“Equine corneal diseases and its common causes”
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Overview
- Corneal anatomy overview
- Non-ulcerative keratitis
- Ulcerative keratitis
- Infectious keratitis

Corneal anatomy
- Normally avascular
- Average thickness: 0.8-1 mm
- Tear film
- Corneal epithelium
- Stroma: collagen fibrils, keratocytes, nerves and GAGs
- Descemet’s membrane: basement membrane for endothelial cells
- Corneal endothelial cells

Ophthalmic exam
- Dark room
- Sometimes, that means... be creative
- Light source!!!
- What is abnormal?
- What else do you see?
- Pupil size?
- Looking at the eye will get you 75% there

Non-ulcerative keratitis
- Tear deficient keratopathies
- KCS is rare
- Clinical signs
  - Blepharospasm
  - Mucopurulent discharge
  - Dull and lack-luster cornea
  - Overt keratoconjunctivitis
- Diagnostics
  - STT<10 mm/min
- Treatment
  - CsA (topical and implant)
  - Lubricants
  - Parotid duct transposition

Eq Ophthalmology, 3rd ED
**Immune mediated keratitis**
- Progressive, chronic or recurring
- Mild to moderate cellular infiltrate
- Vascularization
- Corneal edema
- Absence of overt uveitis
- Varying mild to no signs of discomfort
- Average age: 12 years
  - *unilateral>bilateral*

We'll discuss further in next presentation

**Eosinophilic keratitis**
- White plaques
- Surrounding corneal edema
- Superficial stromal, perilimbal yellow infiltrate
- Geographic ulcers
- Moderate discomfort

*Gilger et al., 2009*

**Eosinophilic keratitis**
- Cytology
- Can be self-limiting
  - Tx. Can speed recovery
  - Systemic cetirizine, dexamethazone

**Parasitic keratitis**
- Onchocerca cervicalis
- Dermal and Cornea, conjunctival lesions
  - Nodular lesions
  - Focal depigmentation/vitiligo
  - Perilimbal edema, acute infiltrates/edema
- Diagnosis: Histopath-microfilaria
- Treatment
  - Surgical excision
  - Ivermectin 0.2 mg/kg IM or PO
  - Moxidectin 0.4 mg/kg PO
  - Routine deworming required for prevention or recurrence

**Corneal degeneration**
- Corneal mineral or calcium
- Can occur from
  - Chronic ocular disease (uveitis, keratitis, etc.)
- Can slough epithelium: ULCER!

**Treatment**
- Topical EDTA
  - High concentrations for chemical chelation standing sedation (40-45 min)
  - Diamond burr debridement
  - Keratectomy

**Band keratopathy**

**Calcium/mineral deposit**
Squamous cell carcinoma

- Breeds: Appaloosas, Draft horses
- Poorly pigmented horses
- Typically Limbal (can also be seen concurrently with eyelid, medial canthus, NM)
- Treatment
  - Surgical intervention (keratectomy, conjunctivectomy)
  - Cryo, PDT, CO2 laser, mitomycin, PDT, etc.

Ulcerative keratitis

Chronic non-healing corneal erosion

- Fail to resolve through normal wound healing
- Epithelial edges visible
- Fluorescein stain underneath epithelium
- Cytology
  - May have infrequent inflammatory cells
  - No bacterial/fungal organism

Chronic non-healing corneal erosion

- Physiology: why don’t they heal?
  - Epithelium dysmaturates poorly adhering to stroma
  - Basement membrane and adhesion complexes are absent
  - Thin superficial hyalinized acellular stromal zone

Chronic non-healing corneal erosions

- Prophylactic topical antibiotics
- Pain/discomfort: cycloplegic, Systemic NSAID
- Treatment options
  - Grid or punctate keratotomy
  - Diamond burr debridement
  - Keratectomy
  - Bandage contact lens?

