

# CORNEAL ULCER

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- Pathogenesis
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- Investigation
- Treatment

# Infective keratitis


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- Bacterial
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- Fungal
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- Protozoal
- Spirochaetal

# Definition

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- Corneal ulcer may be defined as discontinuation in normal epithelial surface of cornea associated with necrosis of the surrounding corneal tissue
- Pathologically it is characterized by edema and cellular infiltration.

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- Infective corneal ulcer may develop when:
    - Either the local ocular defence mechanism is jeopardised
    - There is some local ocular predisposing disease, or host's immunity is compromised
    - The causative organism is very virulent

# Bacterial corneal ulcer

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- There are two main factors in the production of purulent corneal ulcer:
  1. Damage to corneal epithelium
  2. Infection of the eroded area

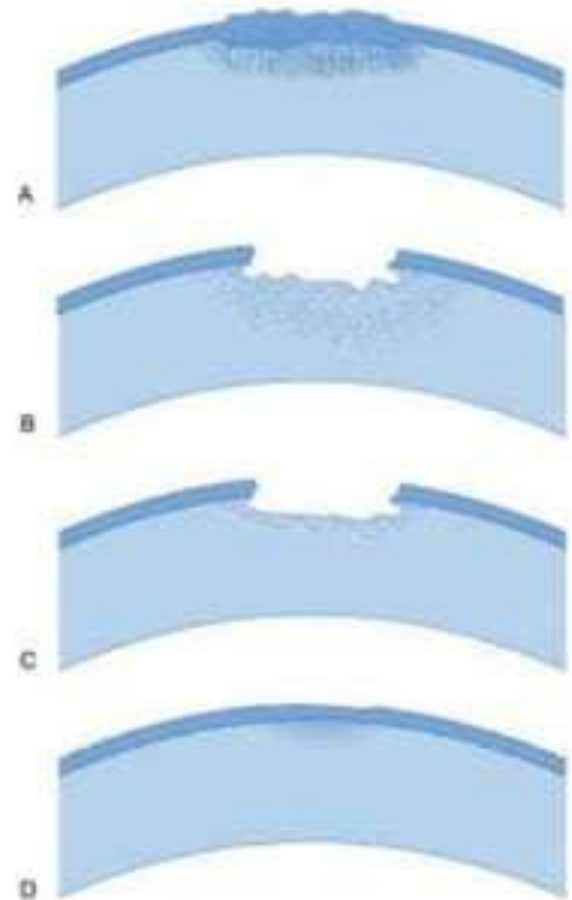
# Common causative organisms

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- ❑ *Staphylococcus aureus*
- ❑ *Pseudomonas pyocyanea*
- ❑ *Streptococcus pneumoniae*
- ❑ *E. coli*
- ❑ *Proteus*, *Klebsiella*
- ❑ *N. gonorrhoea*, *N. meningitidis*
- ❑ *C. diphtheriae*.

# Pathogenesis (Stages)

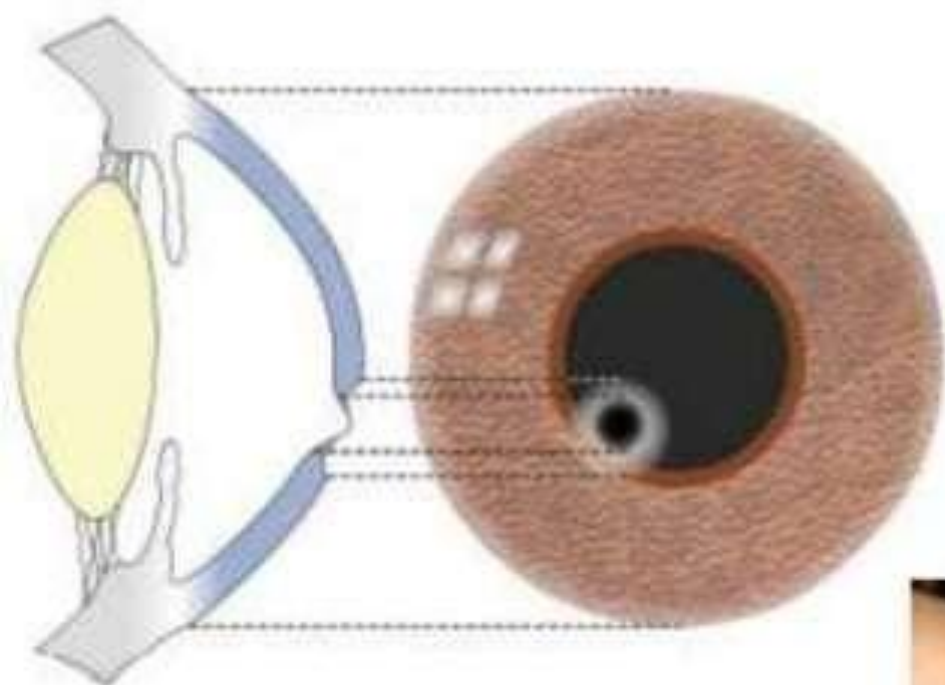
- Stage of infiltration
- Stage of Active ulceration
- Stage of Regression
- Stage of Cicatrization





