



# How to Diagnosis and Management in Corneal Ulcer

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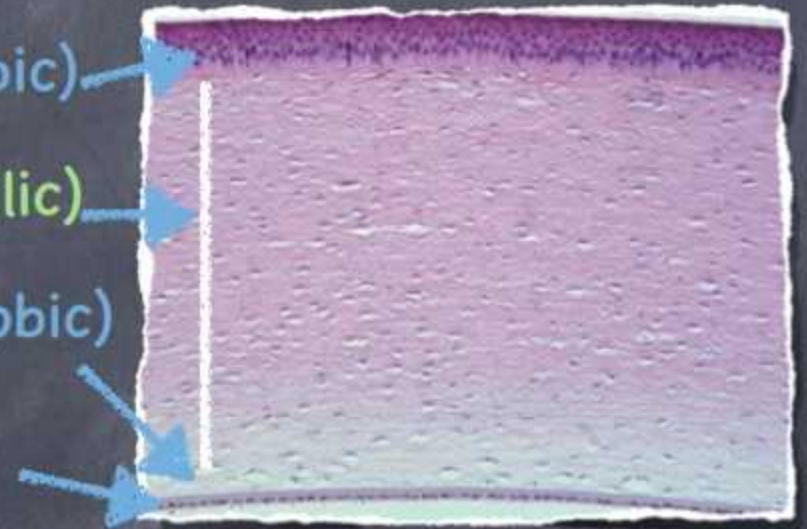
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# Cornea

## • The four layers of the cornea

- Epithelium (hydrophobic)
- Stroma (hydrophilic)
- Descemet's membrane (hydrophobic)
- Endothelium



- In health, the cornea is clear, smooth and colorless
- Dehydration
- Lack of blood vessels
- Lack of pigment
- Low cellularity



# Cornea



Healthy of cornea

# Cornea

- In disease, the cornea loses its clear, colorless character
- Signs of corneal disease include the following
  - A dry or roughened corneal surface ex. KCS
  - Corneal vascularization (superficial or deep vessels)
  - Corneal edema (endothelial defects)
  - Brown discoloration ex. melanosis, sequestrum
  - Corneal fibrosis
  - Stromal white cell infiltrate
  - Refractile, white corneal deposits (lipid or mineral)





