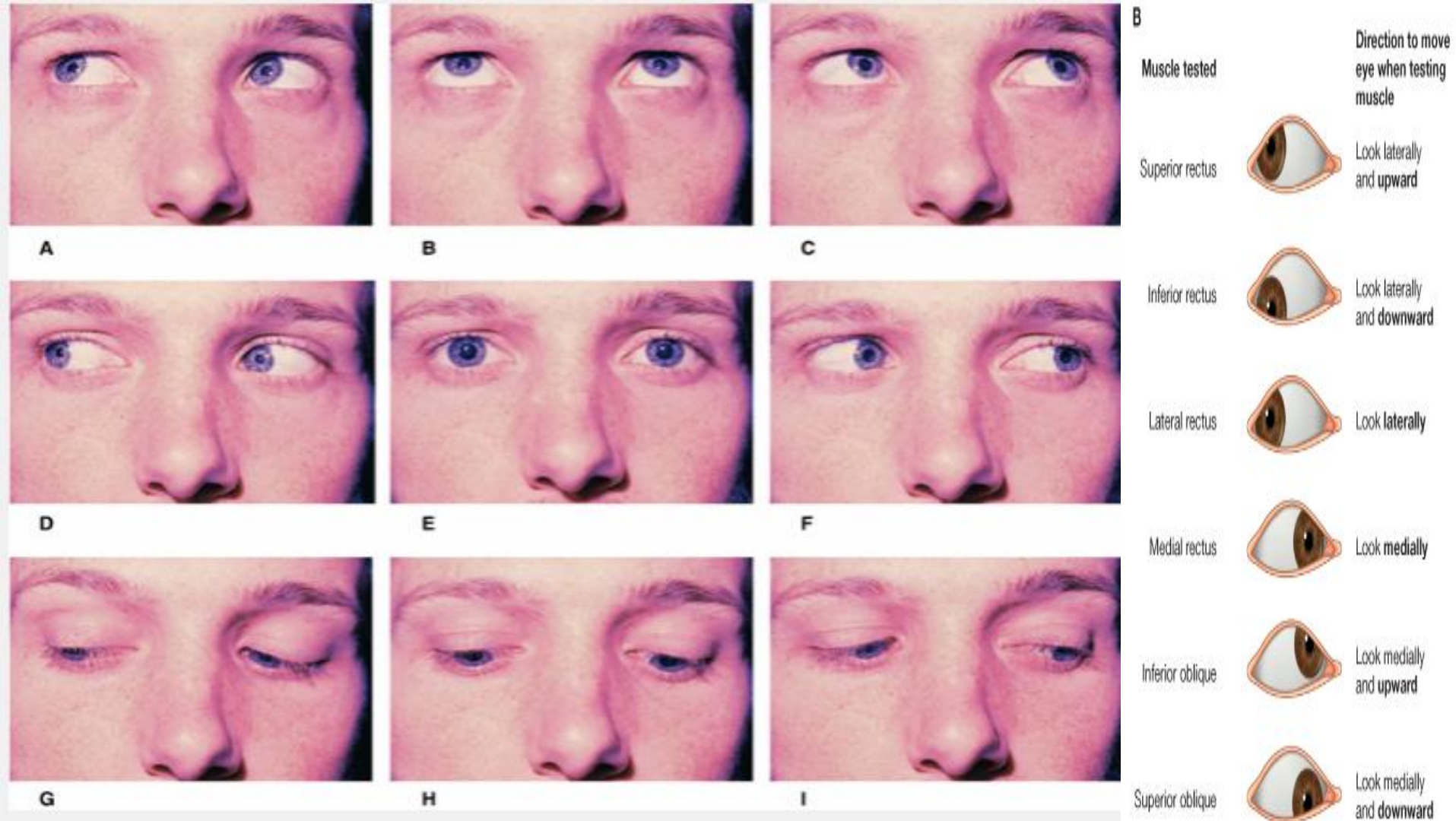


Figure 11-24 The cardinal positions of the right and left eyes and the actions of the recti and oblique muscles principally responsible for the movements of the eyes. **A.** Right eye, superior rectus muscle; left eye, inferior oblique muscle. **B.** Both eyes, superior recti and inferior oblique muscles. **C.** Right eye, inferior oblique muscle; left eye, superior rectus muscle. **D.** Right eye, lateral rectus muscle; left eye, medial rectus muscle. **E.** Primary position, with the eyes fixed on a distant fixation point. **F.** Right eye, medial rectus muscle; left eye, lateral rectus muscle. **G.** Right eye, inferior rectus muscle; left eye, superior oblique muscle. **H.** Both eyes, inferior recti and superior oblique muscles. **I.** Right eye, superior oblique muscle; left eye, inferior rectus muscle.