# Perforated Ulcer

- Perforation of corneal ulcer occurs when the ulcerative process deepens and reaches up to Descemet's membrane.
- Exertion on the part of patient, such as coughing, sneezing, straining for stool etc. will perforate the corneal ulcer
- Adherent leucoma is the commonest end result after such a catastrophe



# Pseudo Cornea Formation

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- When the infecting agent is highly virulent and/or body resistance is very low
- Exudates block the pupil and cover the iris surface; thus a false cornea is formed.
- Ultimately these exudates organize and form a thin fibrous layer over which the conjunctival or corneal epithelium rapidly grows and thus a pseudocornea is formed.

# Pseudocornea / Ant. Staphyloma



# Bacterial Corneal Ulcers

## Manifestation

- Broadly as:
  1. Purulent corneal ulcer without hypopyon
  2. Hypopyon corneal ulcer.

# Symptoms


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- 1. Pain and foreign body sensation
- 2. Watering (Hyperlacrimation)
- 3. Photophobia
- 4. Blurred vision
- 5. Redness ( congestion of circumcorneal vessels)

# Signs

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- Lids are swollen
- Marked blepharospasm
- Conjunctiva is chemosed
- Conjunctival hyperaemia
- Ciliary congestion

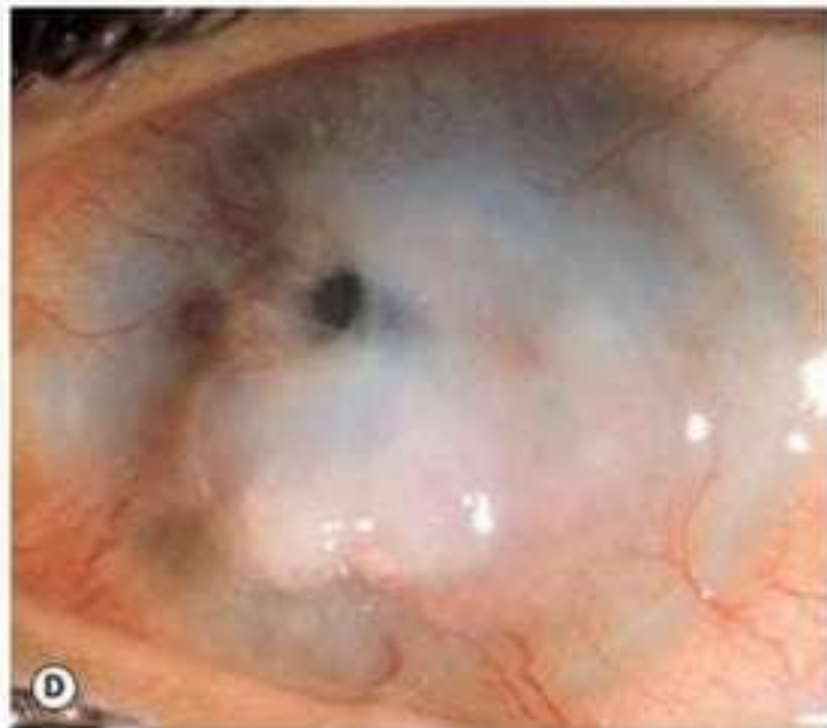
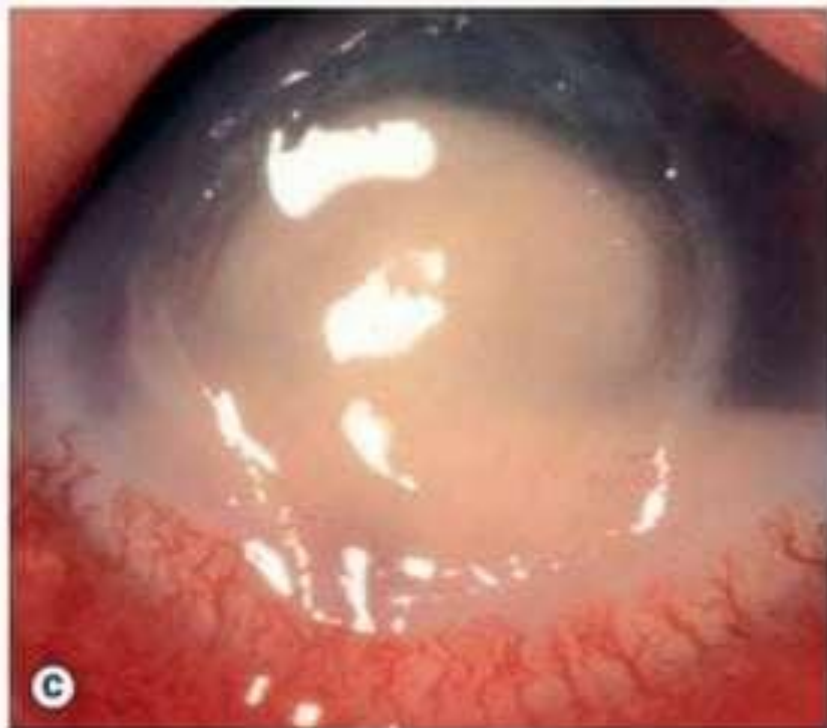
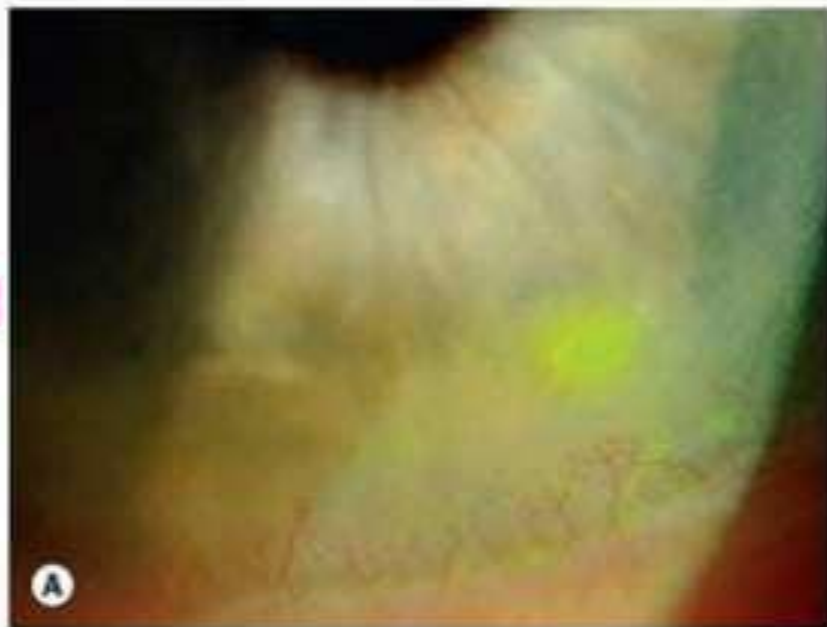
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- Greyish-white circumscribed infiltrate
