

ANATOMY OF EYELID

SOURAV

INTRODUCTION

Mobile tissue curtains

Act as shutters

Spread tear film over the cornea

Contribution to facial features

Position relays information- wake/asleep

EXTENT

Upper eyelid

- From eyebrow downwards to end in a free margin
- Superior boundary of palpebral fissure

Lower eyelid

- Merges with the skin of cheek

LID FOLDS

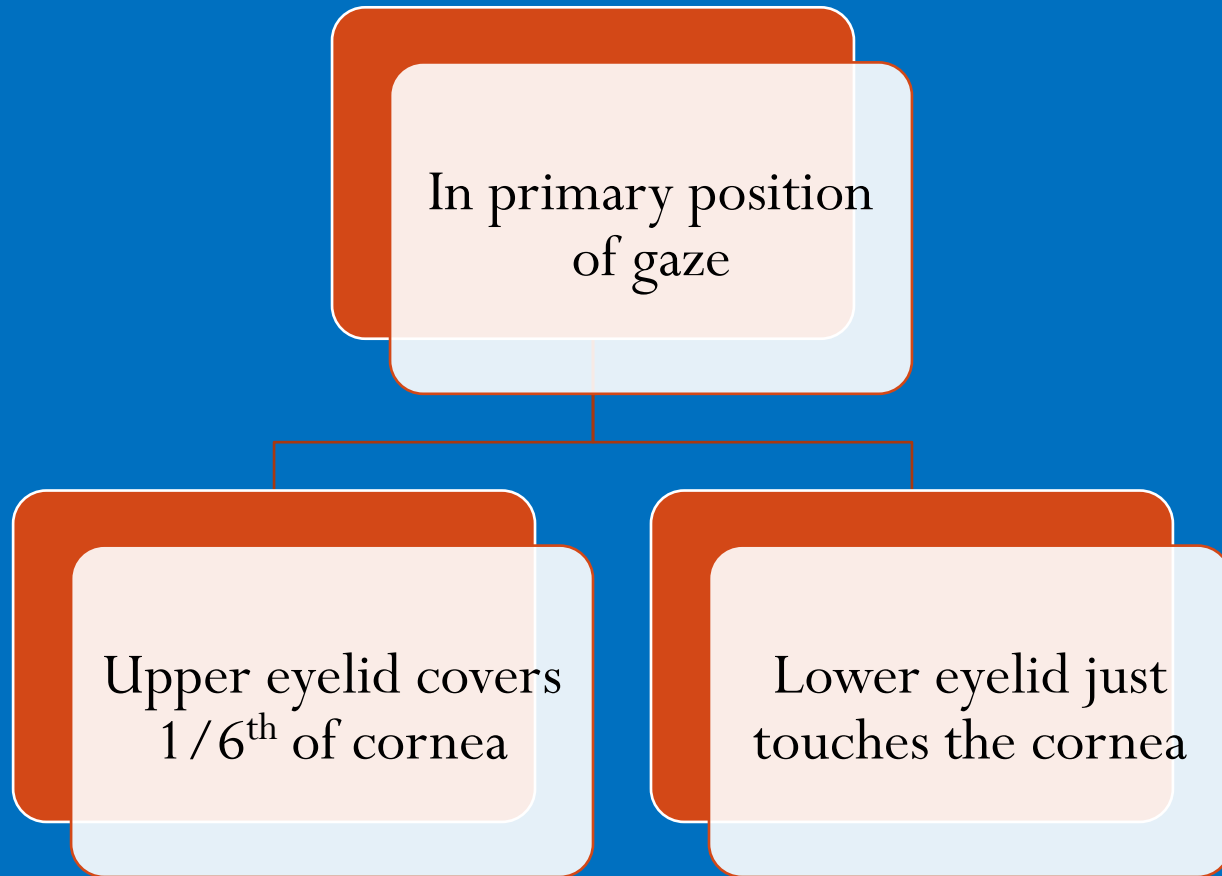
Superior lid fold

- Orbital & tarsal portion
- Formed by fibrous slips, from tendon of levator

Inferior lid fold

- On skin of lower eyelids
- Fibrous slips from fascia of inferior rectus

POSITION OF EYELIDS



CANTHI

Lateral canthus: 5-7 mm from lateral orbital margin

contact with globe

60 deg. with eyes wide open

30-40 deg. with eyes normally open

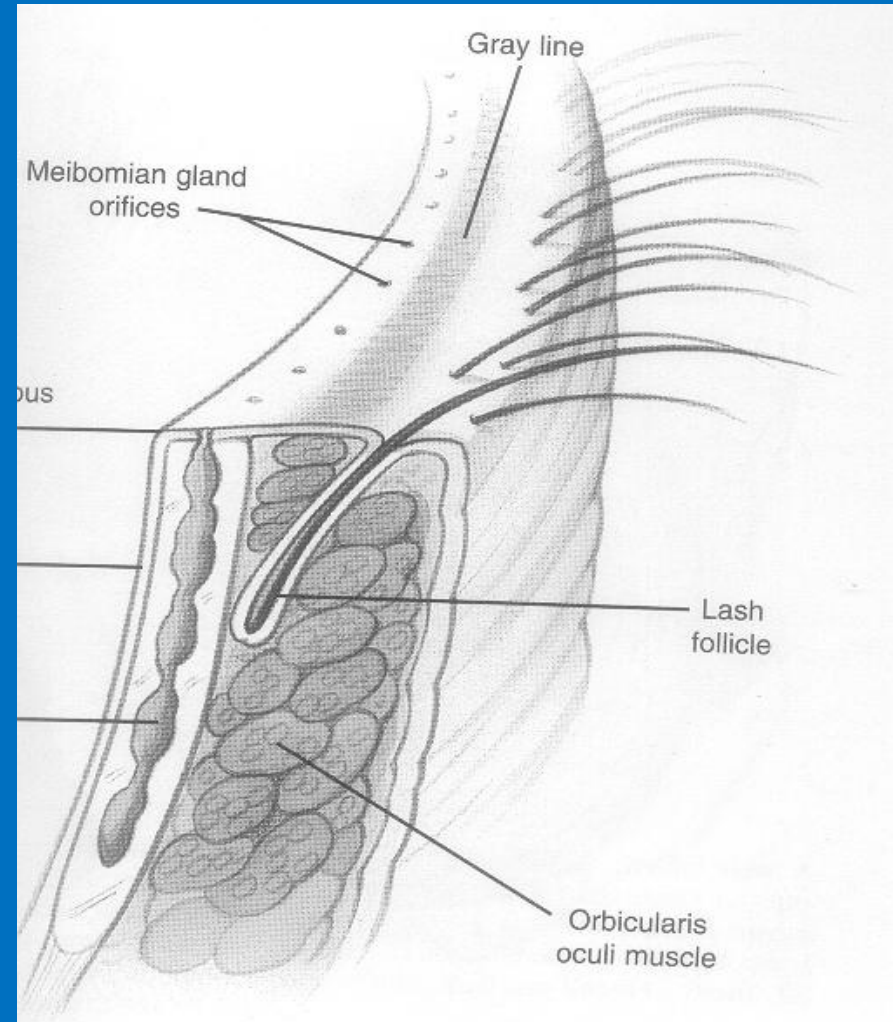
Medial canthus: Rounded

Lacus lacrimalis

Caruncle & Plica semilunaris

EYELASHES

- 2-3 rows (6 to 12 mm)
- 150-100 in upper lid
and 75- 50 in lower lid
- No interlacing
- Tapering (20 – 120 microns)
- 3-4 months
- Glands of Zeis & Moll- empty into infundibulum of each piliary gland



PALPEBRAL APERTURE

- Elliptical space b/w upper & lower lid margins
- Caucasians :
 - In half , both medial canthi and lateral canthi at the same level
 - In half of them lateral canthus is slightly higher than medial canthi
- Mongoloid & antimongoloid slant

PALPEBRAL APERTURE

- **At Birth**

Horizontally– 18 to 21 mm

Vertically = 8mm

- **In Adults**

28 to 30 mm (horizontal)

9 to 11 mm (vertical)

STRUCTURE OF UPPER LID

Skin

Subcutaneous areolar tissue

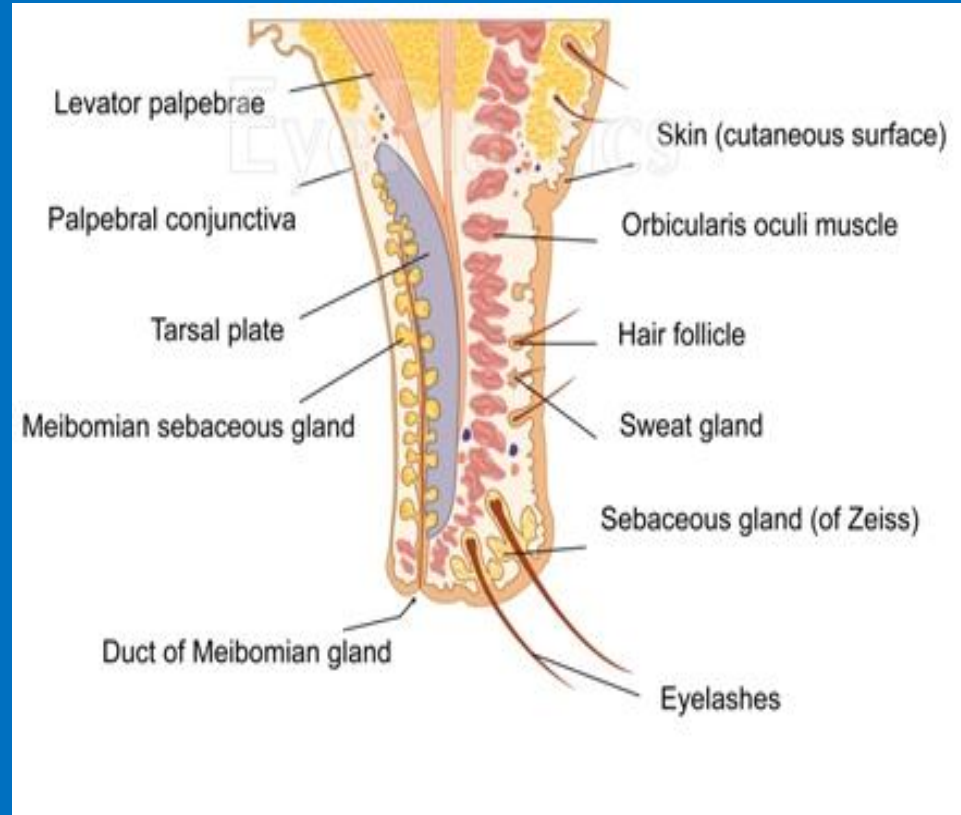
Layer of striated muscles

Sub muscular areolar tissue

Fibrous layer

Non-striated muscle

Conjunctiva



SKIN

- Elastic , fine texture, thinnest in the body
- Epidermis
 - 6-7 layers , stratified squamous epithelium
 - Basal layer- unicellular sebaceous glands, sweat glands
- Dermis
 - Thin layer , dense connective tissue
 - Rich network : BV, elastic fibers, lymphatics, nerve
 - Variable no. of melanocytes

