

3.1 Conjunctiva

Plan

Anatomy

Conjunctivitis

Terms used in conjunctivitis

Symptoms & signs

Diagnosis of conjunctivitis

Classification / Types of conjunctivitis: various types

Classification / Types of conjunctivitis: based on etiology

- Bacterial

- Chlamydial

- Viral

- Ophthalmia neonatorum

- Allergic

- Irritation conjunctivitis

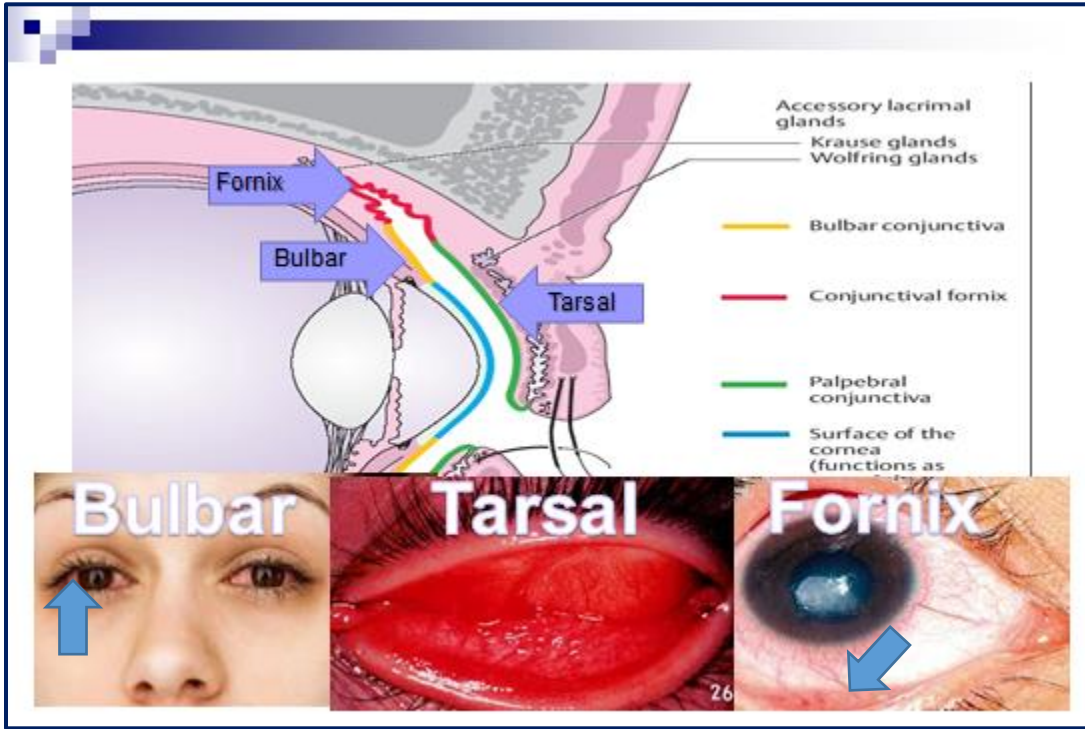
- Conjunctivitis with mucocutaneous diseases

- Miscellaneous conjunctivitis

- Factitious conjunctivitis

Subconjunctival hemorrhage

Anatomy



Conjunctivitis



Conjunctivitis is inflammation of conjunctiva due to any cause which may be infective (bacteria, virus) or non-infective (Allergy, chemical, autoimmune, toxic, chronic irritation).