corneal edema



corneal melanosis

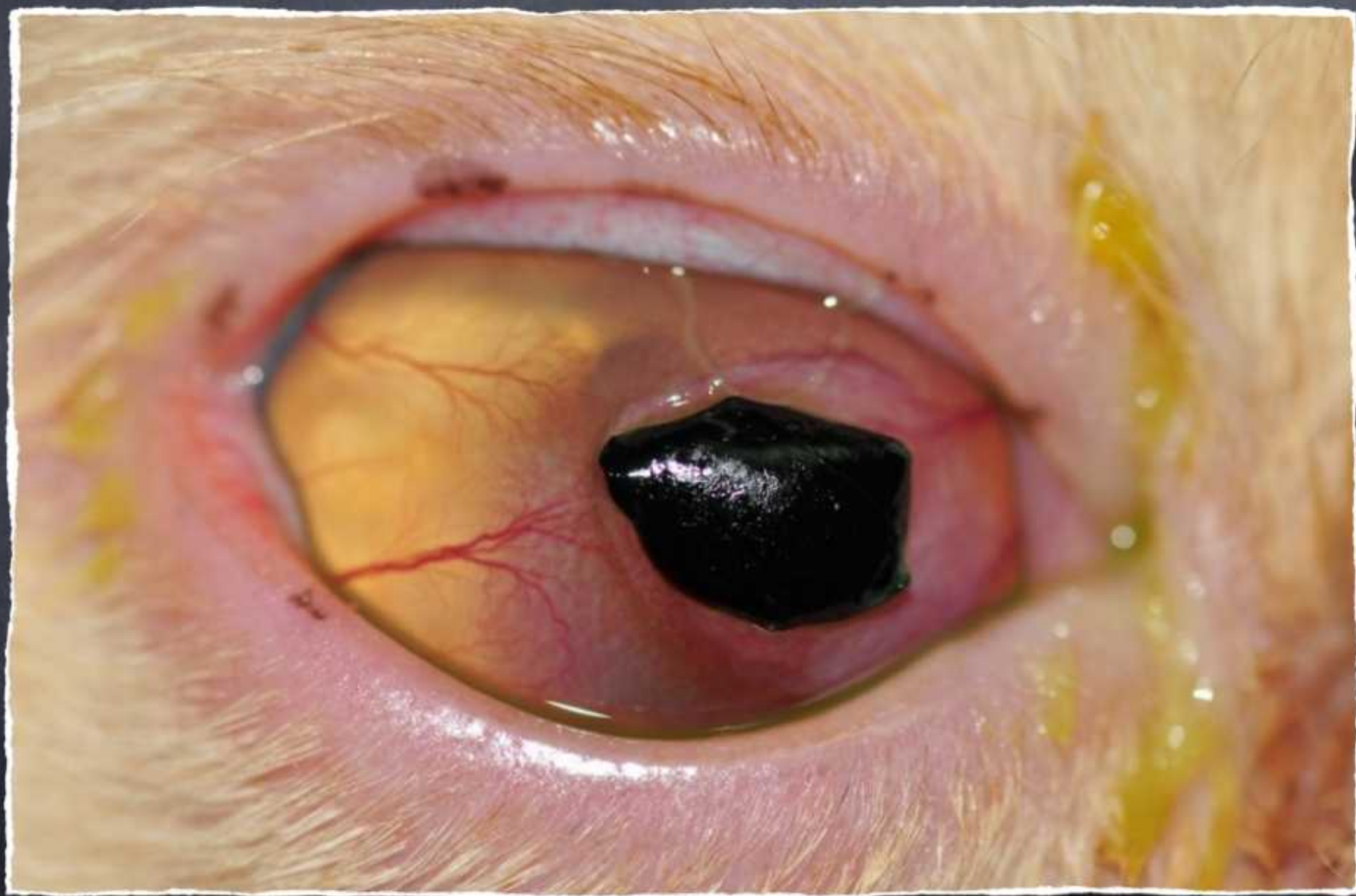


corneal neovascularization



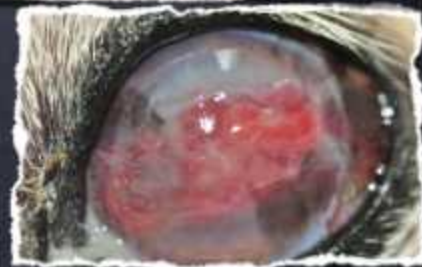
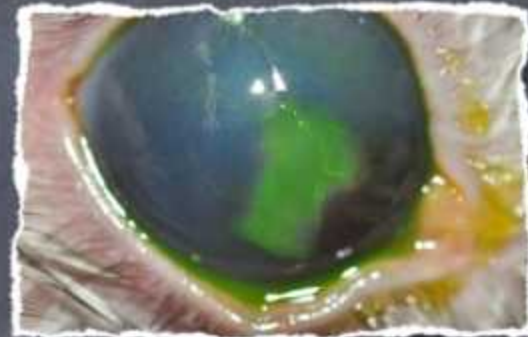
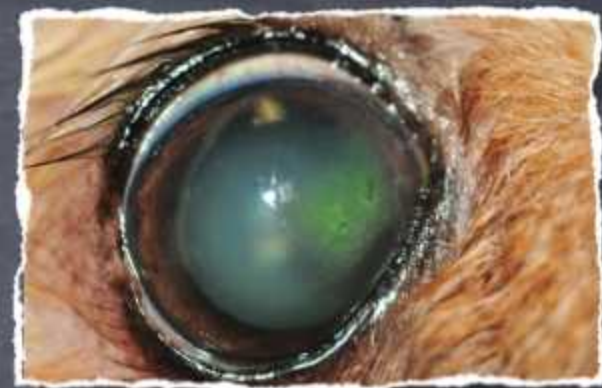
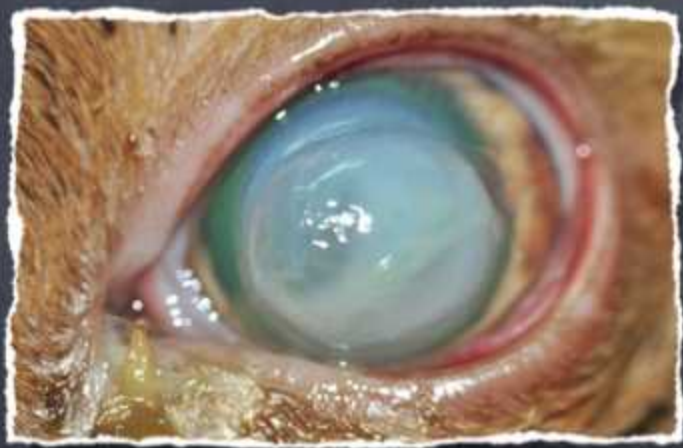
corneal cellulitis