SUBCUTANEOUS AREOLAR TISSUE

- Beneath the skin
- No fat
- Readily distended by blood/ edema
- Nonexistent
 - Near ciliary margin
 - At lid folds
 - Medial & lateral angles

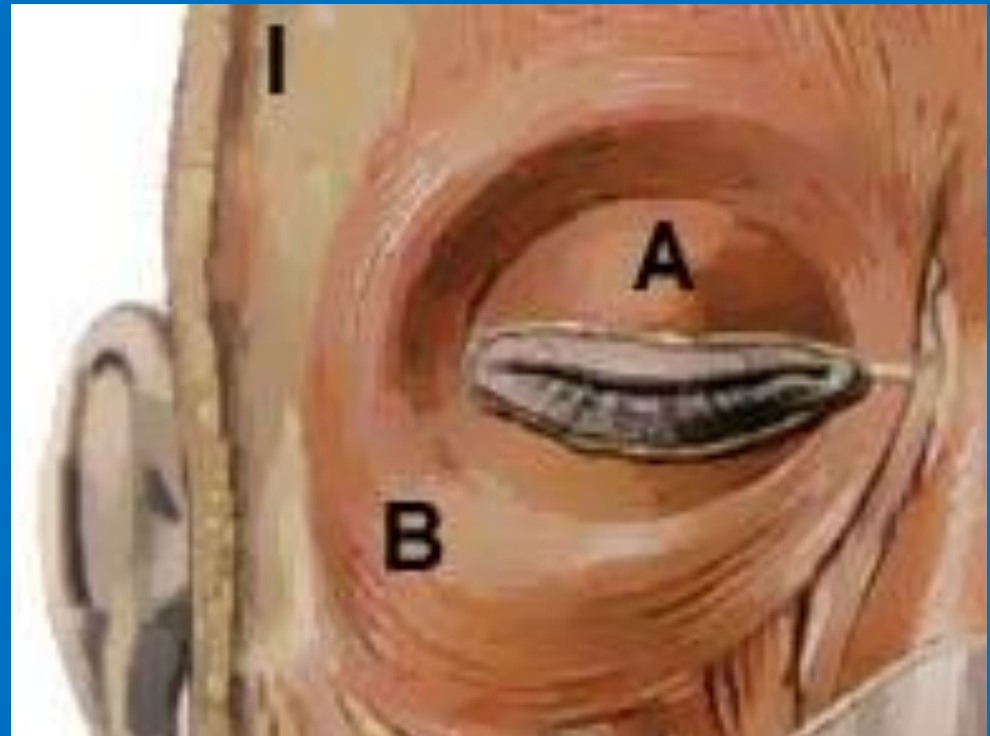
LAYER OF STRIATED MUSCLE

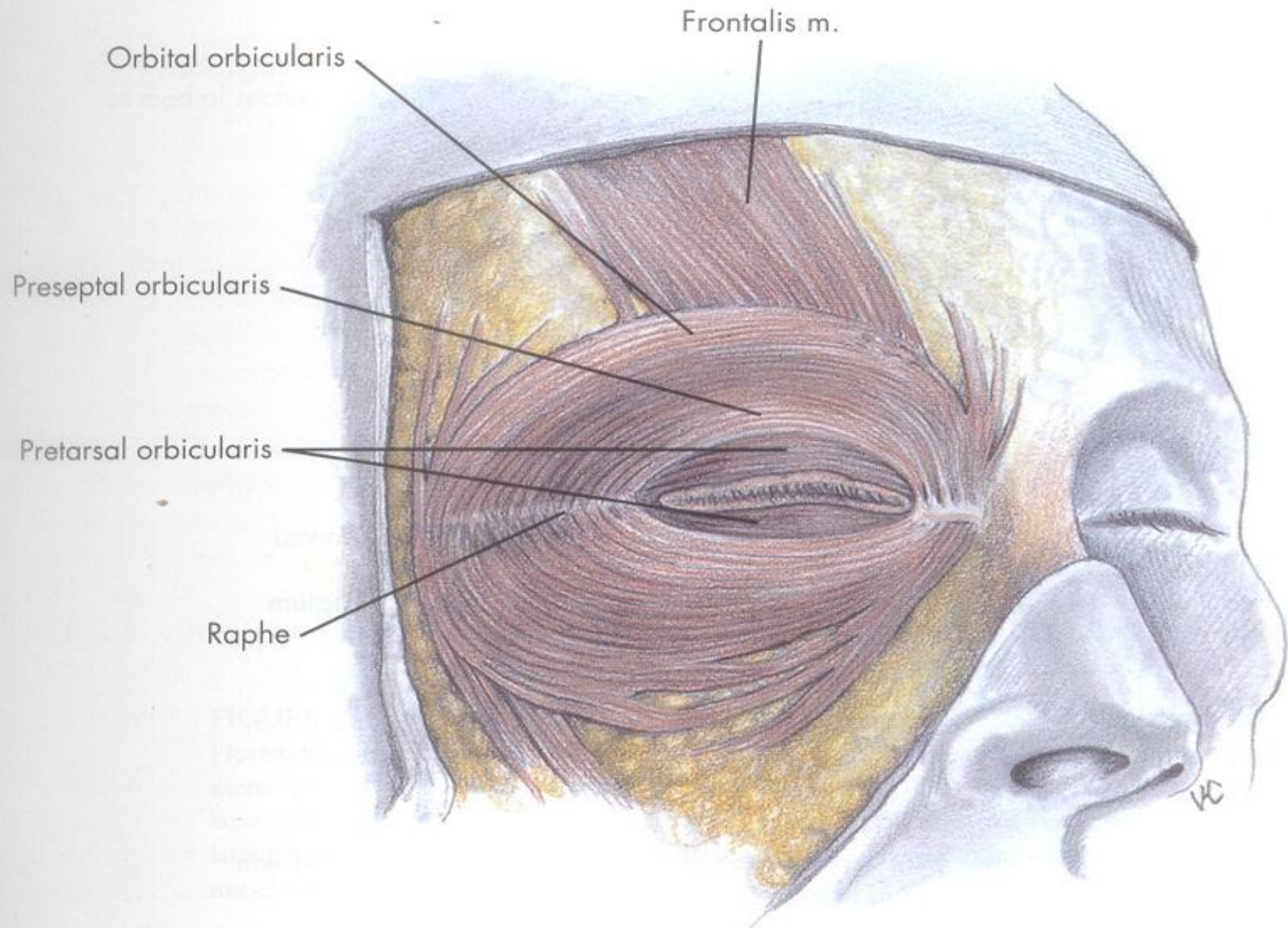
- Orbicularis muscle
thin oval sheet across
eyelids

Divided into
two parts

Palpebral
part

Orbital
part





PALPEBRAL PART OF ORBICULARIS

Preseptal fibres

- Deep head
 - From lacrimal fascia & post. lacrimal crest
- Superficial head
 - From medial palpebral ligament
 - Pass superiorly & inf. In front of orbital septum
 - Unite at lateral palpebral raphe