From definition it is obvious that signs of conjunctivitis will be

- Foreign body sensation from swelling due to inflammation
- Red / pink eye (vascular dilation)
- Watery/ mucopurulent/ purulent discharge (exudation)

Symptoms and signs will be same but severity will be different depending on etiology

Terms used

Hyperemia	means redness or congestion of conjunctiva
Chemosis	means conjunctival edema
Papillae	Papilla is minute, opaque and polygonal with vascular core. It can only develop where conjunctiva is tightly adherent like tarsal conjunctiva and limbal conjunctiva
Papillary reaction/conjunctivitis	Conjunctivitis with papillae on conjunctiva
Follicle	These are bigger than papillae. Elevated translucent elevations with blood vessels around it. Mostly in fornices
Discharge	Exudate because of inflammation which may be watery, mucopurulent or purulent

Symptoms & signs of conjunctivitis

Symptoms of conjunctivitis

- **Hyperemia**
 - Brilliant red
 - Pink appearance
- **Discharge**
 - Watery
 - Mucoid
 - Mucopurulent
 - Purulent
- Papillary (Polygonal with central vessel core)
- Chemosis
- Follicles (Larger with no central core)
- Pseudomembrane and membrane
- Lymphadenopathy



Severe hyperemia



Mild hyperemia



Watery discharge



Mucoid hyperemia



Purulent discharge

- Hyperemia
 - Brilliant red

Symptoms of conjunctivitis



Papillary reaction



Cobblestone papillae



Follicles

- Papillary (Polygonal with central vessel core)
- Follicles (Larger with no central core)
- Chemosis
- Pseudomembrane and membrane
- Lymphadenopathy



Chemosis



Membrane

Diagnosis of conjunctivitis

Conjunctivitis is most common cause of red eye.

Bacterial conjunctivitis is most common cause of conjunctivitis.

History of sticky eye in morning and yellowish discharge hints towards bacterial conjunctivitis.

Conjunctivitis is mainly diagnosed with history.

In bacterial conjunctivitis second eye gets involved 1-2 days after first eye while in viral conjunctivitis both eyes are involved at almost same time.

So History f/b examination f/b laboratory if needed f/b Diagnosis

● History

- Acute, one eye f/b other, sticky discharge
- Acute, both eyes, other people infected, watery discharge
- Long history, seasonal, mucous discharge,
- History of contact lens, artificial eye, sutures in eye

● Examination

- Acute, one eye f/b other, sticky discharge + Papillae → Bacterial
- Acute, both eyes, other people infected, watery discharge + Follicles → Viral
- Long history, seasonal, mucous discharge + Papillae → VKC
- History of contact lens, artificial eye, sutures in eye + Papillae → Irritation

● Diagnosis

History	Response	Laboratory	
Acute, one eye f/b other, sticky discharge	Papillary	c/s for severe For gonococcal Ophthalmia Neo Neutrophils	Bacterial
Acute, both eyes, other people infected, watery discharge	Follicular	Monocytes	Viral
Long history, seasonal, mucous discharge,	Papillary	Eosinophils	VKC
History of contact lens, artificial eye, sutures in eye	Papillary		Chronic irritation

Diagnose on basis of History, Discharge and Response

	Bacterial	Viral	Chlamydial	Allergic (VKC)	Chronic Irritation
History	Sticky eyes 2 nd eye follows	Recurrent	-	Seasonal Bilateral	History of operation
Discharge/ Exudate	Mucopurulent Purulent	watery	Mucopurulent	Mucopurulent	Mucopurulent
Conjunctival response	Papillary	Follicular	Follicular	Papillary	Papillary

Viral & Chlamydial is specific: Follicular
Others on history

Classification / Types of conjunctivitis: **various types**

Classification

- Based on etiology
 - Infective (**Bacterial, viral, chlamydial**, fungal)
 - Non infective (**Allergic VKC**, Autoimmune, Chemical, Toxic, **Chronic irritation**)
- Based on conjunctival response
 - Papillary (Allergic, Autoimmune, Chronic irritation, Blepharitis, topical drugs)
 - Follicular (Viral, Chlamydial, Toxic)
- Based on discharge/Exudate
 - Watery (Viral, Toxic)
 - Mucoid (Vernal, Keratoconjunctivitis sicca)
 - Mucopurulent (Bacterial, Chlamydial)
 - Purulent (Gonococcal, any severe bacterial)

Classification / Types of conjunctivitis based on **etiology**

1- Bacterial conjunctivitis (page 00)

