ANATOMY OF CONJUNCTIVA
AND COMMON DISORDERS

Dr. Pradeep Bastola
MD, Ophthalmologist
Assistant Professor
GMC and Teaching Hospital
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CONJUNCTIVA
- Conjunctiva – (conjoin: to join)
- Transparent mucous membrane which lines the inner surfaces of the eyelids and is reflected over the anterior surface of the eyeball before terminating at the limbus.
- It stretches from lid margin to limbus & encloses a complex space called conjunctival sac.

PARTS OF CONJUNCTIVA
Palpebral conj: marginal, tarsal, orbital.
Bulbar conj: scleral & limbal
Conj. fornix: superior, inferior, lateral, medial

Palpebral Conj.
- Marginal conj.
  Extends from the lid margin to about 2mm on the back of the lid up to a shallow groove – sulcus subtarsalis.
  Transitional zone between skin and conjunctiva proper.
  Common site for lodgment of foreign body.

Tarsal conjunctiva:
  Thin, transparent & highly vascular.
  Firmly adherent to whole tarsal plate in upper lid and only half of tarsal plate in lower lid

Orbital conj.
  Lies between the tarsal plate & fornix.
**Bulbar conjunctiva**
- Thin, transparent making the subconjunctival and episcleral blood vessels visible
- Separated from ant. sclera by episcleral tissue and Tenon’s capsule.
- 3mm ridge of bulbar conj. around the cornea - limbal conjunctiva.
- At the limbus, the epithelium of conj. becomes continuous with that of cornea.

**Conjunctival Fornix:**
- Continuous circular cul-de-sac, broken only on the medial side by caruncle and plica semilunaris.
- Joins bulbar & palpebral conjunctiva.
- Can be divided into superior, inferior, medial and lateral fornice.

**HISTOLOGY OF CONJUNCTIVA:**
- **Epithelium**
  - Marginal conjunctiva – 5 layers of non keratinized stratified squamous epithelium.
  - Tarsal conjunctiva - 2 layers epithelium: superficial layer of cylindrical cells and deep layer of flat cells.
  - Fornix and bulbar conj. - 3 layers epithelium: superficial layers of cylindrical cells, middle layer of polyhedral cells and deep layer of cuboidal cells.
  - Limbal conj. - 5-6 layers stratified squamous epithelium.

- **Adenoid layer:**
  - Lymphoid layer, consists of fine connective tissue reticulum
  - Most developed in the fornice.
  - Develops after 2-3 mths of life.

- **Fibrous layer:**
  - Consists of meshwork of collagenous & elastic fibres
  - Also contains vessels & nerves of conjunctiva.

**GLANDS:**
- **Mucin secretory glands**
  - (goblet cells, crypts of Henle, glands of Manz)
- **Accessory lacrimal glands**
  - Glands of Krause,
  - Glands of Wolfing
Goblet cells
- Located abundantly within the epithelium of all region of conj, except at mucocutaneous & limbal conj.
- Formed from deepest cells of conj.
- Lubricates and protect the epithelial cells of conjunctiva & cornea & ensures tear film stability by lowering the surface tension.

Henle’s glands
- Not a true gland, folds of the mucous memb
- Present in tarsal conj.

Glands of Manz
- Present in limbal conj.

Accessory lacrimal gland
- 60 in no.
- Glands of Krause
  - Present in subconjunctival tissue of fornix
- Glands of Wolting
  - Present along the upper border of sup. tarsus and lower border of inf tarsus

Rudimentary accessory glands
- Plica semilunaris
  - Pinkish crescentic fold of conjunctiva, present in the medial canthus.
  - It is vestigial structure representing nictitating membrane of lower animals
- Caruncle
  - Small, oval, pinkish mass, situated in the inner canthus, just medial to plica semilunaris
  - It is a piece of modified skin Rudimentary accessory glands
  - Covered with stratified squamous epithelium and contains sweat gland, sebaceous gland, hair follicle

Blood supply
Artery
- Derived from three sources
  - Peripheral arterial arcade of the eyelid
  - Marginal arcade of the eyelid
  - Anterior ciliary arteries
- Palpebral conj and fornices supplied by branches from the peripheral and marginal arcades of the eyelids.
- Bulbar conj supplied by
  - Posterior conjunctival arteries- branches from arterial arcades of eyelids
  - Anterior conjunctival arteries-branches from anterior ciliary arteries