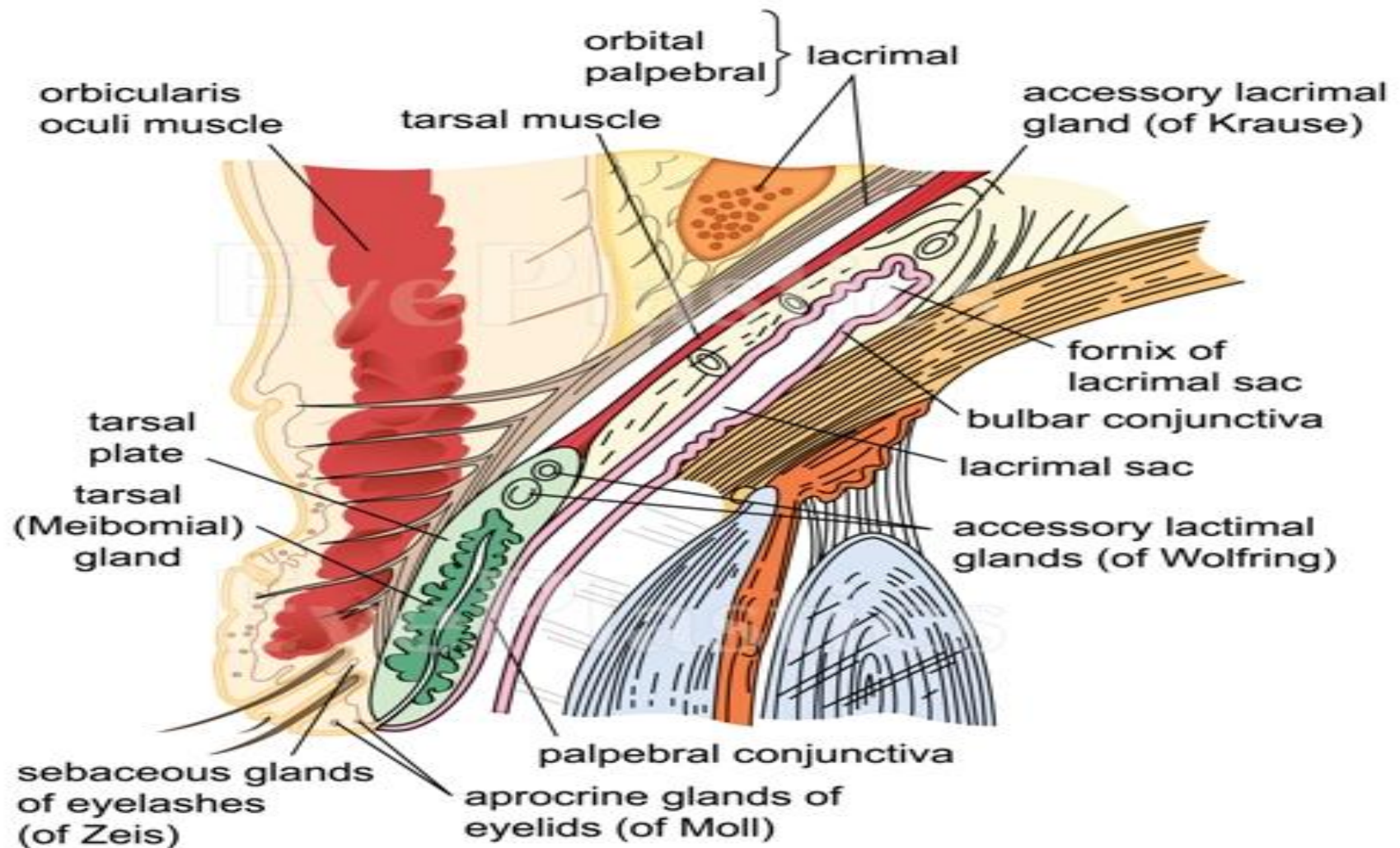
PRETARSAL FIBRES

- **Deep head** - From lacrimal fascia & post. lacrimal crest
 - **Superficial head** – From MPL
-
- ✓ Overlies upper & lower tarsus
 - ✓ Join laterally to form **Lateral Canthal tendon**
 - ✓ It is inserted to **lateral orbital tubercle of Whitnall**
 - ✓ Pars lacrimalis (Horner's muscle)- drainage
 - ✓ Pars ciliaris (muscle of Riolan)- gentle closing

FUNCTIONS OF ORB. OCULI.

- Orbital part
 - Forced closure of eyelids
 - Thus pull eyebrows downwards
- Palpebral part
 - Helps in gentle closure during blinking, sleep, soft voluntary closure
- Branches of 7th nerve

LEVATOR PALPEBRAE SUPERIORIS



Origin of LPS

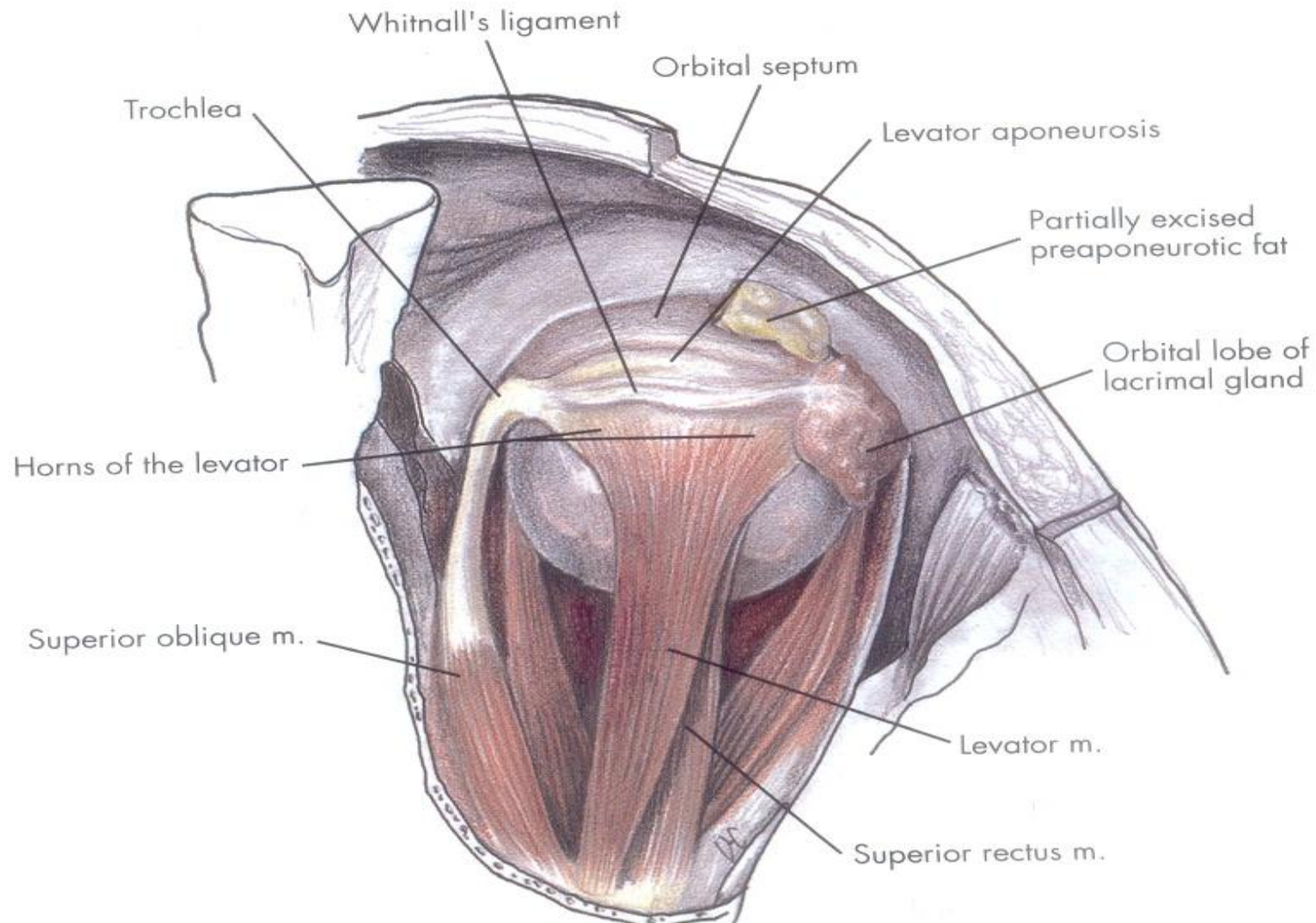
At apex of orbit

Under surface
of lesser wing
of sphenoid

Above Annulus
of Zinn

Short tendon

Blended with
origin of SR



Sup. Transverse ligament of Whitnall

- Thickened band of orbital fascia
- From trochlear pulley to the capsule of orbital lobe of lacrimal gland
- Formed by condensation of the sheath of LPS & sheath of reflected tendon of SO muscle
- During ptosis surgery, severing leads to failure of LPS function

Nerve supply & action of LPS

- Branch of superior division of 3rd nerve
- Elevator of upper lid
- Action antagonised by the palpebral portion of Orbicularis Oculi

MUSCULAR AREOLAR TISSUE

- Layer of loose connective tissue
- Between Orbicularis muscle & fibrous layer
- Nerves & vessels lie in this layer
- Splits lid into anterior & posterior lamina
- Superiorly communicates with sub aponeurotic layer of scalp

