CORNEAL ULCERS

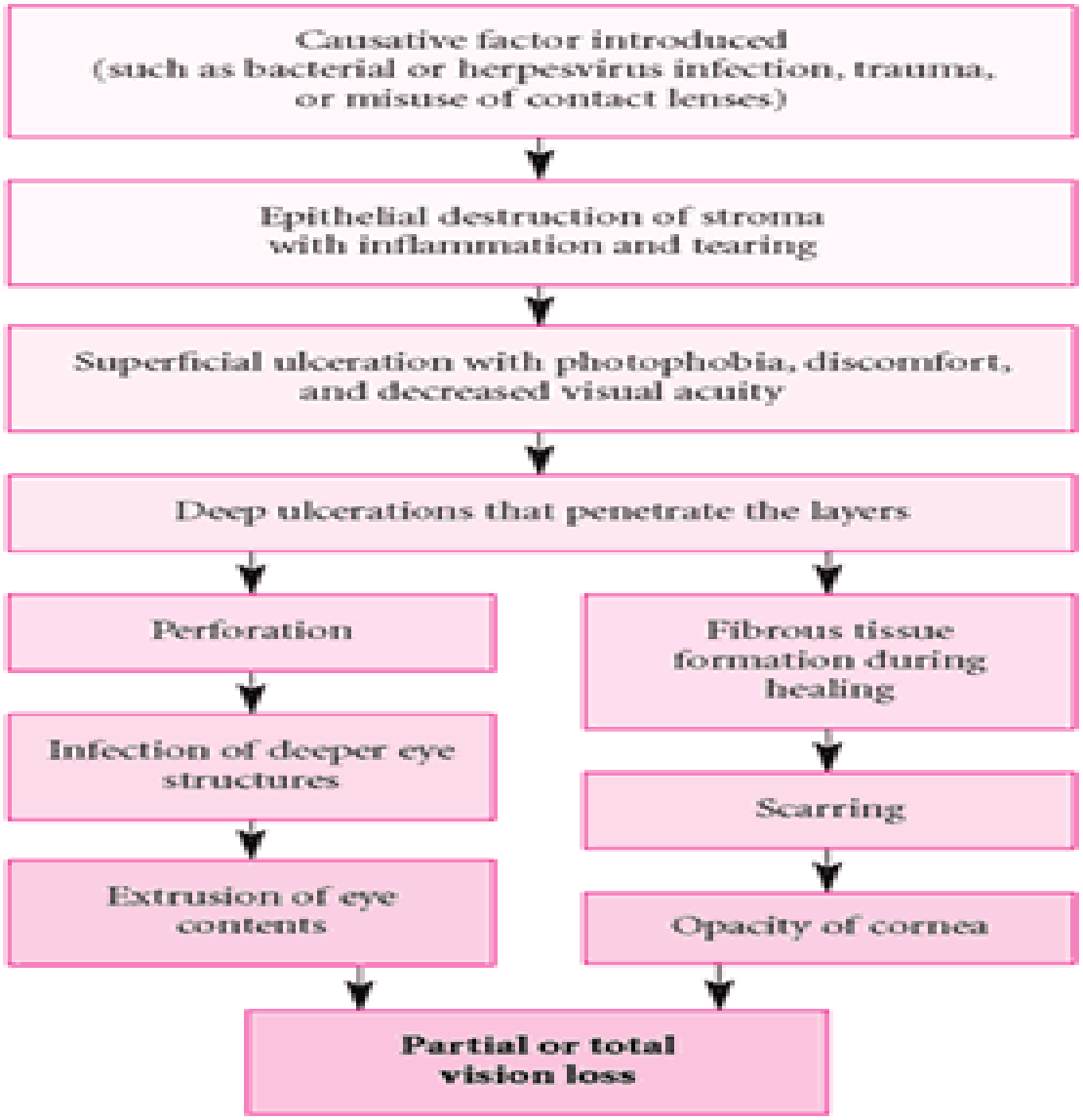
- Ulcer: latin word “ulcus” – A lesion “caused by superficial loss of tissue, usually with inflammation”
- Focal white opacity (infiltrate) in corneal stroma
- An ulcer exists if there is also stromal loss with an overlying epithelial defect that stains with fluorescein
- Rarely occurs in healthy eyes, look for underlying cause

PATHOGENESIS

PATHOPHYSIOLOGY

WHAT HAPPENS IN CORNEAL ULCERATION

Corneal ulcers can be caused by infection (protozoan, bacterial, viral, or fungal), trauma, exposure, toxins, contact lenses, or allergens. Scarring or perforation can cause changes in the eye structure and can lead to partial or total vision loss.



http://www.wrongdiagnosis.com/bookimages/7/2336.1.png

DIAGNOSIS

- ❑ Is there an infectious component?