Mucopurulent
Purulent
Membraneous

2- Chlamydial conjunctivitis (page 00)

Serotype A, B, C: Trachoma
Serotype D-K: Adult inclusion conjunctivitis
Serotype D-K: Neonatal inclusion conjunctivitis
Serotype L: Lymphogranuloma venereum

3- Viral conjunctivitis (page 00)

Acute follicular conjunctivitis (Adenovirus 2,3,6,7)
Pharyngoconjunctival fever (Adenovirus 3,4 & 7)
Epidemic keratoconjunctivitis (Adenovirus 8, 19, 37)
Acute hemorrhagic conjunctivitis (enterovirus & coxsackievirus)
Herpes simplex virus (HSV)
Molluscus contagiosum (pox virus)
With systemic diseases like Measles & Rubella
EBV

4- Ophthalmia neonatorum (page 00)

Ophthalmia neonatorum

5- Allergic conjunctivitis (page 00)

Vernal keratoconjunctivitis VKC
Atopic keratoconjunctivitis AKC
Acute Allergic conjunctivitis
Seasonal allergic conjunctivitis (SAC)
Perennial allergic conjunctivitis (PAC)
Phlyctenular keratoconjunctivitis

6- Irritation conjunctivitis

Contact lens: prolonged use of contact lens causes conjunctivitis
Sutures: Sutures used in various eye surgeries may cause irritation if not removed
Artificial eye: Artificial eye can cause irritation and hence inflammation

7- Conjunctivitis with mucocutaneous diseases

Mucous membrane pemphigoid (Ocular cicatricial pemphigoid)
Steven Johnson syndrome/ Toxic epidermal necrolysis/ Lyell syndrome
Graft-versus-host disease

8- Miscellaneous conjunctivitis

Superior limbic keratoconjunctivitis
Ligneous conjunctivitis
Parinaud oculoglandular syndrome

9- Factitious conjunctivitis

Factitious conjunctivitis

1- Bacterial conjunctivitis: Most common type of conjunctivitis

Bacterial Conjunctivitis

- Mucopurulent: Staphylococcus aureus, Streptococcus pneumoniae
- Purulent: Neisseria Gonorrhoeae
- Membranous: coagulation of exudate on epithelium- Step Pyogens & C Diphtheria

General features:

- Bacterial conjunctivitis is most common type of conjunctivitis.
- Usually one eye gets infected followed by other eye in 1-2days.
- In mild infections inflammatory response is mucopurulent but in severe cases response in purulent
- Discharge is main feature. Discharge causes eye lashes is stick together. Discharge also causes sticky eyes on waking up from sleep

Types / classification:

- **Mucopurulent:** most common type of conjunctivitis caused by staphylococcus aureus, streptococcus pneumoniae
- **Purulent:** caused by Neisseria gonorrhoeae
- **Membranous:** rare type caused by Corynebacterium diphtheria

Predisposing conditions:

- Dry eye
- Lid margin disease (blepharitis)
- Obstruction to tear drainage
- Trauma to the conjunctiva

Symptoms:

- Acute onset of foreign body sensation, redness
- Patient will complain of discharge
- Usually one eye followed by other but both eye can be involved together
- Genitourinary symptoms if gonococcal infection

Signs:

- Conjunctival hyperemia / injection / congestion / hyperemia
- Conjunctival discharge which may be mucopurulent or purulent
- Matted eye lashes because of discharge
- Swollen eyelids in severe cases

Investigations:

- Usually diagnosed clinically but in severe non responding cases conjunctival swabs can be taken for culture and sensitivity

Treatment:

- Use of disposable tissues for wiping eyes
- Minimize contact with others to prevent spread of infection
- Topical antibiotics like chloramphenicol, tobramycin, Ofloxacin and Moxifloxacin
- Removal of membranes in membranous conjunctivitis