  - Stromal oedema
  - Margins of the ulcer are swollen and over hanging
  - Floor of the ulcer is covered by necrotic material.



# Characteristic features produced by some of the causative bacteria

- Staphylococcal aureus and streptococcus (yellowish white)
- Pseudomonas (greenish mucopurulent exudate liquefactive necrosis)
- Enterobacteriae (E. coli, Proteus and Klebsiella sp.) (Greyish white)


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- Anterior chamber may or may not show pus (hypopyon).
  - Hypopyon corneal ulcer for the ulcer caused by pneumococcus (ulcus serpens)
  - Corneal ulcer with hypopyon for the ulcers associated with hypopyon due to other causes



# Complications

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- ❑ Toxic iridocyclitis
- ❑ Secondary glaucoma
- ❑ Descemetocoele
- ❑ Perforation of corneal ulcer
- ❑ Corneal scarring

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- Thorough history taking
  - General physical examination
  - Ocular examination
    1. Diffused light exam
    2. Regurgitation test
    3. Slit lamp

# Laboratory investigations

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- Routine laboratory investigations such as haemoglobin, TLC, DLC, ESR, blood sugar, complete urine and stool examination
  
- Microbiological investigations
  1. Scraping
  2. Swab



# Treatment


- Treatment of corneal ulcer can be discussed under three headings:
  1. Specific treatment for the cause.
  2. Non-specific supportive therapy.
  3. Physical and general measures.