Lower lid – single space behind orbicularis

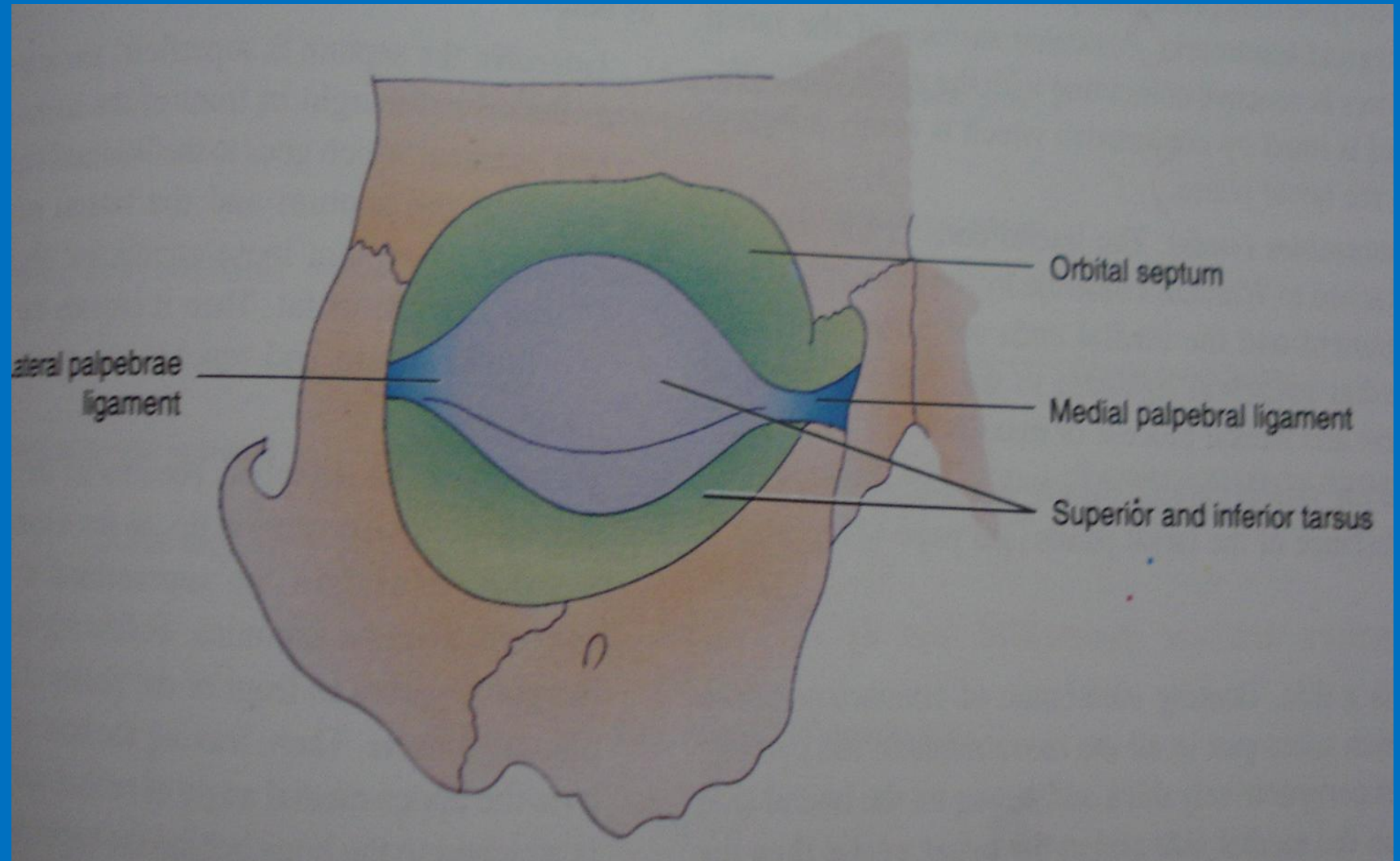
Upper lid

- Pretarsal space- has peripheral arcade
- Preseptal space- triangular, Orbicularis, septum orbitale

Preseptal cushion of fat – Crescent shaped

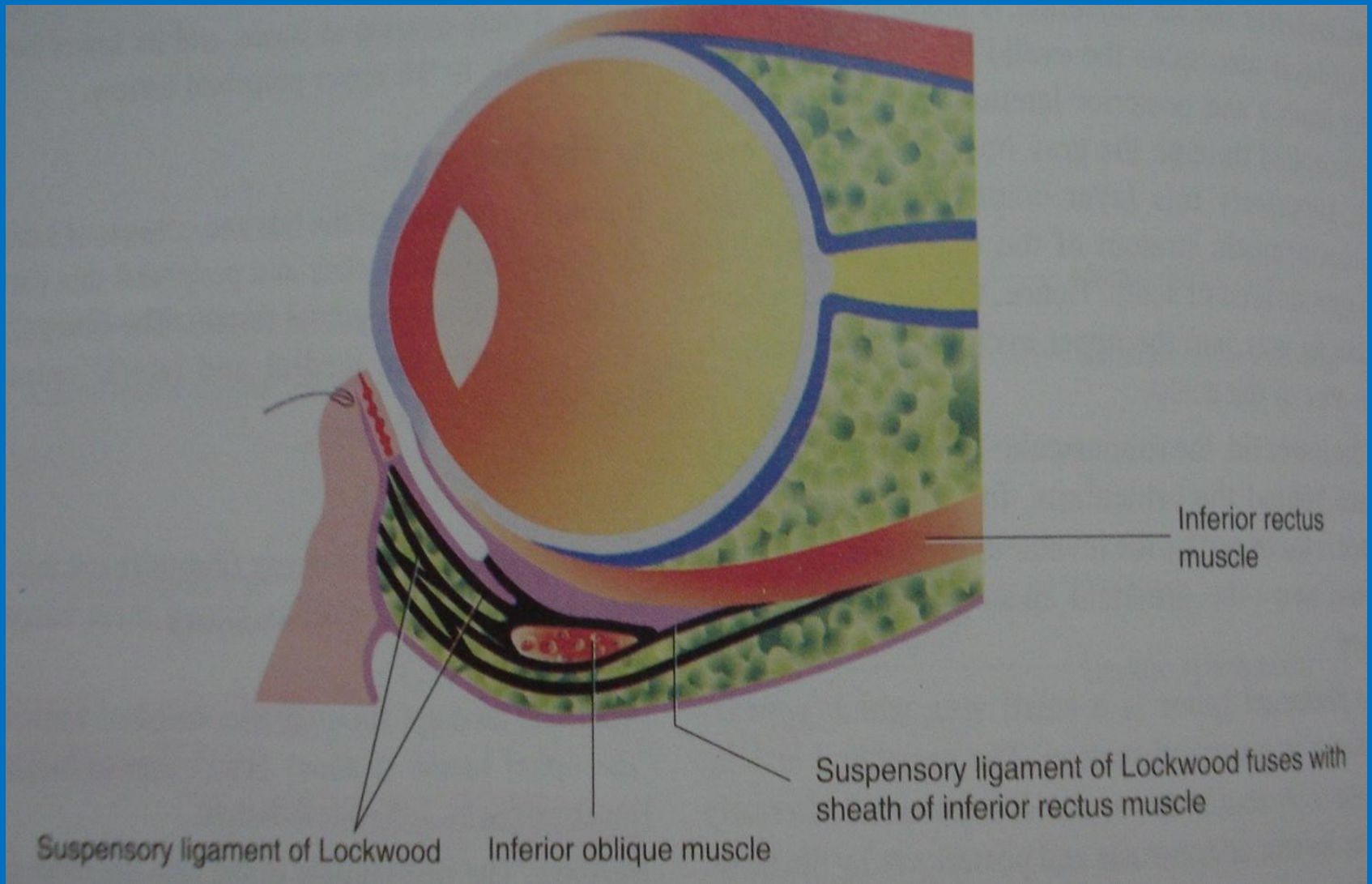
In front of septum
behind orbicularis

FIBROUS LAYER



TARSAL PLATES

- Dense fibrous tissue, skeleton of lids
- 29mm long, 1mm thick
- Upper (10-11 mm) & lower tarsus (4-5 mm)
- Superior borders – septum orbitale, muller's muscle
- Inf border – septum, capsulopalpebral fascia & inferior palpebral muscle
- LPL to Whitnall's tubercle, MPL to Ant Lacrimal crest & maxilla
- Tarsal glands embedded in substance of tarsal plates