2- Chlamydial conjunctivitis

Chlamydial Conjunctivitis

- Serotype A,BC: Trachoma
- Serotype D-K: Adult inclusion conjunctivitis
- Serotype D-K: Neonatal inclusion conjunctivitis
- Serotype L: Lymphogranuloma venereum

Chlamydia

- Chlamydiae are Gram negative bacteria that can not replicate extracellularly
- Though bacteria but not described under bacterial conjunctivitis because of its unique clinical feature
- The distribution is worldwide
- Chlamydia trachomatis serotype A,B,C causes **trachoma**
- Chlamydia trachomatis serotype D-K causes **adult inclusion conjunctivitis**

Trachoma

- The world's most common cause of preventable blindness
- Endemic in many parts of the world
- Infection is spread from eye to eye, flies play an important role
- Recurrent episodes of kerato-conjunctivitis, starting early in childhood, lead to scarring of the tarsal conjunctiva, causes the lashes to turn in towards the eye and rub on the cornea (trichiasis) → scarring of cornea

Clinical presentation

Active inflammatory stage

Most common in children before age of five years
Mixed follicular and papillary conjunctivitis
Mucopurulent discharge

Cicatrical stage

Upper tarsal conjunctiva is particularly affected though all conjunctiva involved
Satellite scars on conjunctiva in mild cases
Scars may join to form broad line called "Alt line"
Limbal follicles resolve to leave small depressions called "Herbet pits"
Conjunctival damage results in dry eye
Cicatricialization results in trichiasis, vascularization and corneal scarring

Investigations

Almost always diagnosis clinically
Giemsa staining and PCR may be done

Management

Improved personal hygiene and treatment of genital condition
Topical antibiotics like tetracycline or erythromycin eye ointment

Systemic antibiotics like azithromycin, tetracycline and doxycycline
Surgical treatment of complications like entropion

Adult inclusion conjunctivitis

It is an oculogenital infection

Caused by chlamydia serotype D-K

Incubation period is one week though eye to eye spread also occurs

Transmission is by autoinoculation from genital secretions

Clinical presentation

Mostly unilateral redness, watering and discharge

Signs:

Watery or mucopurulent discharge

Large follicles usually more in inferior fornix

Periocular lymphadenopathy may be present which can be tender

Investigations

Giemsa staining

PCR

Treatment

Systemic antibiotics like azithromycin, doxycycline or erythromycin

Topically erythromycin or tetracycline ointment

Referral to genitourinary consultant

3- Viral conjunctivitis

Viral Conjunctivitis

- Non specific follicular conjunctivitis (Adenovirus 2,3,6,7:)
- Epidemic keratoconjunctivitis (Adenovirus 8, 19, 37)
- Pharyngoconjunctival fever (Adenovirus 3,4 & 7)
- Herpes simplex virus (HSV)
- Molluscum contagiosum
- Acute hemorrhagic conjunctivitis (Enterovirus, coxsackievirus)
- Picornavirus
- Measles
- Rubella

Adenovirus conjunctivitis

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Adenovirus is most common virus causing 90% of viral conjunctivitis

Its various presentations are

- Acute follicular conjunctivitis
 - Most common viral conjunctivitis with follicular conjunctivitis
 - Spread by droplets with upper respiratory tract infection
 - Subepithelial keratitis causes decrease vision which resolves in long time
- Epidemic keratoconjunctivitis (Adenovirus 8, 19, 37)
 - Highly infectious epidemic follicular conjunctivitis
- Pharyngoconjunctival fever (Adenovirus 3, 4, 7)
 - Follicular conjunctivitis with pharyngitis and fever

Herpes simplex virus conjunctivitis

- Usually unilateral follicular conjunctivitis with skin vesicles

Molluscum contagiosum conjunctivitis

- Non-umbilicate and waxy nodule on lid margin with follicular conjunctivitis

Investigation **all** viral conjunctivitis

- Investigation mostly not needed as diagnosis is almost always clinical
- Giemsa staining, PCR and viral culture may be needed in doubtful and severe cases