# Specific treatment

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- Topical antibiotics (Fortified antibiotics)
- Ciprofloxacin (0.3%) eye drops, Ofloxacin (0.3%) eye drops, Moxifloxacin (0.3%) eye drops.
- Systemic antibiotics

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- Fortified cephazoline 5% ( 50mg/ml)
  - Fortified tobramycine ( 1.3%)
  - Fortified vancomycin 5% (50mg/ml)

# Non-specific treatment

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- ❑ Cycloplegic drugs
- ❑ Systemic analgesics and anti-inflammatory drugs
- ❑ Vitamins (A, B-complex and C)
- ❑ Goggles darker

# MYCOTIC CORNEAL ULCER

- The incidence of suppurative corneal ulcers caused by fungi has increased in the recent years:
  1. Injudicious use of antibiotics
  2. Steroids

# Causative fungi

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- The fungi which may cause corneal infections are :
- Filamentous fungi: *Aspergillus*, *Fusarium*, *Alternaria*, *Cephalosporium*, *Curvularia* and *Penicillium*.
- Yeasts: *Candida* and *Cryptococcus*

# Mode of infection

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- Injury by vegetative material
- Injury by Animal tail
- Secondary fungal ulcers


# Signs and Symptoms

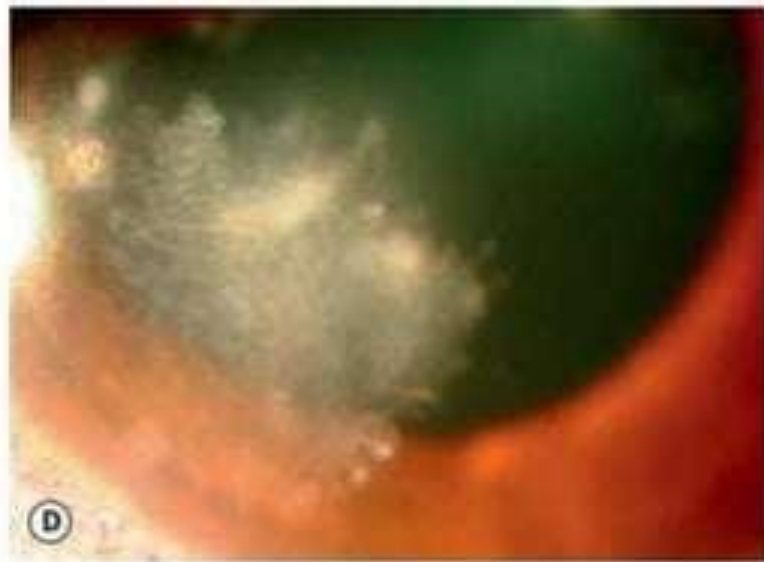
- Symptoms are similar to the central bacterial corneal ulcer
- But in general they are less marked than the equal-sized bacterial ulcer
- Overall course is slow and torpid.

# Signs

- Corneal ulcer is dry-looking, Greyish white
- Feathery finger-like extensions are present into the surrounding stroma under intact epithelium.
- A sterile immune ring
- Multiple, small satellite lesions around the ulcer



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- Big hypopyon
  - Perforation in mycotic ulcer is rare
  - Corneal vascularization is rare




# Laboratory investigations

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- ❑ Wet KOH,
- ❑ Calcofluor white,
- ❑ Gram's and Giemsa- stained films for fungal hyphae
- ❑ Culture on Sabouraud's agar medium

# Treatment

- Topical antifungal eye drops should be used for a long period (6 to 8 weeks).
  
- These include :
  1. Natamycin (5%) eye drops
  2. Fluconazol (0.2%) eye drops
  3. Nystatin (3.5%) eye ointment.

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- Systemic antifungal drugs may be required for severe cases of fungal keratitis.
  - Tablet fluconazole(200mg..bid) or ketoconazole may be given for 2-3 weeks
  - Non-specific treatment and general measures are similar to that of bacterial corneal ulcer

# Viral corneal ulcer :

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- Typically affects both cornea and conjunctiva-keratoconjunctivitis .
  