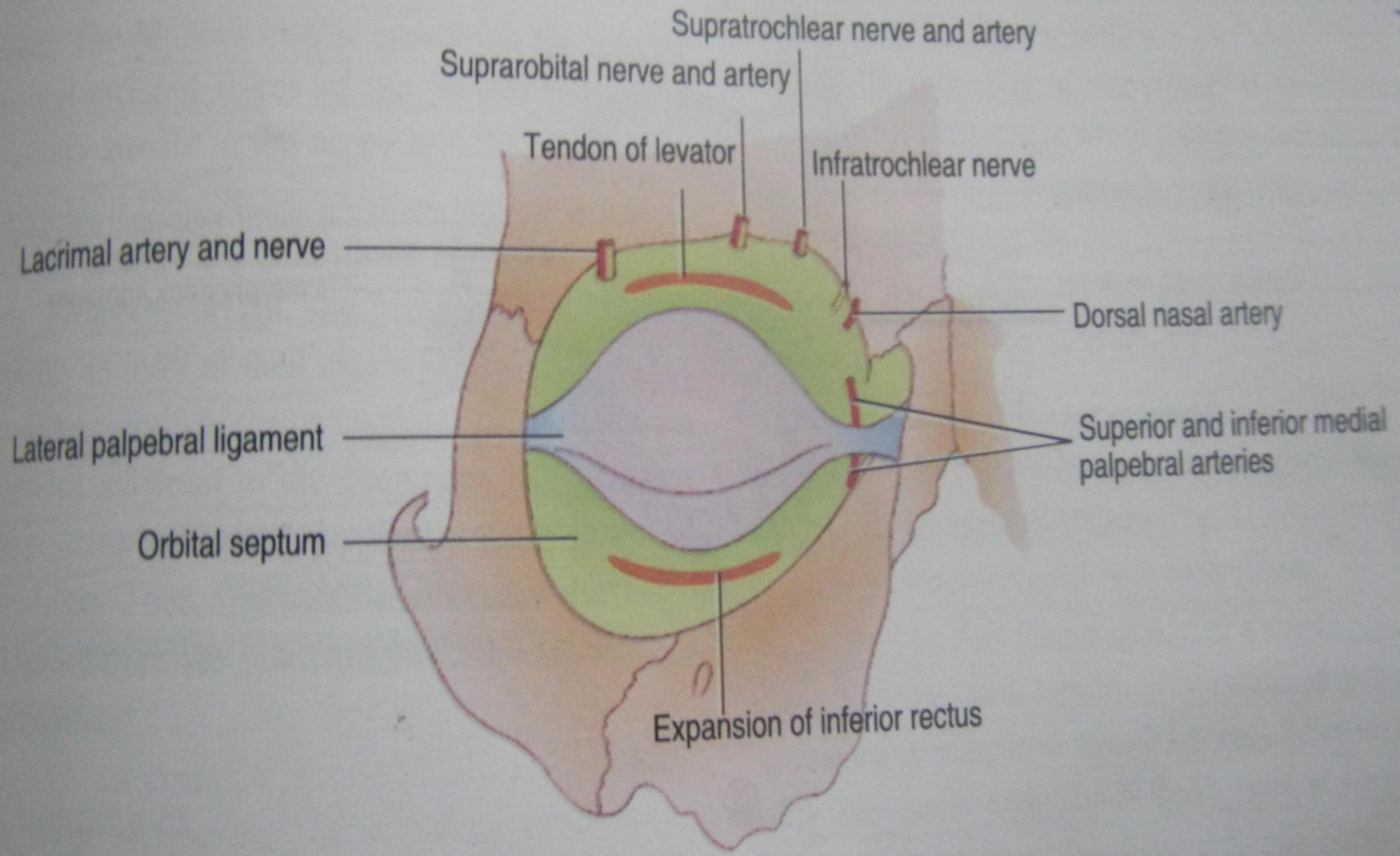


Attachment of capsulopalpebral fascia at inferior border of lower tarsal plate

SEPTUM ORBITALE

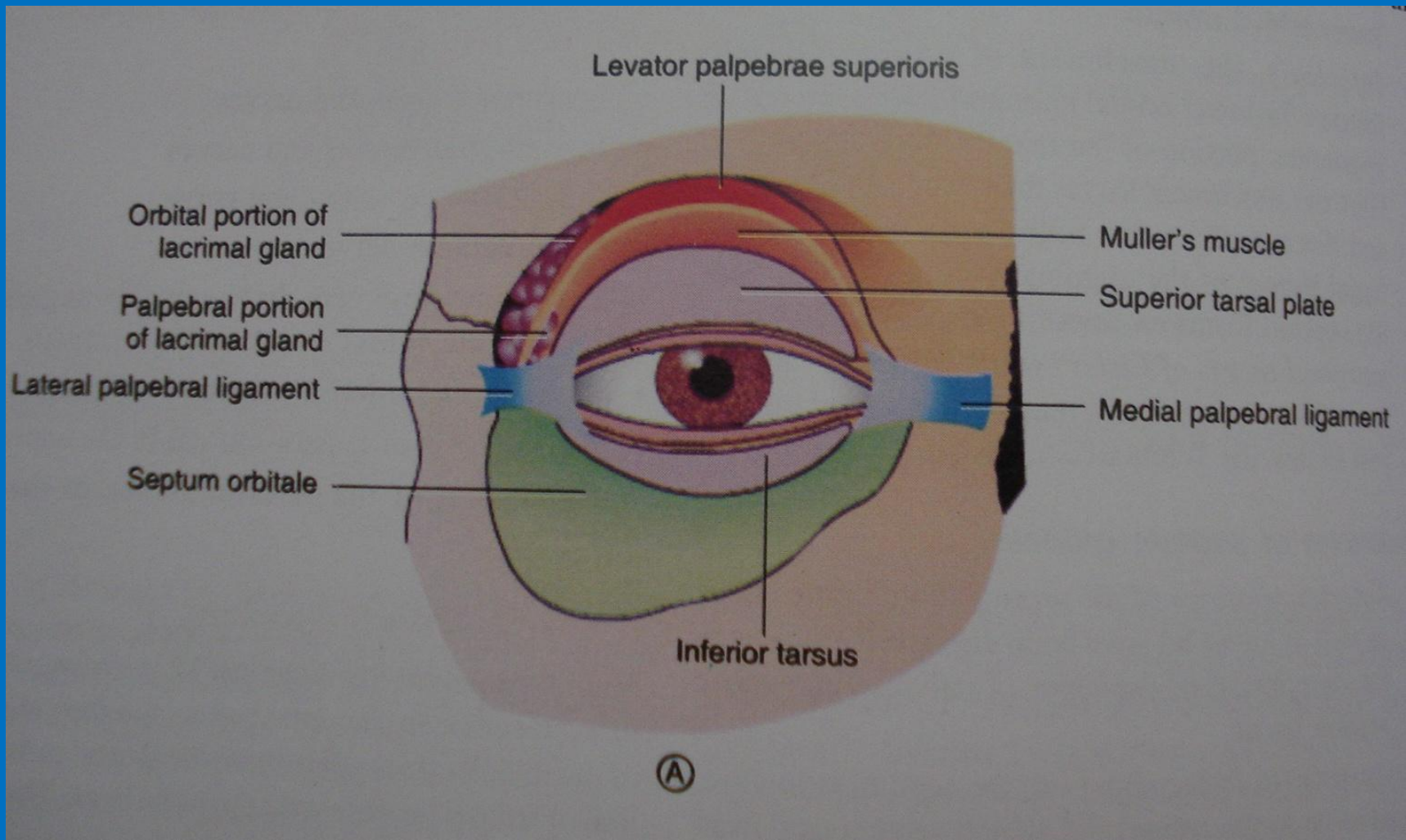
- Thin , floating membrane of connective tissue
- Takes part in all movements of lids
- Thick & strong on lateral and upper side
- Centrally attached to convex borders of tarsi
- Peripherally attached to the orbital margins
- Laterally superficial and is attached in front of LPL
- Forms supraorbital foramina
- Medially lies deep to the lacrimal sac

- Posteriorly septum is in close relation to the orbital fat, which separates it from lacrimal gland, the LPS, tendon of SO
- In lower lid, fat separates the expansion of IR and IO



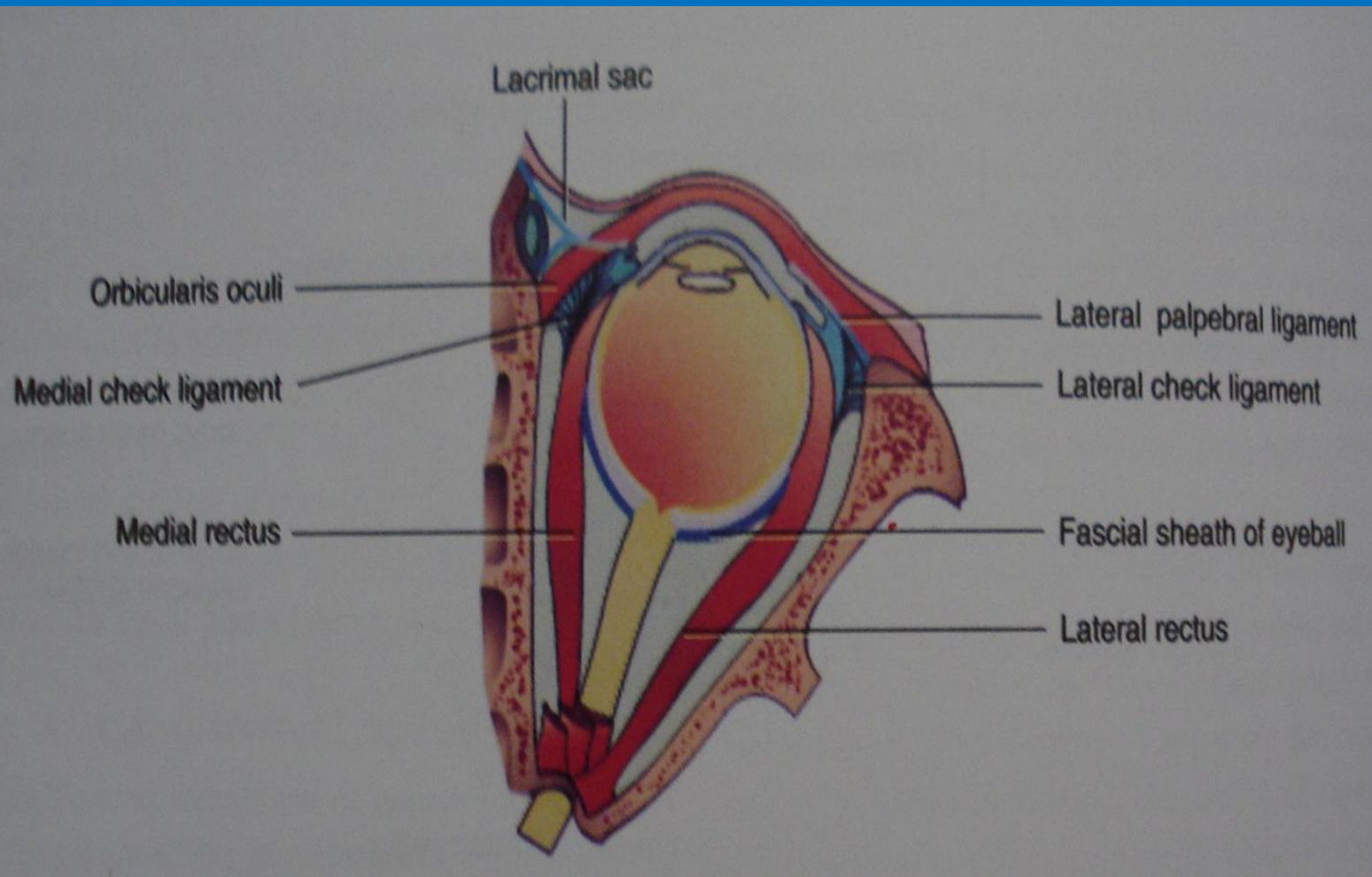
Structures piercing septum orbitale

MEDIAL PALPEBRAL LIGAMENT



Ant. Part of MPL

- Gives origin to superficial portion of Orbicularis
- Angular vessels pass over the medial portion of ant surface
- Continues laterally, splits into lower and upper band – tarsal plate
- Delimits and gives shape to medial canthus
- Two portions are tubular and corresponds to lacrimal part of lid margin, contains lacrimal canaliculi and encloses caruncle