Treatment **all** viral conjunctivitis

- Reduction for cross infection
- Topical lubricants
- Topical steroids
- Topical antibiotics for superadded infection

4- Ophthalmia neonatorum

Infection in day 1-30

Ophthalmia Neonatorum (Neonatal Conjunctivitis)

- Day 1-3: Chemical: silver nitrate, 2.5% povidone-Iodine or antibiotics used for prophylaxis
- Day 1-7: Neisseria gonorrhoeae
- Day 6-8: Staphylococci and other bacteria
- Day 7-14: Herpes simplex type 2
- Day 7-21: Chlamydia D-K: neonatal inclusion conjunctivitis

Conjunctival inflammation developed in first month is called ophthalmia neonatorum.

Causes with presentation time:

Day 1-3: Chemical preparation used in eyes for prophylaxis

Day 1-7: Neisseria gonorrhoea acquired during normal vaginal delivery like

Day 6-8: Staphylococcus and Hemophilus influenzae

Day 7-14: Herpes simplex

Day 7-21: Chlamydia trachomatous

Diagnosis

History:

Time of onset can hint about etiology of ophthalmia neonatorum

Parents may have sexually transmitting disease

Signs:

Chemical injury: Watery discharge from eye

Herpes simplex: Watery discharge

Lid and periocular vesicles

Chlamydia: Mucopurulent discharge suggest chlamydial etiology

Pseudo membranes may be present on conjunctiva

Bacterial: Purulent discharge may suggest bacterial cause

Neisseria gonorrhoea: Hyper purulent discharge may suggest Neisseria gonorrhoea

Severe lid edema which at times looks like preseptal cellulitis

Investigations:

Parental tests for sexually transmitting diseases

Conjunctival swabs for culture

Conjunctival scrapings for microscopy

Treatment:

- Systemic antibiotics like tetracycline, azithromycin
- Topical tetracycline
- Surgery for complications like entropion and trichiasis

5- Allergic conjunctivitis

Allergic Conjunctivitis

- Vernal keratoconjunctivitis (VKC)
- Atopic keratoconjunctivitis (AKC)
- Acute allergic conjunctivitis
- Seasonal allergic conjunctivitis (SAC)
- Perennial allergic conjunctivitis (PAC)
- Phlyctenular keratoconjunctivitis

Vernal keratoconjunctivitis (VKC)

- It is recurrent disease affecting 5 year or elder young atopic patients
- Both eyes affected, often asymmetrically
- Has a seasonal pattern with peak incidence in late spring
- More common in warm dry climates
- VKC goes in remission by teens though some convert in to atopic keratoconjunctivitis
- More common in boys than in girls
- Both IgE and cell mediated immune mechanism play role with infiltration of the conjunctiva by lymphocytes, plasma cells and eosinophils leads to the formation of giant papillae
- Clinical types OR classification
 - Palpebral VKC: Mostly palpebral conjunctiva is affected
 - Limbal VKC: Mostly limbus is involved
 - Mixed VKC: Both palpebral and limbal conjunctiva involved

SYMPTOMS:

Symptoms are itching, burning, foreign body sensation, watering or mucoid discharge.

SIGNS

Conjunctival lesions

Palpebral form

Tarsal hyperemia with velvety papillary conjunctival reaction

Later papillae enlarge in polygonal shape like cobblestones

Later papillae amalgamate to become giant papillae (>1mm)

Limbal form

More common in tropical regions

Limbal papillae with white cellular collections (Horner-Trantas dots)

Mixed VKC

Corneal lesions

Corneal lesion is more common in palpebral and mixed VKC

Superior epithelial erosions and macro erosions are common

Plaques: coating of exposed Bowman membrane with mucous and calcium phosphate

Shield ulcer:

Subepithelial scars may develop and can reduce vision
Pseudogerontoxon can develop in limbal form which is paralimbal scarring
Peripheral superficial new vessels are common
Keratoconus may develop because of rubbing eyes

Eyelids

Eyelid lesions are not common

Treatment:

Topical treatment

Topical steroids

Mast cell stabilizers like sodium cromoglycate, lodoxamide and nedocromil sodium

Topical antihistamines

Topical antihistamine and vasoconstrictors

Combined antihistamines and mast cell stabilizers

Non-steroidal anti inflammatory

Systemic treatment

Oral antihistamines, Oral steroids, Oral immunosuppressants

Surgical treatment

Sub tarsal steroid injections

Atopic keratoconjunctivitis (AKC)

- Develops in **third to fifth decade of life**
- Patients usually have history eczema and asthma
- 5% of VKC patient progress in to AKC
- AKC tends to be chronic **without going in remission unlike VKC**
- AKC tends to be perennial and often **worse in winter**

Symptoms

Signs

Conjunctiva

Mostly inferior palpebral conjunctiva is involved

Papillae may be smaller but later get even bigger than in VKC

Conjunctival scarring may result in featureless palpebral conjunctiva

Cicatricial changes may cause shortening of fornix & keratinization of caruncle

Cornea

Lid

Treatment:

- Same as in VKC but AKC is less responsive to treatment and needs prolonged treatment

VKC versus AKC

	VKC	AKC
Presentation	First decade	Third to fifth decade
Duration	Ends by second decade	Chronic without remissions
Worse season	Often worse in summer	Often worse in winter
Symptoms	Itching, watering, mucoid discharge	Itching, watering, mucoid discharge
Signs	Larger papillae Corneal lesions	Scarring Featureless palpebral conjunctiva
Treatment	Relatively more responsive	Less responsive to treatment

Acute allergic conjunctivitis

- Common allergic conjunctivitis to environmental allergens like pollens and house dust
- Almost always acute itching and watering
- Usually acute chemosis of both eyes
- Treatment usually needed with decongestants and topical steroids

Seasonal allergic conjunctivitis (Hay fever)

- Symptoms are itching, foreign body sensation and redness
- Signs are hyperemia, papillary reaction, chemosis and lid edema
- Usually during **spring and early summer**
- **Garden pollens** are usual culprits

Perennial allergic conjunctivitis

- Symptoms are itching, foreign body sensation and redness
- Signs are hyperemia, papillary reaction, chemosis and lid edema
- Usually **throughout year particularly during autumn**
- **House dust mite** is common culprit

Phlyctenular conjunctivitis (Phlyctenulosis)

Phlyctenular keratoconjunctivitis is also called phlyctenulosis

It is type IV hypersensitivity reaction usually due to staphylococcal antigen

- **Symptoms** are red eye with photophobia
- **Signs** are yellowish conjunctival nodule close to limbus called “phlyctenule”
- **Treatment** is short term topical steroids

6- Irritation conjunctivitis (Giant papillary conjunctivitis)

Irritation / Giant papillary conjunctivitis

It is usually due to mechanical irritants like contact lenses, corneal sutures or prosthesis

- Corneal suture can be removed if possible
- Use of contact lenses can be paused for few weeks with topical treatment
- Prosthesis can be thoroughly cleaned or changed

7- Conjunctivitis with mucocutaneous diseases

Mucous membrane pemphigoid

- Also called ocular cicatricial pemphigoid (OCP)
- It is autoimmune mucocutaneous including skin and mucous membranes including conjunctiva
- **Symptoms** are recurrent bilateral conjunctivitis
- **Signs** are papillary conjunctivitis, conjunctival scarring
- Skin blisters make diagnosis clear
- **Treatment** is topical lubricants and topical steroids and referral to dermatologist

Stevens-Johnson syndrome (SJS)

Toxic epidermal necrolysis (TEN) is severe form of SJS

It is cell mediated delayed hypersensitivity reaction to drugs

- **Symptoms** are acute eye redness, foreign body sensation and watering
- **Signs** are crusts on lid margin with bleeding
- Papillary conjunctivitis with membranes
- Later conjunctival scarring and corneal lesions
- Dry eye is result of conjunctival scarring and eventually keratinization if not treated
- **Systemic features** are flu like symptoms, hemorrhagic vesicular skin lesions particularly face
- Mucosal involvement is in form of hemorrhagic blistering of mouth and nasal mucosa
- **Treatment** is stopping drug causing it and supportive measures
- Topical and systemic steroids with immunosuppressant