Veins
- Drain into venous plexus of eyelids
- And some around the cornea into anterior ciliary veins.
Lymphatic drainage
- Lateral side drains into preauricular LN
- Medial side drains into submandibular LN

Nerve supply
- Circumcorneal zone of conj. - branch from long ciliary nerves
- Rest of conj supplied by lacrimal, infratrochlear, supratrochlear, supraorbital & frontal nerves

Common Conjunctival Disorders
- Degenerative conditions
  - Pinguecula
  - Pterygium
  - Concretions
- Symptomatic conditions
  - Ecchymosis or subconjunctival haemorrhage

Pinguecula
- Term pinguecula derived from 'pinguis' meaning fat due to its resemblance with fat
- Extremely common degenerative condition characterized by formation of yellowish patch on bulbar conj near the limbus

Degenerative conditions
- Pinguecula
- Pterygium
- Concretions

Pinguecula
- Pathology
  - Elastoid degeneration of collagen fibers of substantia propia of conj

Pinguecula
- Etiology
  - Exactly unknown
  - Considered as an age-change
  - Occurring more in persons exposed to strong sunlight, dust and wind
- Treatment
  - No t/t required
  - May be excised
  - Occasionally gets inflamed ( termed pingueculitis), then treated with topical weak steroids like fluorometholone
Pterygium

- Derived from 'pterygion' meaning wing
- Is a triangular wing-shaped fibrovascular subepithelial ingrowth of degenerative conjunctival tissue over the limbus onto the cornea
- Etiology
  - Exactly unknown
  - More common in pts who have been living in hot climates
  - May also represent a response to chronic dryness and exposure to ultraviolet rays

Pathology
- Elastoid degenerative changes in vascularized subepithelial stroma
- C/F
  - More common in elderly males doing outdoor work
  - May be unilateral or bilateral
  - Triangular fold of conjunctiva encroaching the cornea more on the nasal side
  - Stocker's line due to iron deposition may be seen in the corneal epithelium anterior to the advancing head of pterygium

Types of pterygium
- Type 1: <2mm on the cornea
- Type 2: up to 4mm on the cornea
- Type 3: >4mm on the cornea and involve the visual axis

Progressive pterygium
- Thick, fleshy, and vascular with few infiltrates in cornea, in font of the head of the pterygium (called the cap of pterygium)

Regressive pterygium
- Thin, atrophic, attenuated with very little vascularity
- There is no cap
- Ultimately it becomes membranous but never disappears

Parts of pterygium
- Head-apical part present on the cornea
- Neck-limbal part
- Body-scleral part

Symptoms
- Is an asymptomatic condition in early stages except for cosmetic purpose
- Visual disturbances occur when it encroaches the pupillary area or due to corneal astigmatism due to fibrosis in regressive stage
- Occasionally diplopia due to limitation of EOM

Complication
- Cystic degeneration
- Infection
- Rarely neoplastic change to epithelioma, fibrosarcoma, or malignant melanoma may occur

D/D
- Pseudopterygium
  - Is a fold of bulbar conjunctiva attached to the cornea.
  - It is formed due to adhesions of chemosed bulbar conj to the marginal corneal ulcer
### Differences bet pterygium & Pseudopterygium

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<tr>
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<th>Pterygium</th>
<th>Pseudopterygium</th>
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<tr>
<td><strong>Etiology</strong></td>
<td>Degenerative process</td>
<td>Inflammatory process</td>
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<tr>
<td><strong>Age</strong></td>
<td>Usu. occurs in elderly</td>
<td>Can occur at any age</td>
</tr>
<tr>
<td><strong>Site</strong></td>
<td>Situated in the palpebral aperture</td>
<td>Can occur at any site</td>
</tr>
<tr>
<td><strong>Stages</strong></td>
<td>Either progressive, regressive</td>
<td>Always stationary</td>
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<tr>
<td><strong>Probe test</strong></td>
<td>Probe can not be passed underneath</td>
<td>Probe can not be passed under the neck</td>
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### T/t of pterygium
- **Medical**
  - Tear substitutes
  - Topical steroids for inflammation
- **Surgery-indication**
  - Cosmetic reason
  - Continued progression threatening to encroach the pupillary area
  - Diplopia due to EOM involvement
- Recurrence after surgery occurs in 30-50% patients