corneal sequestrum

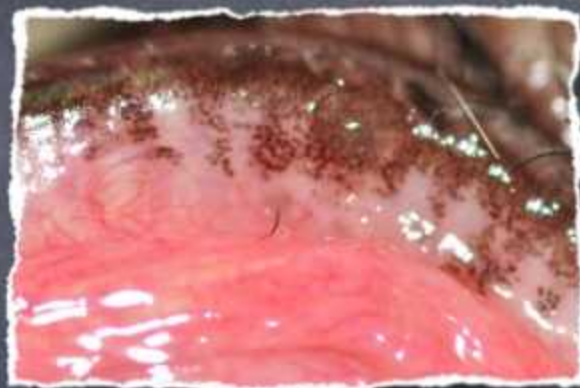




Unhealthy of cornea



# Complete Ocular Examination





# Corneal Ulcer

- Simple corneal ulceration
- Indolent corneal ulceration
- Deep and perforating corneal ulceration
- Melting corneal ulceration



# Simple corneal ulceration

- A loss of corneal epithelium
- This type of ulcer is **not infected**
- The underlying cause of the ulcer has resolved
- Simple corneal ulcers heal within 1 week
  - Healing occurs by multiplication and migration of epithelial cells over the defect



# Simple corneal ulceration





# Simple corneal ulceration

- Ocular trauma are at higher risk of corneal ulceration
  - Active dogs
  - Blind animals
  - Animal with brachycephalic ocular syndrome

# Simple corneal ulceration

- Individuals with impaired blinking are predisposed to development
  - Lagophthalmos
  - Facial nerve paralysis
  - Exophthalmos
- Individuals with eyelid or pre corneal tear film disorders



• Lagophthalmos

• Exophthalmos

# Simple corneal ulceration

- Defining characteristics
  - Ocular pain
  - blepharospasm
  - Epiphora or other ocular discharge
  - Elevation of the third eyelid
  - Red eye (conjunctivitis, chemosis)
  - Rubbing or pawing at the eye



# Simple corneal ulceration

- The diagnosis of a corneal ulcer is made by observing corneal fluorescein retention
- **Fluorescein is water-soluble** and does not adhere to the intact, hydrophobic corneal epithelium
- Corneal ulceration exposes the **hydrophilic corneal stroma**, to which fluorescein does adhere

# Simple corneal ulceration

- The ulcer is diagnosed as superficial based on the following:
  - Absence of visible stromal loss
  - Superficial appearance of any vessel that may be in the cornea
  - Because simple corneal ulcers are not infected, white cell infiltrate will be absent