- Common viral infections-
  1. Herpes simplex(DNA virus)
  
  2. Herpes zoster
  
  3. Adenovirus



# Herpes simplex:

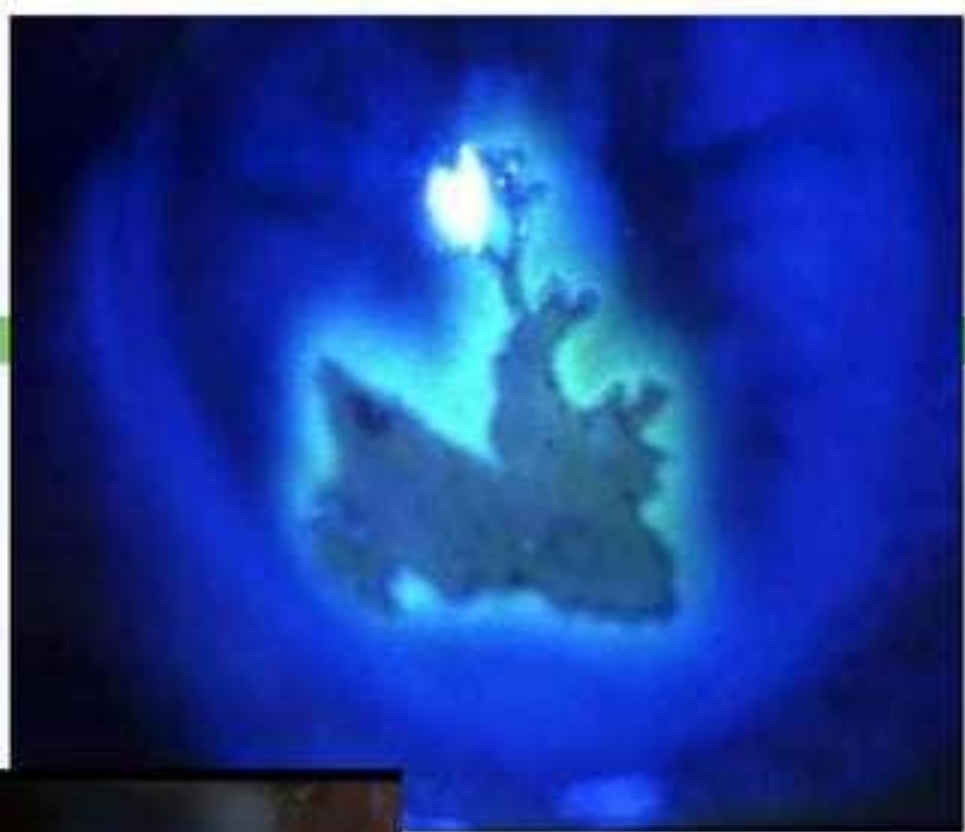
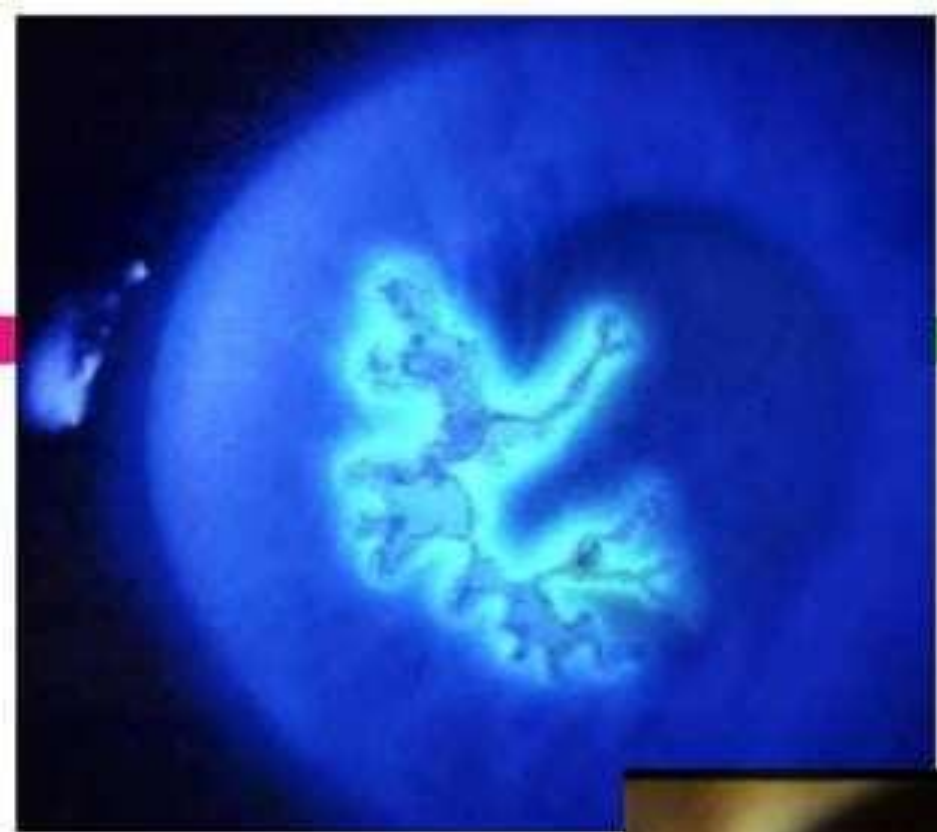
## □ Mode of Infection:

1. HSV-I : face, lips, eyes.(kissing)
2. HSV- II : genital herpes (infection from genital secretion)

## □ Primary Herpes:

1. Skin lesions
2. Conjunctiva - Acute follicular conjunctivitis
3. Corneal signs:  
Fine epithelial punctate keratitis, coarse epithelial punctate keratitis, dendritic ulcer.





# Primary Ocular Herpes

- Basically seen during first attack b/w 6months to teenagers.
  
- Clinical features
  1. Skin lesions. (Vesicular lesions)
  2. Acute follicular conjunctivitis
  3. Keratitis ( Coarse punctate/ diffused branching involving epithelium only)

# Recurrent ocular herpes

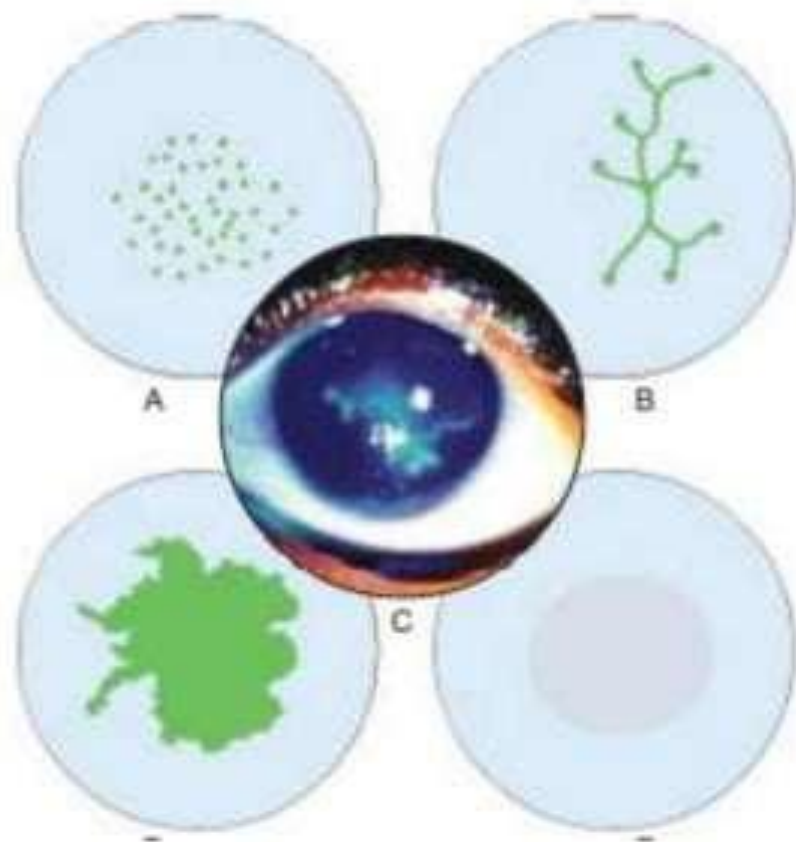
- ❑ Fever such as malaria, flu, exposure to ultraviolet rays,
- ❑ General ill- health, emotional or physical exhaustion
- ❑ Mild trauma, menstrual stress
- ❑ Following administration of topical or systemic steroids and immunosuppressive agents.

□ Epithelial keratitis

i. Punctate epithelial keratitis

ii. Dendritic ulcer (knobbed )