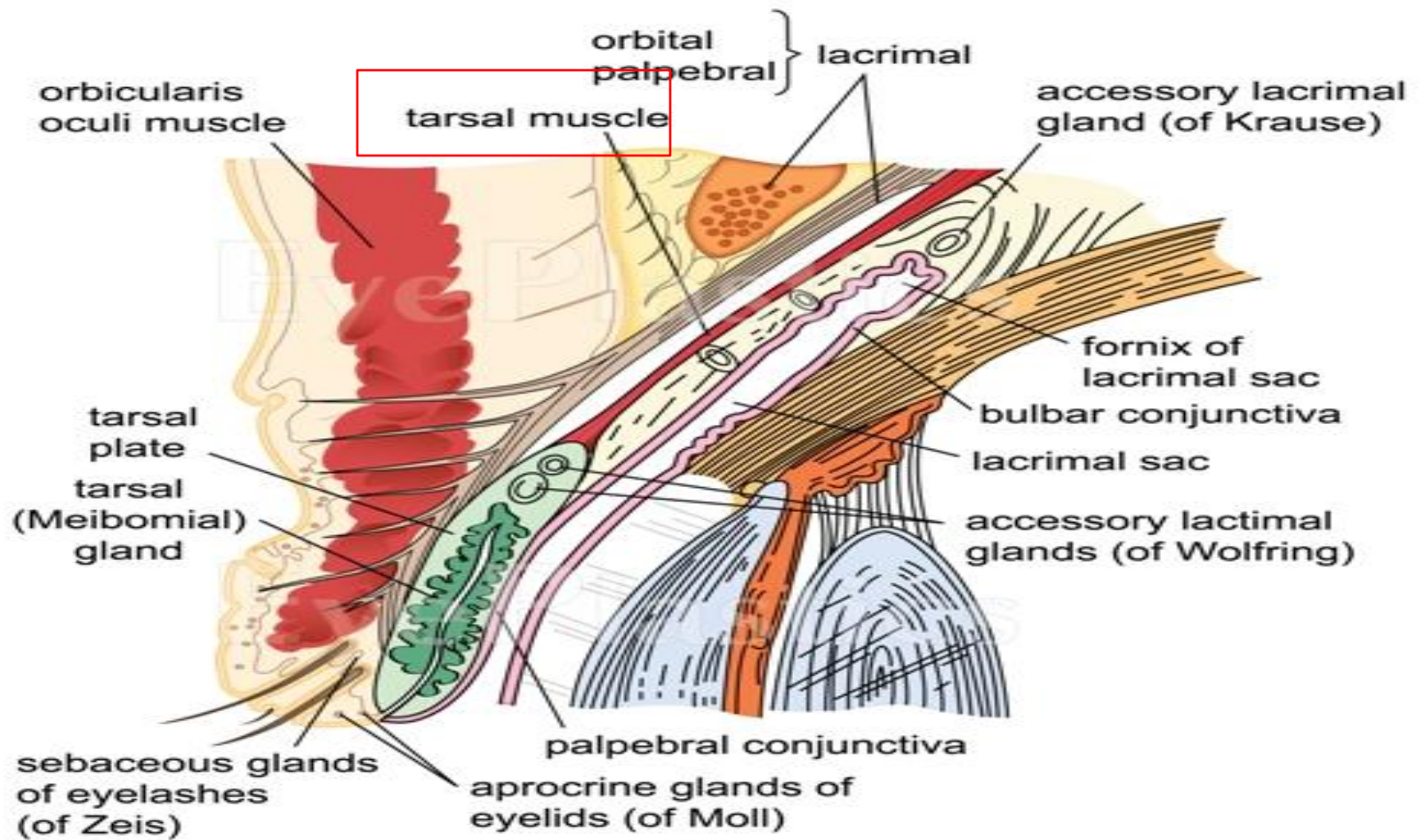


Medial and lateral palpebral ligaments in coronal section

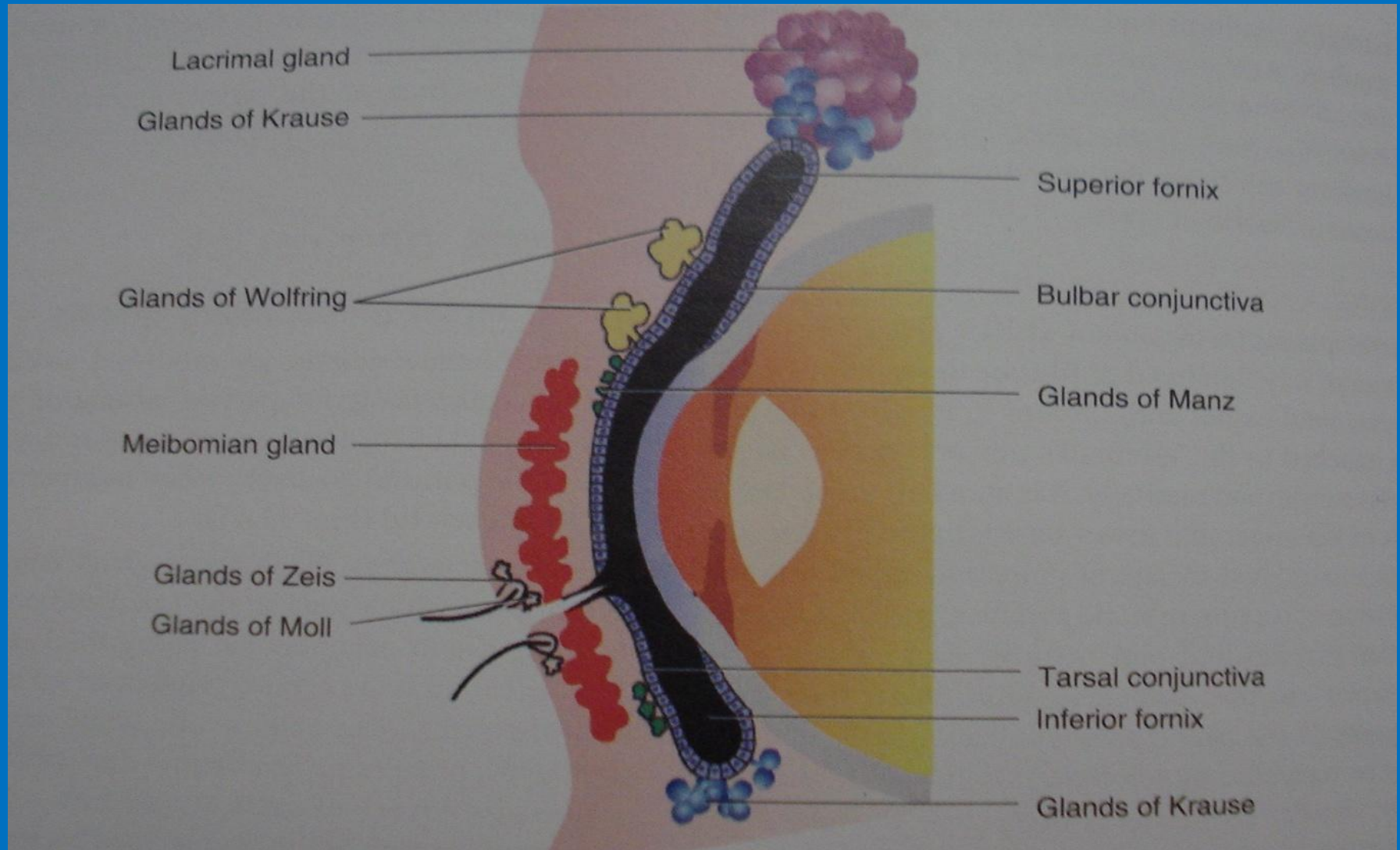
Lateral palpebral ligament

- Thin band
- Lateral- Whitnall's tubercle
- Medially- lateral ends of upper & lower tarsi
- Anterior surface- lat.palpebral raphe
- Posterior surface- check ligament of LR
- Upper border- lateral expansion of LPS aponeurosis
- Lower border- lateral expansion of IO ,IR