# Simple corneal ulceration

## 👁️ Treatment

- 👁️ Aimed at preventing infection and treating ocular pain while the ulcer re-epithelializes
- 👁️ **Prevention of infection**
- 👁️ **Broad-spectrum antibiotic** with efficacy against Gram-positive anaerobes and Gram-negative bacteria

# Simple corneal ulceration

## 👁️ Treatment (con't)

- 👁️ neomycin/polymyxin B/bactitracin ophthalmic ointment or solution
- 👁️ Very good prophylaxis for simple corneal ulcer in dogs
- 👁️ **Fluoroquinolone**, not recommended for prophylactic use in simple corneal ulcers or other uninfected corneal ulcer



# Simple corneal ulceration

## • Treatment (con't)

- The first recheck appointment should be within 5-7 days of initial presentation

## • Prognosis

- Complete resolution is very good
- Long-term corneal scarring is usually minimal to absent

# Indolent corneal ulceration

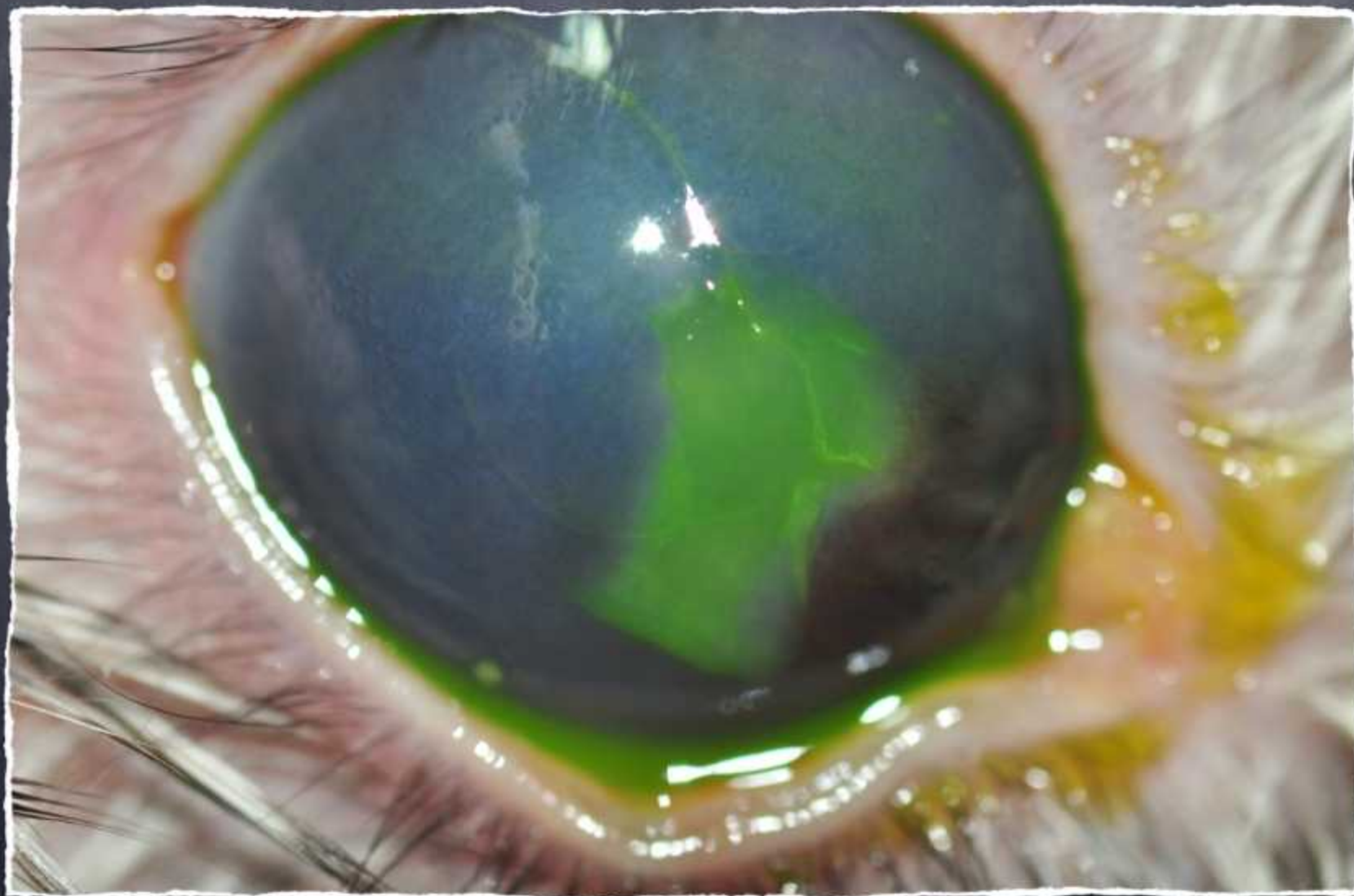
- Corneal ulceration possessing of the following characteristics
  - Superficial
  - Chronic
- Does not heal due to impaired corneal epithelial-stromal attachments
  - Epithelial division and migration over the defect occurs, impaired attachments prevent adherence of epithelium to stroma
- Not infected