iii. Geographical ulcer



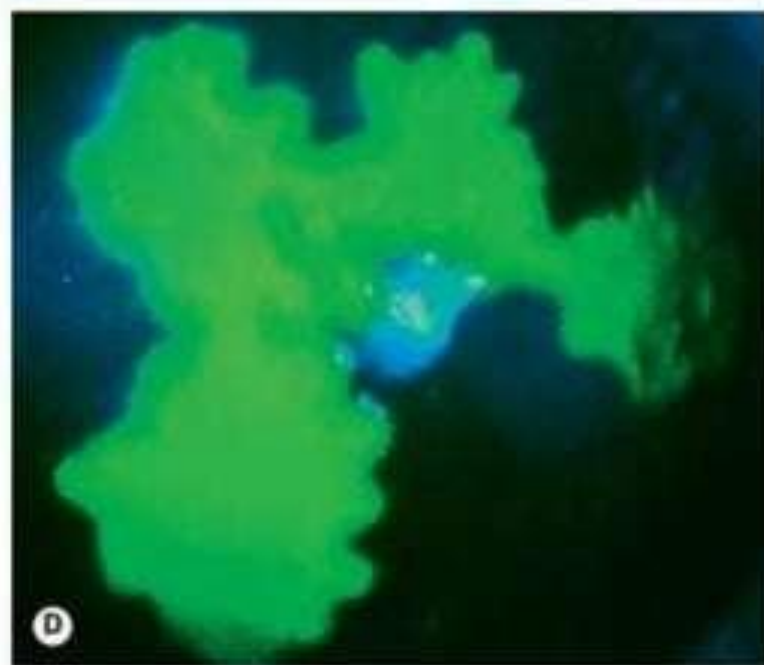
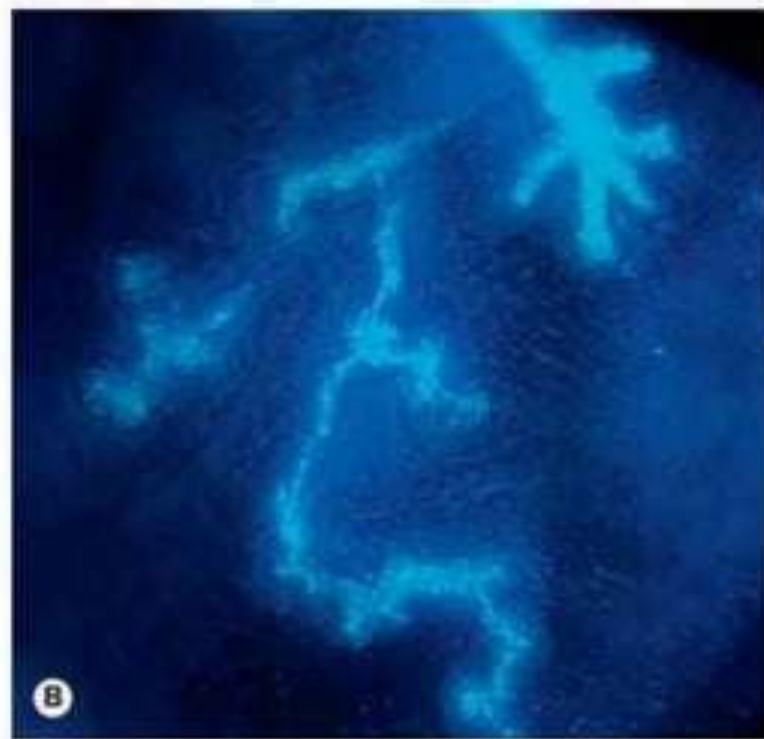
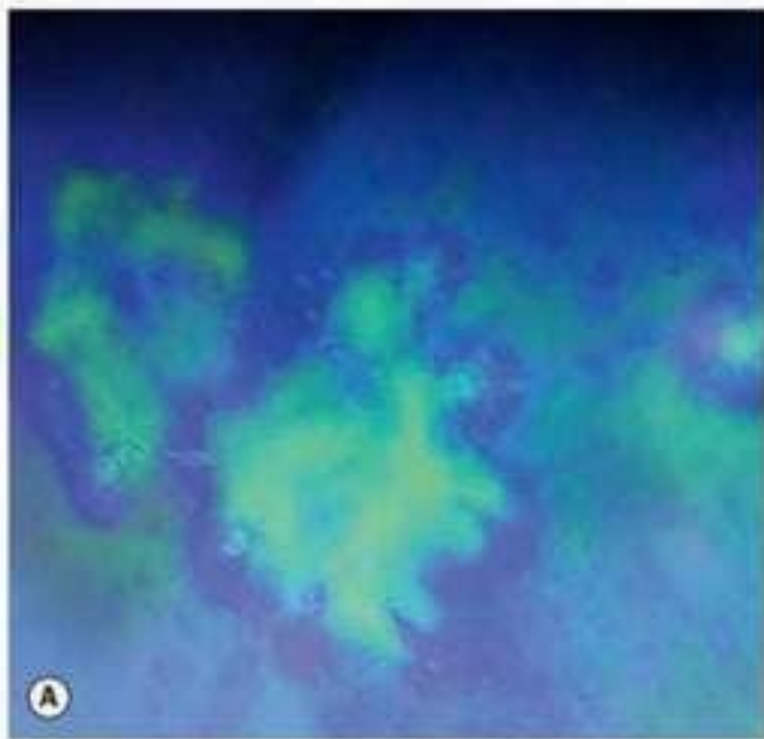


- Stromal keratitis

1. Disciform keratitis

2. Necrotizing interstitial keratitis

- Meta herpetic keratitis



# Treatment

- Specific treatment

1. Antiviral drugs are the first choice presently.


- Oint. Aciclovir 3 percent : 5 times a day until ulcer heals and then taper to 3 times a day for 5 days.