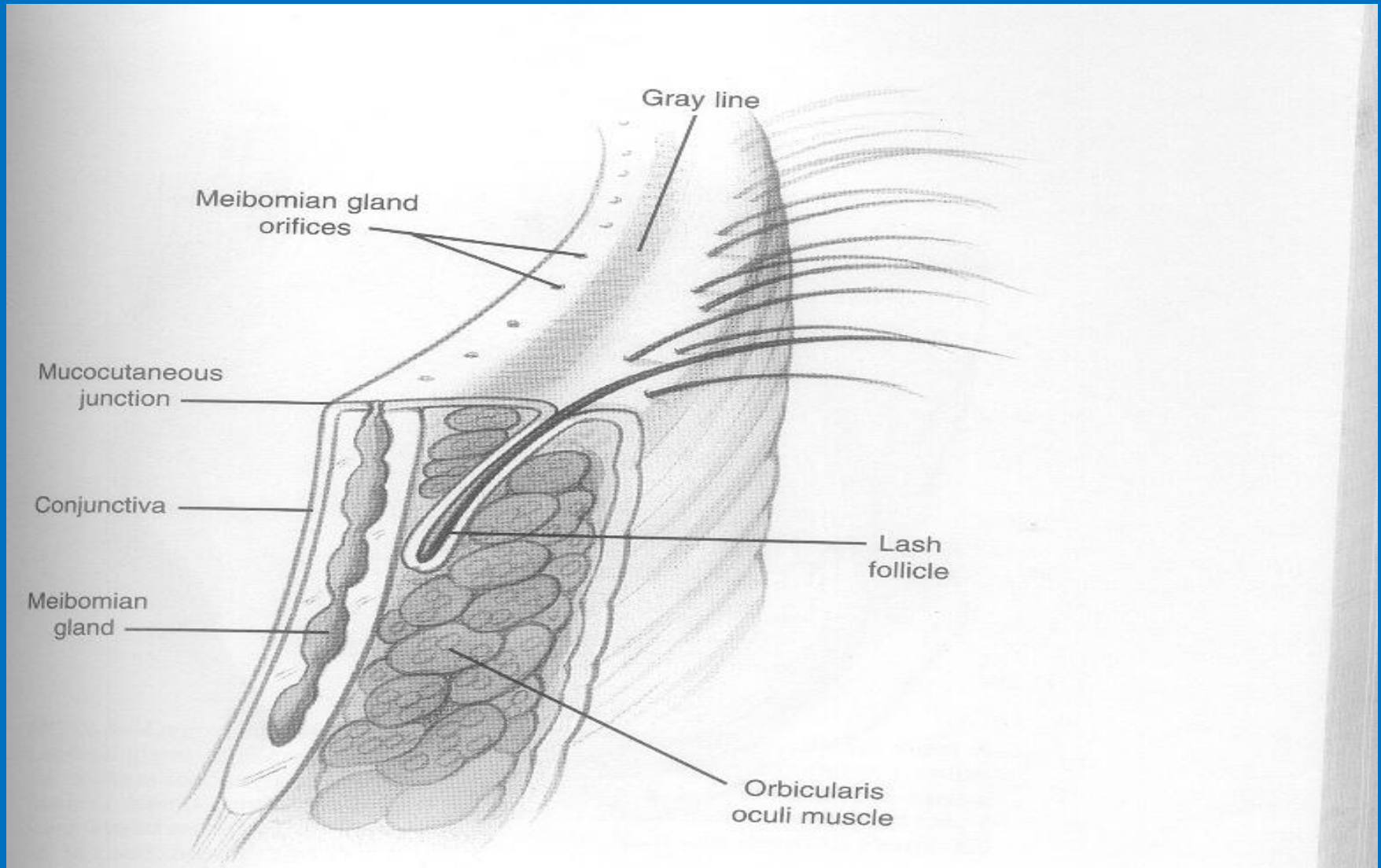
Layer of non striated muscle fiber



Glands of Eyelids



Tarsal (meibomian) glands



GLANDS OF ZEIS

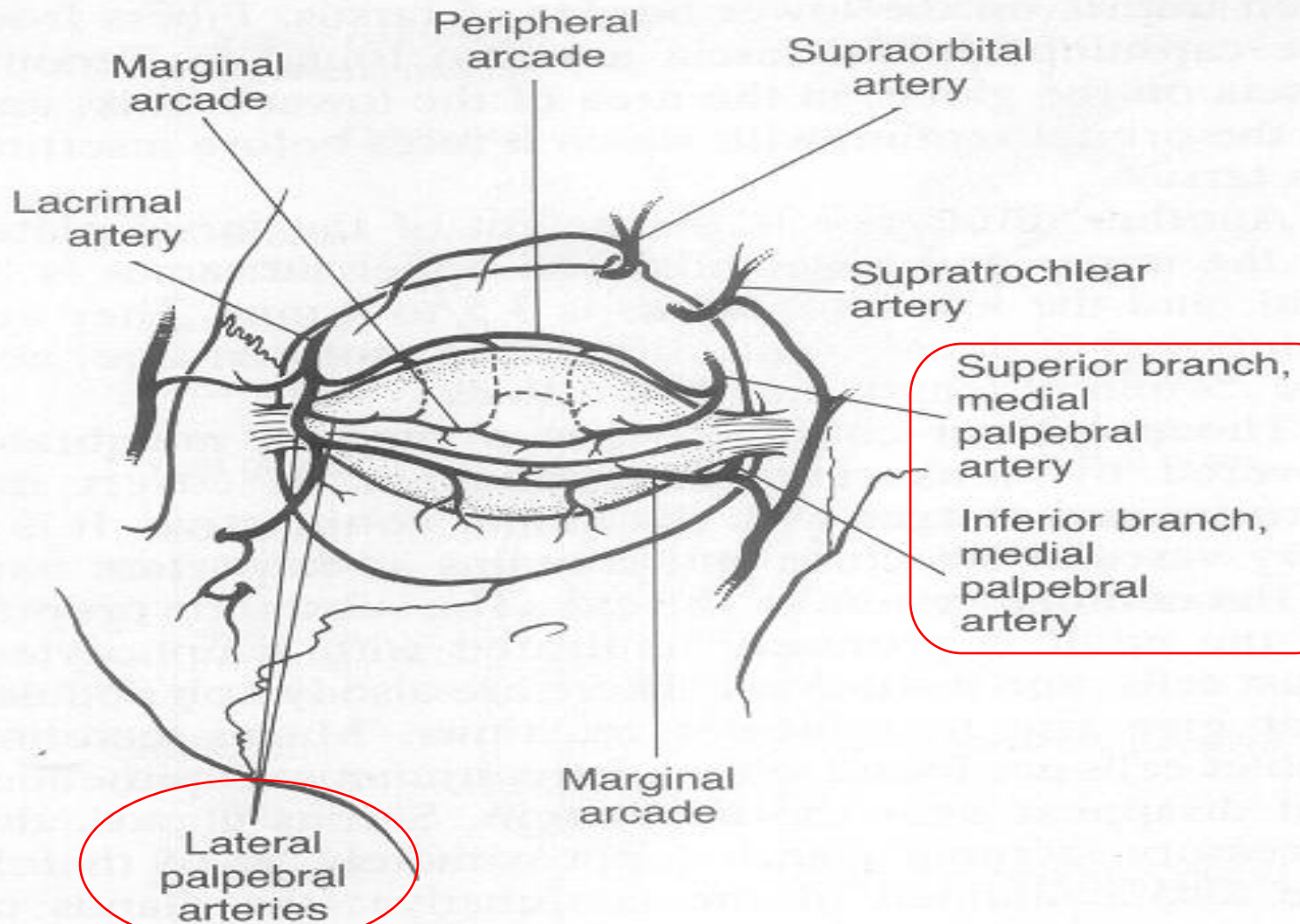
- Modified sebaceous glands
- 2 glands are attached directly to eyelash follicle
- Single cul-de-sac or 2-3 lobules only
- Secretion
 - Sebum, prevents lashes becoming dry
 - Oily layer of tear film

GLANDS OF MOLL

- Modified sweat gland, lies b/w the cilia
- More in the lower eyelid than the upper
- Gross structure
 - Un branched spiral shape
 - Fundus, body, ampullary portion & neck
 - Duct of the gland passes through dermis, epidermis and may terminate
 - Separately between the two lashes
 - b/w the lash and its epithelial covering
 - Into the ducts of zeis gland

Vessels & nerves of eyelids

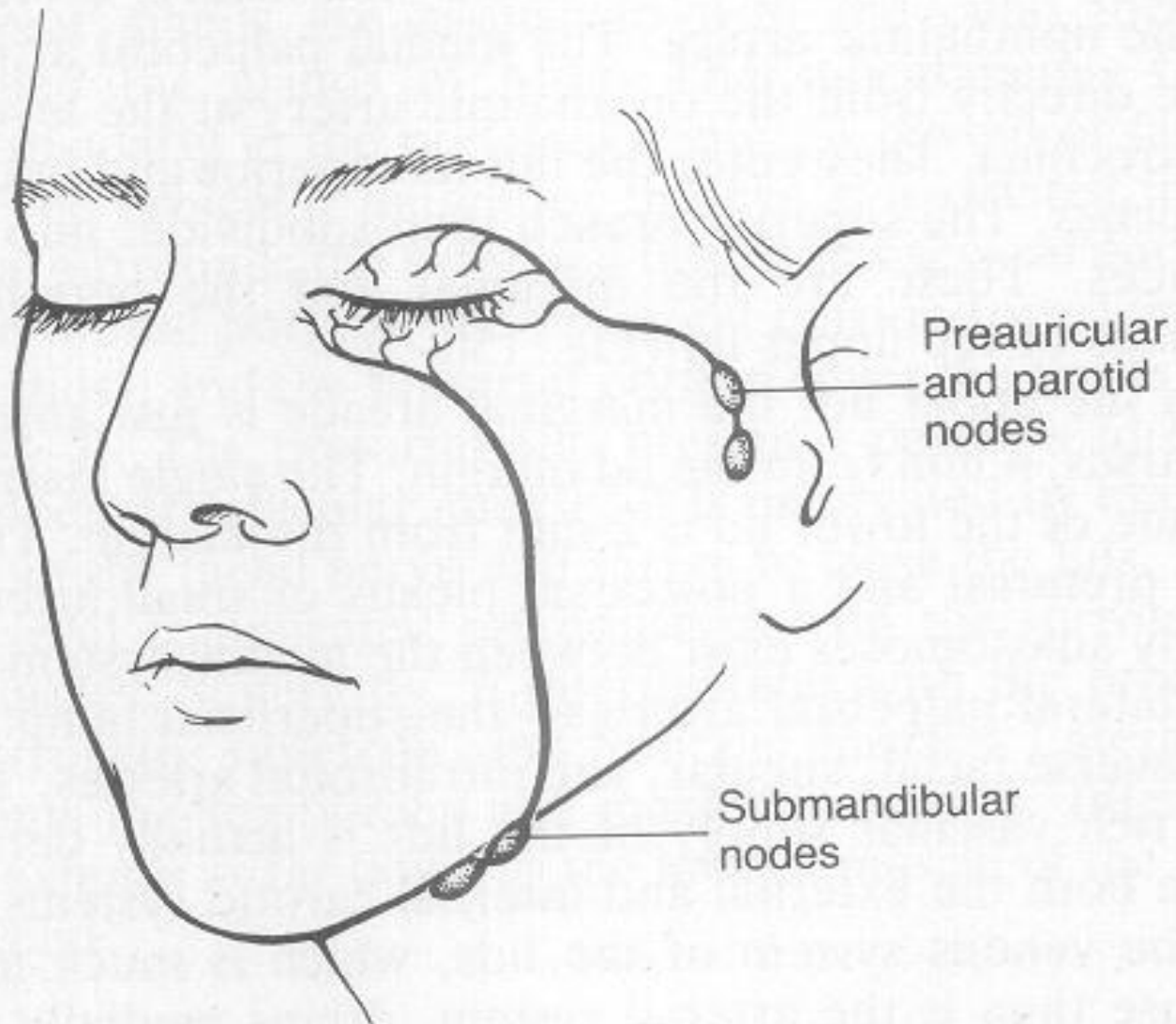
ARTERIAL SUPPLY



VENOUS DRAINAGE

- Larger & more numerous than the arteries
- Pretarsal Venous Plexus
 - Superficial to the tarsus
 - Angular vein– Internal jugular vein
 - sup. temporal, lacrimal vein - External jugular vein
- Post-tarsal venous plexus
 - Structures posterior to tarsal plate
 - Ophthalmic veins