# Indolent corneal ulceration



# Indolent corneal ulceration





# Indolent corneal ulceration



# Indolent corneal ulceration

- Occurs in a dog
- Indolent ulcers are not the result of underlying ophthalmic condition ( e.g. eyelid diseases and KCS)
- Predisposed individuals
  - Boxers
  - Corgis
  - Middle-aged and older dogs



# Indolent corneal ulceration

## • Treatment

- The goals of treatment are to
  - Encourage attachments to form between the epithelium and the stroma: **corneal debridement and grid keratotomy**
  - Prevent secondary bacterial infection of the cornea
  - Manage ocular pain
  - Prevent self-trauma



# Indolent corneal ulceration

- corneal debridement and grid keratotomy





## Deep and perforating corneal ulceration

- Loss of corneal stroma in addition to the epithelium
- Decemetocelles are deep corneal ulcer where the corneal epithelium and all of the stroma have been lost
- Only Descemet's membrane and the endothelium remain intact
- Perforated ulcers are full-thickness defects of the cornea

# Deep and perforating corneal ulceration

- Predisposed individuals
  - Brachycephalic dogs are at higher risk for complications that change a simple corneal ulcer into a deep corneal ulcer
  - Dogs with KCS are at increase risk of secondary infection of a superficial corneal ulcer, potentially leading to depending of the ulcer



# Deep and perforating corneal ulceration

- Predisposed individuals
  - In Cats, herpetic ulcers can progress to involve the deep stromal layers
  - When corneal ulcer develop in individuals receiving chronic ophthalmic corticosteroid treatment, the risk of complications leading to stromal loss is higher

# Deep and perforating corneal ulceration

- Clinical significance
  - Corneal ulcers can be quite painful
  - These ulcers are usually infected
  - Eyes with deep corneal ulcers are high risk of rupture
  - Deep and perforating corneal ulcers carry high rate of visual compromise or blindness



# Deep and perforating corneal ulceration

- Clinical significance (con't)
  - Anterior uveitis is present, to varying degrees, and should be treated
  - Healing requires rebuilding of corneal stroma in addition to re-epithelialization
  - Time course to healing is several weeks, at minimum

# Deep and perforating corneal ulceration

- Diagnosis
  - fluorescein stain pattern will identify a descemetocoele
  - Corneal cytology and culture and sensitivity are warranted due to high potential for infection



