



The General Practitioner's Guide to Corneal Ulcers



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Trevor Arnold DVM, MS, DACVO
Consultant to Heska

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LIGHT SOURCE AND MAGNIFICATION!!!

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Your Friends

- Transilluminator
- Loupes
- Cobalt Blue Light (Not Red Free)





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Your Friends

- Cobalt Blue

vs

- Red Free Light

- Old ophthalmoscope heads often have a red free light, but no cobalt blue





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Diagnostics

- Fluorescein Stain:
 - Do not touch a dry strip to the eye
 - Moisten with saline first, or mix 1 strip with 1ml saline.
 - The pattern of staining can tell you a lot about the ulcer...Location and Depth

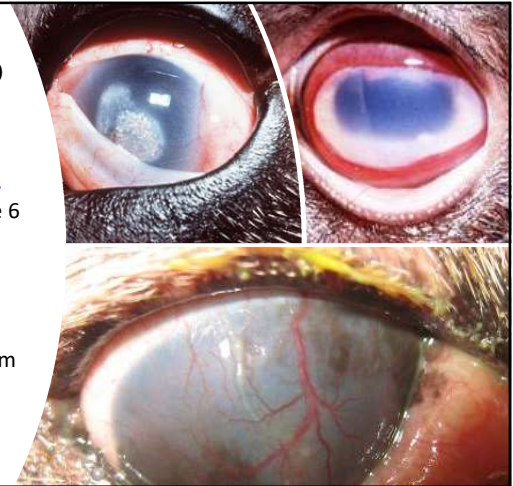


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The Cornea is so simple!

Essentially the cornea can be 6 colors

1. Red...Blood
2. White and wispy...Fibrosis
3. Blue/hazy...Edema/Fluid
4. Black...Pigment or sequestrum
5. Yellowish...White Blood Cells
6. White and sparkly...Lipid or Mineral



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Don't be this Doctor...

- Patient 1: Skin abrasion
 - Corneal ulcers are skin abrasions
- Start cephalexin



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Don't be this Doctor...

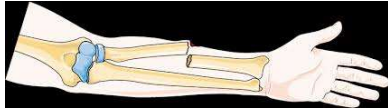
- Patient 1: Skin abrasion
 - Corneal ulcers are skin abrasions
- Start cephalexin
- Recheck 1 week: Healed



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Don't be this Doctor...

- Patient 2: Open fracture
 - A more serious skin abrasion
 - Start cephalexin, pain control
 - Recheck 1 week: Not Healed...?
 - Try antibiotic #2...Augmentin.
 - Recheck 1 week later: Still Not Healed???
 - Should we try Enrofloxacin?...Amikacin?
-
- Look for the cause of the ulcer, don't just look at the ulcer.
 - Sometimes corneal ulcerations don't heal due to infection and an antibiotic change is warranted...but you have to prove it.



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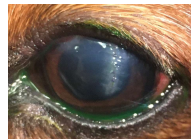
Common causes for corneal ulcerations

- Trauma or Foreign Body
- Anatomical (entropion, distichia, ectopic cilia)
- KCS
- Indolent Corneal Ulceration
- Corneal Dystrophy/Degeneration
- Melting Corneal Ulceration
- Feline Herpes Virus

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Trauma and Foreign Material

- Nature of the trauma must be considered when choosing therapy
 - Self trauma or mild abrasion
 - May only need to apply a protective collar and any antibiotic
 - Some foreign bodies are easy to remove, others require surgery
 - Jewelers Forceps or hydropulsion
 - Cat claw injuries
 - The epithelial injury may be small, but the claw can penetrate deep
 - Need to choose an antibiotic that penetrates the intact epithelium
 - May need to manage intraocular complications if full thickness
 - Any loose flaps of stroma will need to be removed as motion will prevent healing