OR

- Ganciclovir (0.15% gel)

- Triflurothymidine 1% dp (QID)

2. Mechanical debridement of involved area



□ Systemic Antiviral

Tab .Acyclovir 400mg po tid/ bid for 10 to 21 days

In non responsive cases and recurrent cases.





- Stromal keratitis

- (a) Disciform keratitis

- (b) Diffuse stromal necrotic keratitis.

Treatment :

- Diluted steroid eye drops instilled 4-5 times a day with an antiviral cover (aciclovir 3%) twice a day.


# Herpes Zoster Ophthalmicus

- Herpes zoster ophthalmicus is an acute infection of Gasserian ganglion of the fifth cranial nerve by the varicella-zoster virus (VZV).
- It is neurotropic in nature
- The infection is manifests as chickenpox and the child develops immunity. The virus then remains dormant in the sensory ganglion of trigeminal nerve

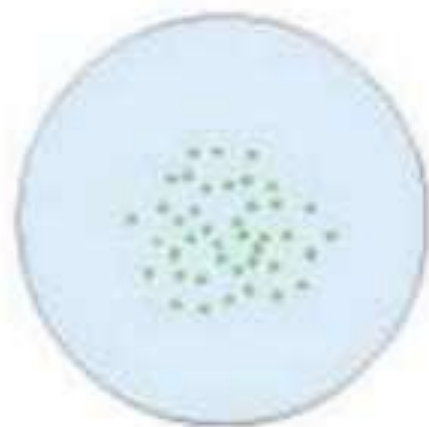
# Clinical features

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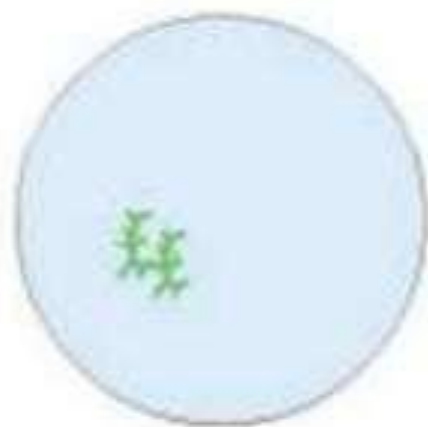
- Frontal nerve is more frequently affected than the lacrimal and nasociliary nerves.
- 50 percent cases of herpes zoster ophthalmicus get ocular complications
- Hutchinson's rule

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- General features.
  - Cutaneous lesions
  
  - Ocular lesions.
    1. Conjunctivitis
    2. Zoster keratitis
    3. Episcleritis and scleritis
    4. Iridocyclitis
    5. Anterior segment necrosis and phthisis bulbi.





**A**




**B**



# Treatment

- Systemic therapy for herpes zoster
  
- Oral antiviral drugs.
  1. Acyclovir in a dose of 800 mg 5 times a day for 10 days, or
  2. Valaciclovir in a dose of 500mg TDS
  
- Analgesics.
- Systemic steroids.



□ Local therapy for ocular lesion

1. Topical steroid eye drops 4 times a day.
2. Cycloplegics such as cyclopentolate eyedrops BD or atropine eye ointment OD.
3. Topical acyclovir 3 percent eye ointment should be instilled 5 times a day for about 2





- Any queries???

- THANK YOU

| SIGNS                               | BACTERIAL   | FUNGAL  |
|-------------------------------------|---|---|
| Lids                                | Swelling of lids  | Might be present  |
| Blepharospasm                       | present   | present   |
| Conjunctival chemosis and hyperemia | Present+++  | Present++   |
| Ciliary congestion                  | +++   | +++   |
| Ulcer                               | Greyish-white circumscribed infiltrate, Yellowish-white oval/irregular area of ulcer. Stromal edema | Elevated rolled out margins<br><b>Satellite lesion</b><br>Dense suppuration<br>Endothelial plaque |
| Hypopyon                            | Hypopyon (sterile, whitish, mobile  | Hypopyon (infected, immobile, yellowish), common  |
| Complications                       | Corneal perforation, endophthalmitis  | Endophthalmitis   |