# Deep and perforating corneal ulceration





# Deep and perforating corneal ulceration



moderate conjunctivitis



# Deep and perforating corneal ulceration



Corneal edema + hypopyon

# Deep and perforating corneal ulceration



Corneal edema + hypopyon



# Deep and perforating corneal ulceration



Corneal edema

# Descemetocoele





# Descemetocoele

Edges of the ulcer stain positively, because exposed stroma is present. The base of the ulcer does not stain, because Descemet's mb is lipophilic

# Deep and perforating corneal ulceration

## 👁️ Treatment

👁️ goals are to

👁️ (1) control infection

👁️ (2) control intraocular inflammation

👁️ (3) treat ocular pain

👁️ (4) provide physical support to the eye



# Deep and perforating corneal ulceration

## • Treatment

- (1) control infection – antibiotic solution applied, not re-commence ointment

- Gram -negative rods

- gentamicin, tobramycin, ciprofloxacin, ofloxacin

- Gram-positive cocci

- cefazolin, gatifloxacin, moxifloxacin

- Ultimate antibiotic selection will be dictated by results of culture and sensitivity

# Deep and perforating corneal ulceration

- Treatment
  - (2) control intraocular inflammation
    - Do **not use ophthalmic steroids** due to potential to worsen infection and inhibitory effect on tissue healing



# Deep and perforating corneal ulceration

## • Treatment

### • (3) treat ocular pain

• Atropine 1% ophthalmic solution, one drop to the affected eye one to two times daily

• to maintain mydriasis

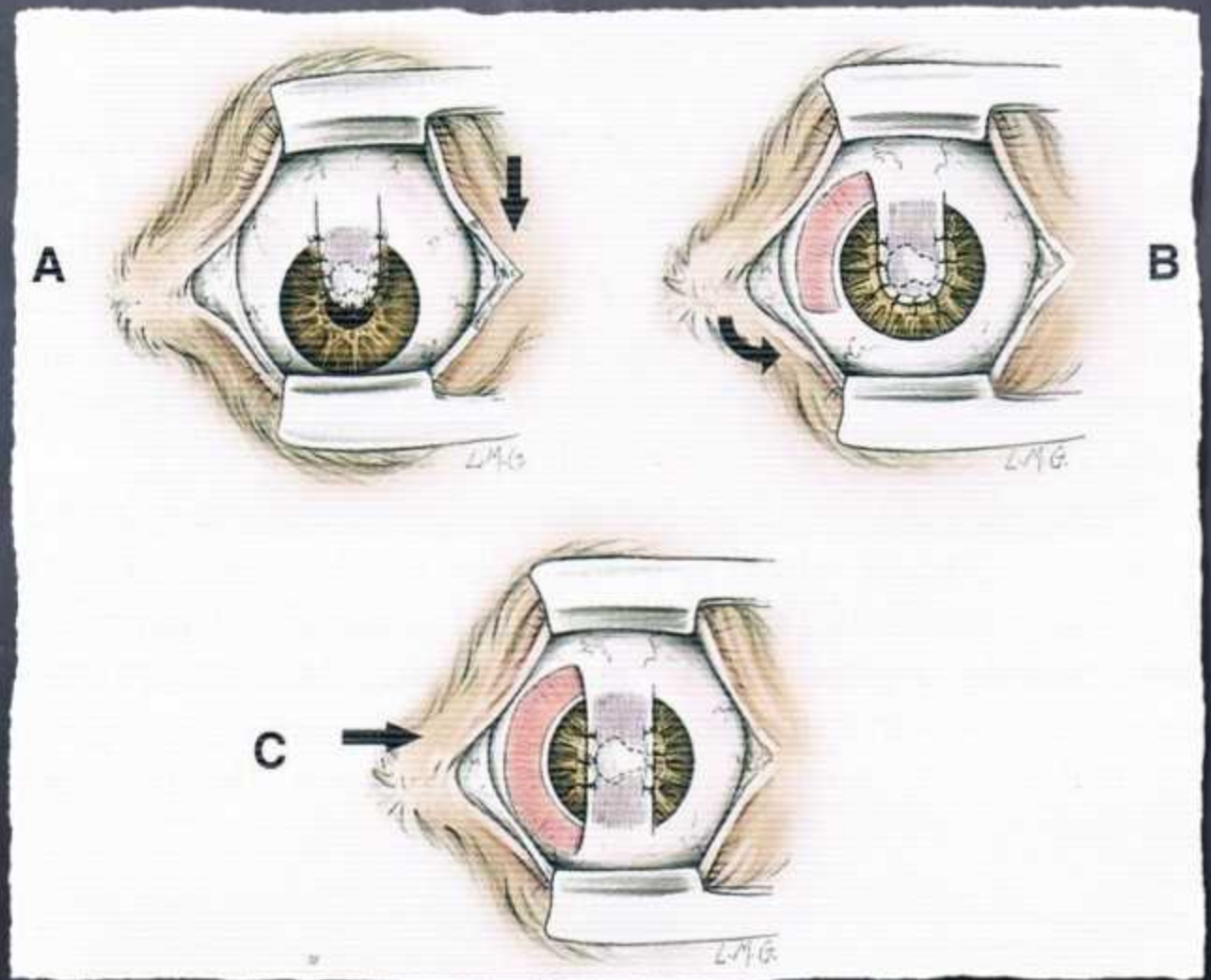
• Analgesia also addressed by oral NSAID use