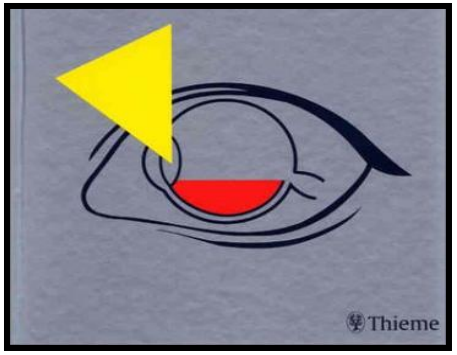
- What local host factors contribute to increased risk of ulceration?

- Autoimmune disease, inflammatory, immunocompromised?

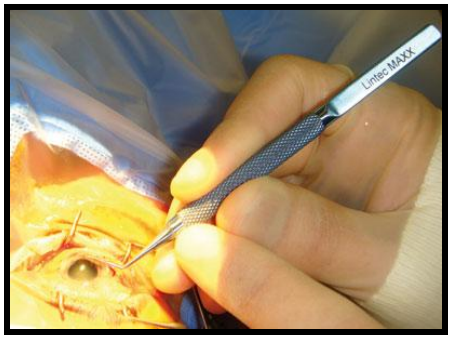
HISTORY: Infectious

Contact Lens use: overnight wear, extended wear

Foreign bodies



Trauma (soil, vegetation)



Previous Surgery (ocular, refractive)

Exposure to contaminated water

Ocular medications

HISTORY: Impaired Host Defense

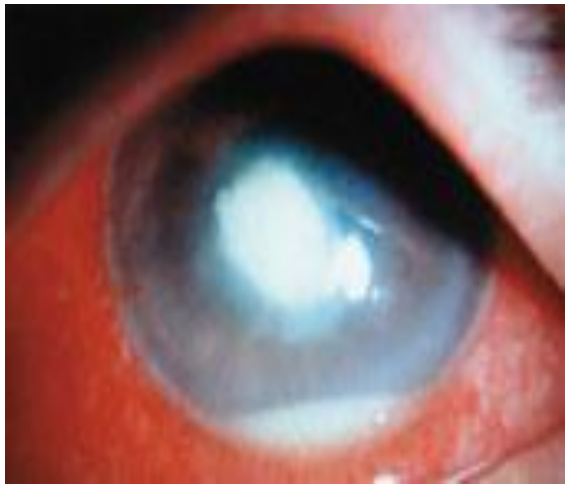
- Ocular chemical injury
- Neurotrophic disease
- Exposure and lid or lash malpositioned
- Tear insufficiency
- Stem cell deficiency
- Bullous keratopathy
- Previous herpetic disease

❑ Medical history:

– DM, AIDS, malnutrition, alcoholism, RA, Wegener's granulomatosis, Sjögren's

BACTERIAL KERATITIS

- It is always exogenous infection due to pyogenic organisms
- The organisms produce toxins which cause tissue death and pus formation in cornea tissue



CAUSES OF BACTERIAL KERATITIS

❑ Common Organisms:

– ***S aureus***

– ***Staph epidermidis***

– ***Strep pneumonia***

– ***Pseudomonas aeruginosa (MC in CL users)***

– **Enterobacteriaceae *(Proteus, Enterobacter, Serratia)***

❑ Uncommon Organisms:

– ***Neisseria spp***

– ***Moraxella spp***

– ***Mycobacterium spp (most common in refractive surgery)***

– ***Nocardia spp***

– ***Corynebacterium sp***

CLINICAL PRESENTATION

- Rapid onset of conjunctival injection
- photophobia, decreased vision

- Bacterial Keratitis:

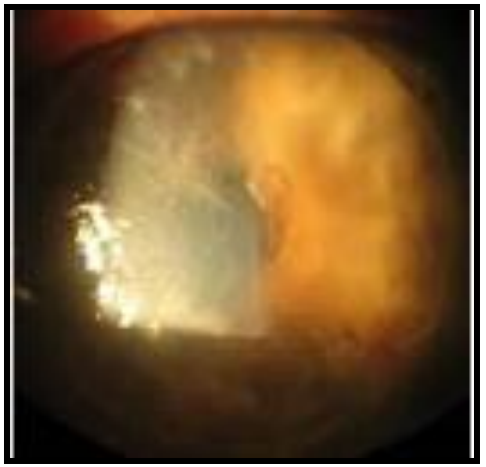
- Sharp epithelial demarcation

- Underlying dense suppurative stromal inflammation with indistinct edges

- Surrounding stromal edema

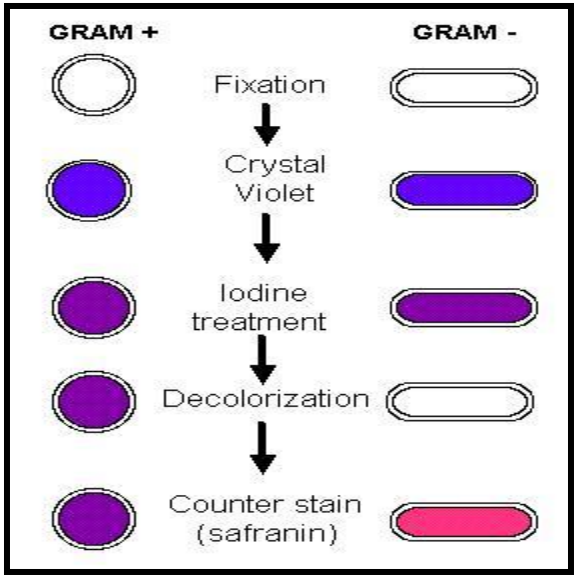
CLINICAL PRESENTATION

- Slow growing, fastidious organisms (Mycobacteria, anaerobes) can produce nonsuppurative infiltrate with intact epithelium. i.e. *infectious crystalline keratopathy*
- Densely packed, white branching aggregates of organisms absent/impaired host inflammatory response.
- Risk factors: CL wear, corticosteroids, infected graft
- Alpha-hemolytic *Strep most* common



LAB EVALUATION

- Wide variety of bacterial species can cause microbial keratitis
- Culture all patients before initiating therapy
- Gram stain and culture: Aerobic, anaerobic, fungal…



TREATMENT

- Initiate broad spectrum antibiotic until microorganism identified

- 4th-gen fluoroquinolone : good gram positive or negative coverage (gatifloxacin 0.3%, moxifloxacin 0.5%)

- 2nd-gen fluoroquinolone: ciprofloxacin 0.3% → Best for *Pseudomonas*

TREATMENT

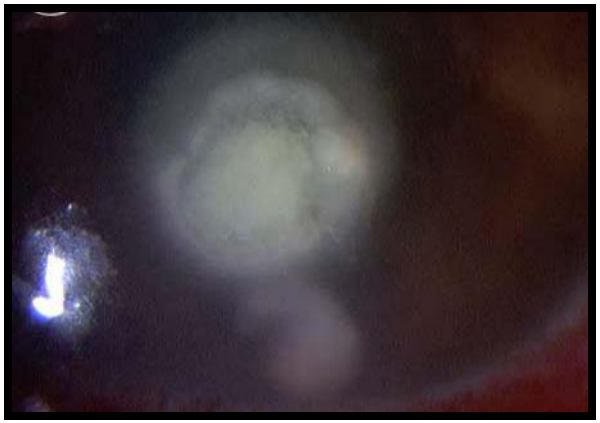
- Fortified Antibiotics – produce therapeutic concentration in stroma
  - Vancomycin 50mg/ml (gram positive coverage plus MRSA)
  - Gentamycin or Tobramycin 15mg/ml (gram negative coverage)

- Route of Administration based on severity:

  - Q30-60min fortified topicals for bacterial keratitis
  - Cycloplegic drops to prevent synechiae formation or when hypopyon present
  - e.g.: Homatropine 5% BID or Cyclogyl 1% BID

FUNGAL KERATITIS

- Seen more frequent in warmer, more humid parts of country
- Always consider when trauma with Plant/vegetable matter or in immunocompromised patient
- Etiology: *Fusarium*, *Aspergillus*, *Candida albi*cans



FUNGAL KERATITIS

- Risk factors: Topical corticosteroids decrease corneal resistance to infection
  - Contact lens use
  - Gardeners, weed trimmers
  - Immunocomprised states (*Candida)*
  - Chronic keratitis

- Signs/symptoms:
  - Have fewer inflammatory sings and symptoms during initial period
  - Little of no conjunctiva injection
  - Multifocal or satellite infiltrates (less common)

TREATMENT

- Natamycin 5% drops (filamentous): Works particularly well w/ *Fusarium spp*

- Amphotericin B 0.15-0.30% (*Candida):* Most effective for yeast, also works well for *Aspergillus spp (filamentous) but* Penetration reduced with intact epithelium, may need epidebidement

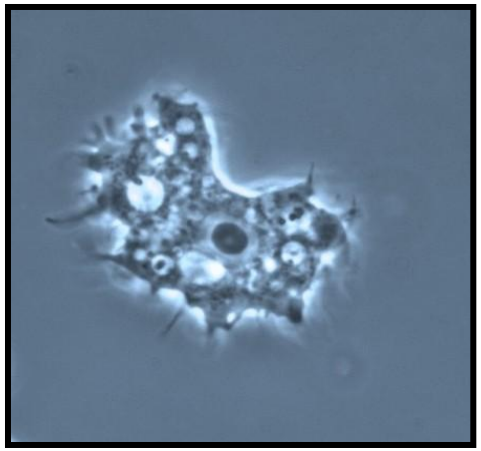
- Adjunctive therapy:
  - Oral ketoconazole (200-600 mg/day)

- For severe filamentous keratitis
  - Oral fluconazole (200-400 mg/day)

- For severe yeast keratitis
  - Oral itraconazole (200 mg/day): Broad-spectrum activity against all *Aspergillus & Candida* but variable against Fusarium

ACANTHAMOEBA KERATITIS

- Free living ubiquitous protozoa found in freshwater and soil
- Most commonly associated with contact lens use (70%), corneal trauma and history of fresh water exposure
- Often pain is more severe than signs in early course of the disease
- No therapeutic response to antimicrobials



Signs:

- Early disease: Unilateral diffuse punctate epitheliopathy or dendritic epithelial lesion
- Often misdiagnosed as HSV
- May progress to stromal infection (3-8 wks)
- Stromal infection occurs in central cornea
- Gray-white superficial, nonsuppurative infiltrate
- Partial/complete ring infiltrate in paracentral cornea
- Enlarged corneal nerves (radial perineuritis)
- Limbitis
- Scleritis may be found in advanced cases

Diagnosis &Treatment

- Diagnose with corneal scrapings
- Stain with Giemsa, PAS, calcofluor white
- Confocal microscopy

Treatment:

- Polyhexamethyl biguanide (PHMB) 0.02% or Chlorhexidine 0.02%
- Clotrimazole
- Neomycin

PK if continued progression on max meds and severe stromal melting

HSV KERATITIS (EPITHELIAL)

- Unilateral (10% bilateral)
- Symptoms: tearing, foreign body sensation, photophobia, ocular pain and blurring of vision
- First present as punctate keratitis that may become progressive
- Pathognomonic single or multiple branching dendritic ulcers with terminal bulbs possibly progressing to wider geographic ulcers
- Ciliary flush w/ mild conj injection
- Mild stromal edema & subepithelial infiltrate