Graft-versus-host disease (GVHD)

GVHD is when donor immune white blood cell rejects recipient

Graft rejection is when recipient immune system rejects donor

- **Symptoms** are hyperemia and dry eye
- **Signs** are conjunctival hyperemia with membrane formation
- Severe dry eye with corneal punctate erosions and even corneal thinning and perforation
- **Treatment** is lubricants and topical anti-inflammatory eye drops

8- Miscellaneous conjunctivitis

Superior limbic keratoconjunctivitis

- Rare disease of superior limbus
- **Symptoms** are hyperemia and foreign body sensation
- **Signs** are Papillary reaction at superior limbus and tarsal conjunctiva
- **Treatment** is topical steroids and sometimes soft contact lenses

Ligneous conjunctivitis

- Very rare sight and life threatening disorder
- Recurrent hard pseudomembranous lesion with respiratory and urinary system involvement

Parinaud oculoglandular syndrome

- Rare unilateral conjunctivitis with lymphadenopathy and fever

9- Factitious conjunctivitis

Graft-versus-host disease (GVHD)

Intentional self-injury is most common cause

Unintentional conjunctival injury may be during contact lens removal

- **Symptoms** are exaggerated
- There is usually some motive behind symptoms like need off work certificate
- **Signs** are inferior conjunctival and inferior corneal abrasions
- **Treatment** is counseling after excluding other causes

Subconjunctival haemorrhage

Subconjunctival hemorrhage is very common clinical condition.

It appears all the sudden without any symptoms.

Usually, red eye is noticed by family members or friends.

Resolves in 20-30 days without any consequences.

Treatment may be with topical antibiotics to prevent secondary infections.

Etiology:

- Unknown
- Trauma

Sub-conjunctival hemorrhage



Onset	Acute
Pain	Nil
Laterality	unilateral
VA	Normal
Pupil	Normal
Anterior chamber	Normal
Others	

Conjunctival degenerations

Following are more common conjunctival degenerations

- Pterygium
- Pinguecula
- Concretions

Pterygium

Exposure to ultraviolet sun exposure may be responsible

It is more common outdoor working men in hot dry climates

Histologically it is elastotic degeneration in vascularized subepithelial collagen

Definition: It is conjunctival degenerative condition with fibrovascular growth from conjunctiva towards cornea

Symptoms:

- Most are symptomatic with only a cosmetic issue
- Recurrent inflammation can cause attacks of redness and photophobia
- Vision not affected if cornea not involved but vision decreases because of scarring when pterygium encroaches on central cornea

Signs:

- A fleshy growth on exposed bulbar conjunctiva in horizontal axis
- Pterygium has three parts: Avascular irregular cap, head and body
- Pseudopterygium has history of injury, can be at any location and loosely attached except at head.



Treatment:

- Most of pterygia stay small and don't need any treatment.
- It can be excised by leaving bare sclera but this **bare sclera technique** has high recurrence.
- Bare sclera technique augmented by topical mitomycin C has relatively less recurrence
- Excision with **autograft of conjunctiva** has less recurrence rate. Excision is done as in bare sclera technique and then graft of own conjunctiva is done to cover bare area.

Pinguecula & Concretions



Pinguecula

Common dull white lesion on conjunctiva

Pinguecula:

It is localized conjunctival degeneration.
It is non progressive.
Does not need any treatment



Concretions

Single or multiple white lesions

Concretions :

These are multiple white subconjunctival calcium deposits.
Normally no treatment needed.
Occasionally cause irritation and then need to be removed

Conjunctival tumours in section 5.1

Conjunctival tumours or swellings are described in module 5