# Surgical Treatment of Deep and perforating corneal ulceration

A: graft from the  
bulbar  
conjunctiva

B: Rotational  
pedicle graft

C: A conjunctival  
bridge graft





# Deep and perforating corneal ulceration

## • Treatment

- (4) provide physical support to the eye
  - A hard E-collar should be worn at all times
  - Referral for conjunctival graft
  - If a corneal foreign body is present, this is removed at the same time
  - Further rechecks will depend on progression of healing
  - early stages. rechecks every few days may be required
  - Thereafter, weekly rechecks may be required

# Deep and perforating corneal ulceration

- Prognosis
  - For deep corneal ulcers that receive prompt medical and surgical therapy, prognosis is good
  - Postoperative corneal scarring may cause vision compromise
  - The prognosis for perforated ulcers is guarded
    - some eyes can successfully be treated with conjunctival grafting
    - Some eyes may sustain irreversible damage and require enucleation



# Deep and perforating corneal ulceration



Corneal scarring

# Melting ulcer





# Melting Corneal ulceration

- Corneal ulcers with collagenolysis of corneal stroma
  - Proteinases, produced by both the host and the pathogen, degrade corneal collagen
  - Stromal collagen loses its rigidity and becomes malice

# Melting Corneal ulceration

## Defining characteristics

- The cornea become opaque and white
- The cornea appears gelatinous rather than solid
- The corneal curvature becomes altered as the corneal collagen loses its rigidity
- The corneal surface appears to be "oozing" off the remainder of the eye
- Moderate to marked sign of keratoconjunctivitis will be present



# Melting Corneal ulceration

## 👁 Clinical significance

- 👁 Corneal ulcers are painful
- 👁 Corneal melting can progress rapidly
- 👁 There is a high risk of loss of vision or the eye if melting is not stopped
- 👁 Melting ulcers are presumed to be infected
- 👁 Melting corneal ulcers are usually accompanied by significant anterior uveitis

# Melting Corneal ulceration

## 👁️ Diagnosis

- 👁️ The diagnosis is made on characteristic appearance
- 👁️ As with deep/perforating corneal ulcers, cytology and culture and sensitivity are recommended



# Melting Corneal ulceration

## 👁️ Treatment

- 👁️ Stop collagenolysis
- 👁️ Control infection
- 👁️ Control inflammation
- 👁️ Treat ocular pain
- 👁️ Provide physical support to the eye



Thank you for Attention