LYMPHATIC DRAINAGE



2 deep medial channels drain

- ✓ the conjunctiva of the medial 2/3 of the lower lid
- ✓ caruncle

 Deep sub mandibular LN

Lateral group- Superficial lateral trunk drains

- ✓ lateral $\frac{3}{4}$ of upper lid
- ✓ lateral part of lower lid

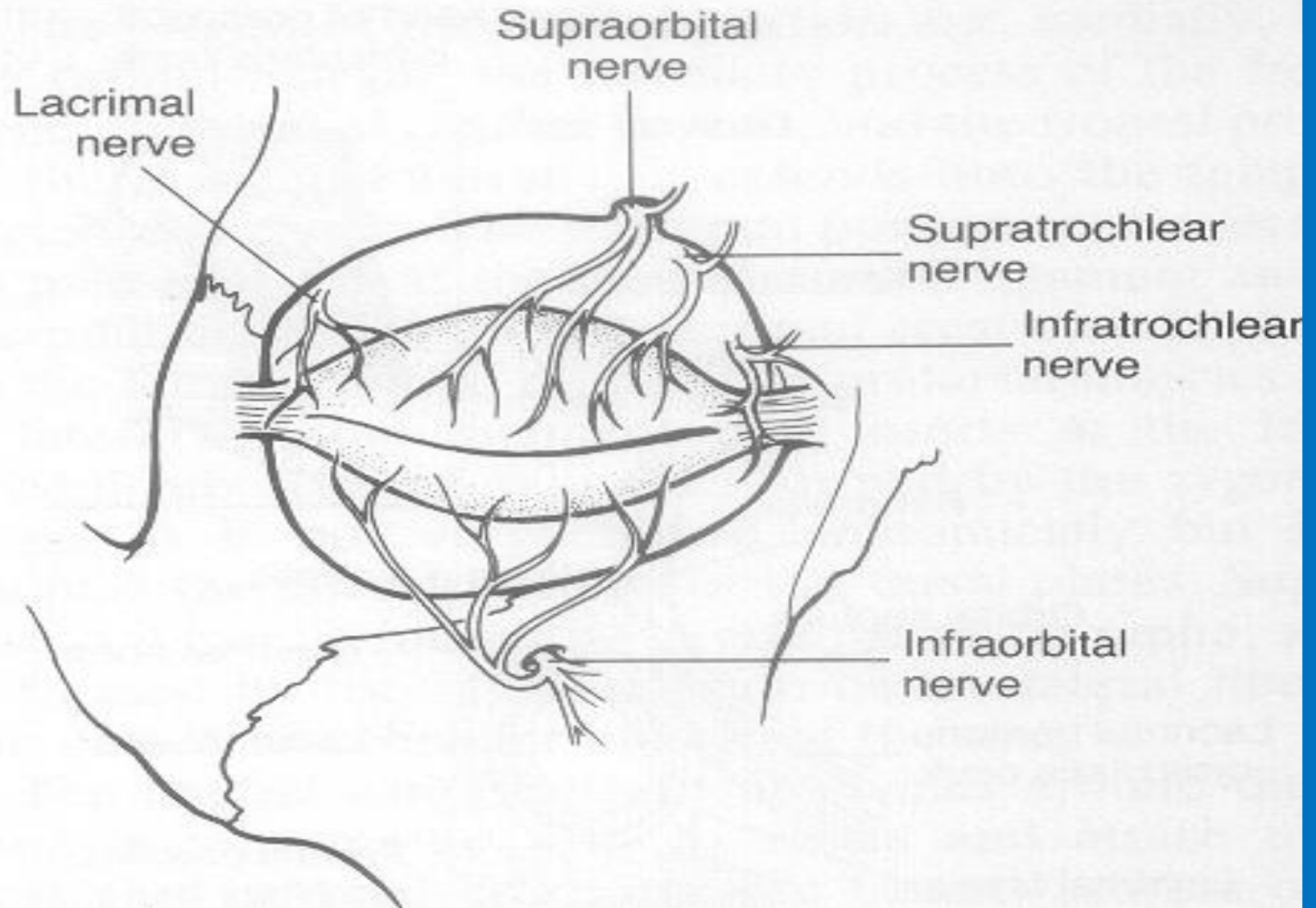
 Superficial parotid LN & Pre auricular LN

Deep lateral trunk drains

- ✓ entire conjunctiva of UL
- ✓ conjunctiva of lateral third of LL

 Deep parotid LN

NERVE SUPPLY



- Sympathetic nerves

- Muller's muscle
- Vessels and glands of skin

- Arrangement of the nerves

- most of the nerves are arranged in sub muscular plane
- injection of anaesthetic agents

Physiology of eyelid movements

Opening movements

Upper Lid

- LPS muscle – primary elevator
- Fronatalis muscle – Accessory elevator
- Muller's muscle – Long term adjustment

Lower Lid

- Elastic recoil of tissues
- Traction exerted by attachment of IR to IT
- Muller's muscle – Long term adjustment

Eyelid excursion during opening movements

Upper eyelid raised 10 – 15 mm without frontalis action

When added additional 3-5 mm elevation

B/L coordination & their basis

Opening movement are B/L symmetric- Direction
Amplitude

Can be voluntarily inhibited

Fine, gross, slow and fast movement

Yoke muscle (obey Hering's law)

In U/L weakness, other eye may be retracted

Tone of LPS

- Directly related to tone of EOM
- In upward gaze, tone increases in both SR and LPS in concert



Elevation of visual axis

&

Elevation & Retraction of UL

Reciprocal innervation pattern

- Exists between LPS and Orbicularis Oculi
- LPS receives maximal innervation during opening & Orbicularis Oculi receives min innervation & vice versa (Sherrington's law)

- **Blink rate**

- Normal blink rate varies 12-20/min
- Varies with alertness, activity & environmental factors
- Increases with
 - Extremely dry conditions
 - Strong air currents
 - Emotion situations such as surprise, anger & fight
- Decreases with visual observation, voluntarily inhibited
- Complete blink 9 - 12 mm
- Incomplete blink 4 – 5 mm

Dynamics of opening

- Opening of UL & LL begins in phase
- LL opening much slower due to lack of direct muscle pull
- UL moves upward, while LL moves laterally
- Overshoot followed by recovery is frequently seen
- Voluntary efforts at great visual attention results in widening by 2 mm

Closing movements

- Orbicularis muscle – 3 diff functional units
- Spontaneous blinking & tactile corneal reflex Pretarsal
- Voluntary blinking and sustained activity - Preseptal and Pretarsal
- Forceful closure – pretarsal, preseptal and orbital fibres

Upper eyelid versus lower eyelid during closing

- UL moves downwards while LL moves medially
- Rate of movement similar b/w the two lids
- Lower lid movement is 10 – 20 m sec earlier
- Gravity - no role
- UL voluntary closing has a varying speed(max 14 cm/s)
- Small blinks -slowest while complete blinks -rapid

Peering

- Act of looking at some object with great interest
- Degree of eye movements constant
- UL moves down by 2.5 mm, LL moves both down (2.5 mm) & medially (1mm)
- Similar to closing movement, the LL begins some 200 ms before UL
- Relaxation of peering, entails decreased tone of Orbiculris
and a slow return of 2 lids to their normal position

Blinking

- Co-ordinated opening and closing of lids
- Complete or incomplete
- Complete blink – both UL & LL meet for atleast half of length of their ciliary part
- Voluntary
- Involuntary
 - Spontaneous
 - Reflex

Spontaneous blinking

- Without any obvious external stimulus or voluntary willed efforts
- At frequent intervals, also in blind – no retinal stimuli
- No or very infrequent in first few months
- Zipper like fashion - displaces tear towards puncta
- Functions
 - Reform and redistribute tear film
 - Protection against desiccation, Flying missiles or trauma
 - Perception – information processing procedure of brain
 - Rest – EOM – momentary upturning

Reflex blinking

- Co-ordinated closing and opening movement of lids which occur reflexly in response to some direct stimulus
 - Tactile reflex blinking
 - Optical reflex blinking
 - Auditory reflex blinking
 - Stretch type stimulus

Voluntary blinking & winking

- Co-ordinated closure & opening- both eyes
- One eye- winking
- Simultaneous contraction of palpebral & orbital portions of orbicularis
- Rate & degree of closure & opening can be varied as per will
- Voluntary maximal closure – 20 sec
- Maximal forceful closure : 50 – 70 mm Hg

Blephrospasm

- Involuntary sustained and forceful closure
- Entails all portion of orbicularis oculi & eyebrow muscles
- Tonic – lids locked shut for a period of time
- Clonic – rapid fluttering of the lids
- Essential –
 - rare idiopathic, 45-65 yrs,
 - no apparent cause, no connection with visual system
 - Less apparent during heightened attention

- Reflex blephrospasm

- Reflex sensory stimulation – 5th nerve branches
- Keratitis, foreign body, corneal ulcers and iridocyclitis
- Dazzling light, stimulation of facial nerve and hysteresis

Prolonged blephrospasm-

persistent epiphora

lid oedema

visual disability is incapacitating

Treatment

Botulinum injection

Facial denervation

removal of the cause

Bell's phenomenon

- Highly coordinated reflex b/w facial and oculomotor nuclei
- On closure, eyeball rolls upward & outward
- Protective mechanism
- Not present in 10% of normal population
- **Inverse bell's phenomenon**- globe rotates downward and outwards on attempted closure
- When inverse bell's associated with lagophthalmos – severe corneal drying and ulceration may result