### Surgery options
- Currently most widely used technique is excision of pterygium and covering defect with conjunctival autograft or amniotic membrane
- Adjunctive t/t with mitomycin C and beta-irradiation may be used to minimize recurrences
- MacReynold’s operation - transplantation of pterygium in lower fornix - not done nowadays
- Surgical excision with bare sclera
- Peripheral lamellar keratoplasty for deep extensive lesions

### Concretions
- Formed due to accumulation of inspissated mucus and dead epithelial cell debris into the conj depressions called loops of Henle
- Commonly seen in elderly people as a degenerative condition and also occur in chronic meibomian gland dysfunction
- Common condition
- Small, often multiple, chalky, yellow-white deposits more commonly in the inferior tarsal and fornical conj
- May produce foreign body sensation and lacrimation by rubbing the corneal surface
- Occasionally may cause even corneal abrasions
- Not necessary
- Large concretions can be removed with a hypodermic needle under topical anesthesia
- May vary in extent from small petechial hemorrhage to extensive one spreading under the whole of the bulbar conj
- The condition draws the attention of the patients immediately as an emergency but is most of the time trivial
- Common condition
Etiology

- Trauma
  - Most common cause
  - It may be:
    - (i) Direct trauma to the conj including that due to surgery and subconjunctival injections
    - (ii) Retrobulbar haemorrhage spreading below the bulbar conj
- Inflammations of the conj
  - Petechial subconjunctival haemorrhage seen in hemorrhagic conjunctivitis caused by picorna viruses, pneumococcal conjunctivitis and leptospirosis
  - Sudden venous congestion of head
    - Causes rupture of conj vessels
    - Common conditions are whooping cough, epileptic fits, strangulation or compression of jugular veins, violent compression of thorax and abdomen as seen in crush injuries

Spontaneous rupture of fragile capillaries - occurs in vascular diseases such as arteriosclerosis, HTN, DM
- Local vascular anomalies such as telangiectasia, varicosities, aneurysm or angiomatous tumor
- Blood dyscrasias such as anemia, leukemia, dysproteinemia
- Bleeding disorders such as purpura, hemorrhage, sepsis
- Acute febrile systemic infections such as malaria, typhoid, diphtheria, meningococcal septicaemia, measles and scarlet fever
- Various bleeding associated with menstruation - extremely rare cause

C/F

- Symptom less
- O/E appears as a flat sheet of homogenous bright red colour with a well defined limits
- In traumatic subconj hmg, when posterior limit is visible it is due to local trauma to eyeball and when not visible, it is due to injury to the orbit
- Most of the time it is absorbed completely in 7-21 days
- During absorption, colour changes from red to colour to orange then yellow
- In some severe cases, pigmentation is left behind after absorption

T/t

- Treat the cause when discovered
- Placebo therapy with astringent eye drops
- Psychotherapy and assurance to the pt
- Cold compression to check bleeding in initial stage and hot compression may help absorption of blood in late stages

Hyperemia of conjunctiva

- Is congestion of conj without being asa with any the established diseases

Etiology

- May be
  - 1) Acute transient hyperemia
  - 2) Recurrent or chronic hyperemia

Acute transient hyperemia
- Occurs due to temporary irritation caused by
  - Direct irritants: foreign body, miltreated cells, smoke, stormy wind, bright light, extreme heat and rubbing of eyes with hands
  - Reflex hyperemia: due to eye strain from inflammation of nasal cavity, lacrimal passages and lids
  - Hyperemia asso with febrile cond
  - Non-specific inflam of conjunctiva

Recurrent or chronic hyperemia
- Seen in chronic smokers, chronic alcoholics, people residing industry, ill ventilated rooms, workers exposed to prolonged heat, in patients with rosacea, and in patients suffering from insomnia
C/F
- Feeling of discomfort, heaviness, grittiness, tiredness, tightness in the eyes
- May be associated with mild lacrimation and minimal mucoid discharge
- Conj looks normal
- But mild to moderate congestion may be present more on fomices

T/t
- Removal of the cause
- Symptomatic relief may be achieved by use of topical decongestants (e.g., 1:1000 adrenaline drops)

THANK YOU