Trauma induced wounds

- Superficial
- Penetrating
- Perforation
**Corneal lacerations**
- Usually overt pain, blepharospasm and epiphora
- Superficial
- Debride?
- Can be deep
  - Edema usually causes bulging of edges
  - Recommend Seidel test

**Corneal foreign bodies**
- Epiphora, blepharospasm
- Plant or grain debris

**Corneal foreign bodies**
- Treatment: Removal
  - Hydropulsion (5-mL syringe with 25 G needle)
  - Manual extraction (needle? Forceps?)
  - Surgical removal (REFER)

**Infectious keratitis**
- Equine Herpes Virus
  - Rare in the US!
  - EHV-2, EHV-5
  - Multifocal epithelial and subepithelial opacities in axial cornea
  - Stain with fluorescein and Rose Bengal
  - Typically non or mild pain
  - Treatment
    - Topical antivirals
      - Idoxuridine q4hrs
      - Trifluridine q4hr
    - Variable prognosis

**Bacterial keratitis**
- Gram positive
  - Staphylococcus
  - Listeria
- Gram negative
  - Streptococcus
  - Pseudomonas
**Bacterial keratitis**
- Blepharospasm
- Mucopurulent discharge
- Corneal infiltrate
- Keratomalacia → stromal loss
- Reflex uveitis

**Diagnosis**
- Cytology
- Aerobic culture/susceptibility

**Bacterial keratitis: Treatment**
- Aggressive medical management
- Broad-spectrum antimicrobial coverage (*change pending susceptibility)
  - Fluoroquinolones
  - Combo therapy
    - Aminoglycosides + Cephalosporin
  - Anti-collagenase
    - Serum/plasma
    - N-acetylcysteine
    - EDTA
  - Cycloplegic
    - Atropine
  - Systemic NSAIDs
    - Flunixin

**Bacterial keratitis**
- SPL?
- Mask?

**Surgical intervention:**
- Delayed or ineffective medical treatment
- Stromal loss (especially if >50%)
- Corneal melting → progressive stromal loss

**Fungal keratitis**
- Most common organism
  - Fusarium
  - Aspergillus
  - Penicillium
- Presentations
  - Epithelial keratomycosis
Epithelial keratomycosis
- Can mimic viral keratitis and/or IMMK
- Rose Bengal and fluorescein stain uptake
- Diagnosis: Cytology
- Treatment: Topical antifungals (voriconazole, miconazole, itraconazole, etc.)

Ulcerative keratomycosis
- Similar clinical signs (and sometimes appearance) to bacterial keratitis
- Furrow!
- Can have plaque formation
- Thick brown-yellow plaques on corneal surface
- Requires keratectomy

Stromal abscess
- May start off as a corneal ulcer that rapidly heals
- Similar clinical signs
- Appearance: Focal yellow-white opacities (typically deep)
  - Fluorescein negative
  - Surrounding edema
  - +/- Vascularization
  - Anterior uveitis
- Diagnosis: Cytology/culture - Requires surgical intervention as they are DEEP
- Treatment: Aggressive medical therapy
  - Antifungal (voriconazole = ideal, itraconazole, natamycin, etc.)
  - Antibiotics (*that penetrate)
  - Cycloplegic
  - Systemic NSAIDs

Stromal abscess
- Surgical treatment options
- Intrastromal injections (voriconazole, moxifloxacin)
  - May eliminate need of topical
- DLEK
- PLK
- PK

Stromal Abscess
- Diagnosis: Cytology/culture - Requires surgical intervention as they are DEEP
- Treatment: Aggressive medical therapy
  - Antifungal (voriconazole = ideal, itraconazole, natamycin, etc.)
  - Antibiotics (*that penetrate)
  - Cycloplegic
  - Systemic NSAIDs

Questions?
Haab’s striae or Linear keratopathy
- Can be seen with
  - Glaucoma
  - Blunt force trauma
- But usually INCIDENTAL!

Corneal dystrophy in Fresian horses
- Progressive stromal loss
- Average: 10 years
- Unilateral> Bilateral (symmetric)
- Surgical intervention usually necessary