TREATMENT

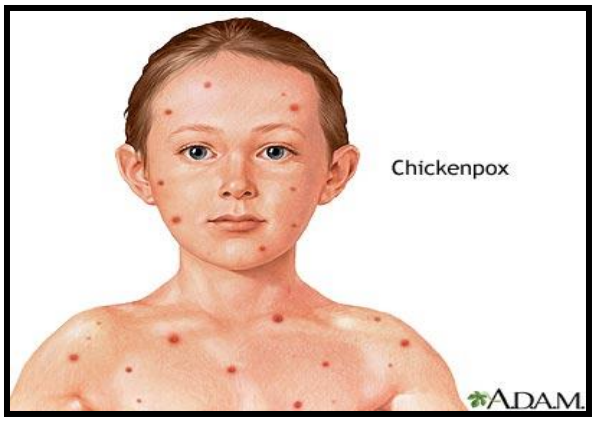
- Treatment shortens clinical course mild epi debridement

➢ Trifluridine 8X/day x 10-14 days

➢ Oral acyclovir 400mg 5X/day, OR Valaciclovir 1g TID

HERPES ZOSTER

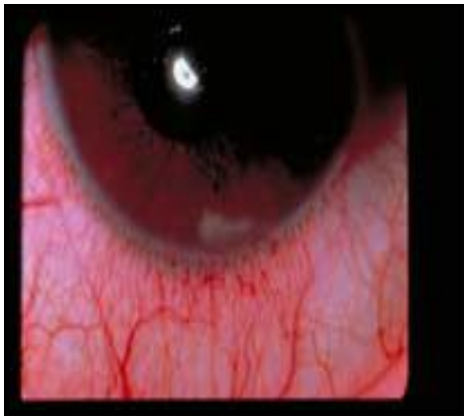
- It is caused by Varicella zoster virus (VSV).
- It is associated with chickenpox infection in youth and children
- It also occurs in elderly with depressed cellular immunity e.g. Diabetes, alcoholics, AIDS or Cancer
- Symptoms: Fever, Malaise, Skin of lid and face becomes red and oedematous, Vesicles suppurate, bleed and cause pitted scar



Parsons' diseases of the eye. 18th ed. / Stephen J.H. Miller.

MARGINAL ULCER

- Staphylococcal Marginal/Hypersensitivity Keratitis:
- Peripheral corneal infiltrates and/or ulceration
- Usually parallel to limbus, separated by a clear corneal zone
- Presents with marked conjunctival injection
- Occurs in middle-aged patients but may occur at any age
- Commonly associated with staphylococcal blepharoconjunctivitis, rosacea or phlyctenulosis



Sterile Infiltrates vs. Infectious Infiltrates

Sterile Infiltrates	Infectious Infiltrates (MK)
Smaller lesion (< 1mm)	Larger lesion (> 1mm)
More peripheral	More central
Minimal epithelial damage (Defect size compared to underlying infiltrate)	Significant epithelial defect (Size of staining defect closely mirrors size of underlying stromal lesion)
No mucous discharge	Mucopurulent discharge
Less pain and photophobia	Pain and photophobia
Little to no anterior chamber reaction	Anterior chamber reaction
No lid involvement	Lid edema

Source: Stein RM, Clinch TE, Cohen EJ, et al. Infected vs. sterile corneal infiltrates in contact lens wearers. Am J Ophthalmol 1988 Jun 15;105(6):632-6.

DIFFERENTIAL DIAGNOSIS

Clinical Features	Bacterial	Viral	Fungal
Discharge	Mucopurulent	Watery	May be present
Pain	Severe	Moderate	Mild
Fever, headache	-	++	-
Recurrence	-	++	-
Trauma	Common with penetrating injury	-	Vegetative matter injury

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CONTD…

Signs	Bacterial	Viral	Fungal
Injection	Marked	Moderate	Marked
Follicles	-	+	-
Ulcer	Central disc with necrotic material	Dendritic and geographical pattern	Dry yellow grey with satellite lesions
Depth	May be deep	superficial	Deep
Corneal sensations	Present	Absent	Present
Preauricular lymphadenopathy	+	+	-

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Common Types of Microbial Keratitis

Organism	Characteristic finding
Fungal	Satellite lesions, feathery borders
Herpes Simplex	Dendritic (Branching) corneal defect
Acanthamoeba	Radial perineuritis
Bacterial	Corneal ulceration, stromal abscess formation, surrounding corneal edema, and anterior segment inflammation
Pseudomonas aeruginosa	Stromal melting

http://www.revoptom.com/content/d/cornea/c/15459/ Last accessed on 8th July 2010