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Foreign Body Removal



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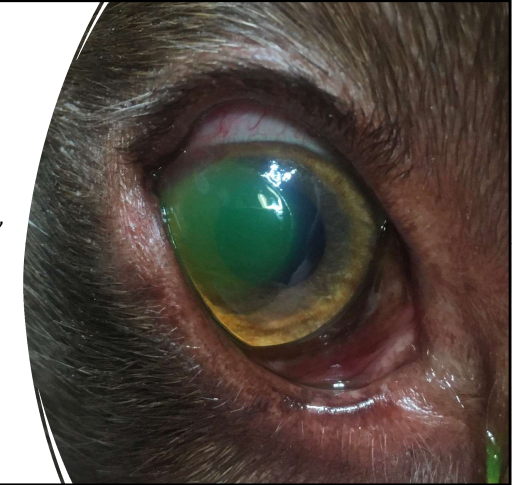
Anatomical

- Entropion, Ectopic cilia, (Distichia)
- Signalment and history should help increase the index of suspicion
 - These are typically young dogs (<1.5yr)
 - Bulldog, Labrador, Shar Pei, Chow Chow, Large breeds with lax eyelids
 - Chronic irritation with epiphora and often have significant vascular keratitis
 - Location of keratitis should line up with the problem
 - Most entropion is ventral lateral, Most ectopic cilia are in the dorsal central lid

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Indolent Ulcerations

- Used to be called Boxer ulcers, but we see them in all breeds
- Superficial
- Loose epithelial edges – need to wait a minute after staining
- Chronic (multiple rechecks)
- Variable amounts of vascularization
- SUPERFICIAL!!!



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Indolent Ulcerations

- Best way I have found to explain it...even if its not 100% accurate
 - Skin cells are like trees, they grow roots (hemidesmosomes) into the underlying stroma
 - With indolent ulcers its like a layer of concrete develops in the stroma
 - The skin is trying to heal, but can't stick down
 - Heal and Peel (ulcer looks like it's getting better, until it gets worse again)



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Indolent Ulcerations

- Need to disrupt the "concrete layer"
- Cotton tipped debridement: 30% healing
- Grid keratotomy or Punctate keratectomy: 80% healing
- Algerbrush II with 3.5mm medium grit Diamond burr...not a dental burr
 - 80% healing but much less traumatic
- DO NOT DEBRIDE DEEP OR INFECTED ULCERATIONS!
- Topical antibiotic and OTC lubricating drops
- E-collar
- Third eyelid flaps or contact lens placement can help more complicated cases

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Diamond Burr Debridement Video



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Corneal Dystrophy/Degeneration

- Older patients, Genetics, Hypothyroid
- Mineral/crystal formation in the corneal layers
 - Ok if these are deep, but when superficial the skin cannot stick down
 - The flexibility of the cornea is affected, and these crystals can crumble out
- EDTA 1% drops: may help if the crystals are predominantly calcium
- Diamond burr debridement
 - Need to be cautious with melting and uveitis following debridement



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Melting Corneal Ulcers

- Corneal ulceration can lead to infection
- Infections lead to an influx of WBC
- This risk is higher in most brachycephalic breeds and in dogs receiving topical steroids.



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Melting Corneal Ulcer

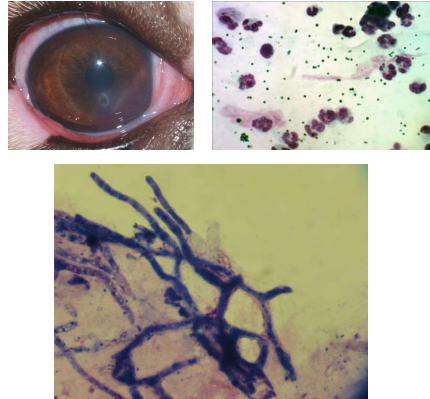
- Cornea is made up of collagen
- Collagenases are produced by WBCs and by certain pathogens (eg pseudomonas bacteria and most fungal sp.)
 - Leads to corneal necrosis (keratomalacia)
 - The cornea can melt out in hours



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Melting Corneal Ulcer

- Try to find the cause
 - Topical steroid use, Infection, Breed Predisposition, Compliance, No E-collar, swimming in ponds etc
- **CYTOLOGY** (or biopsy)



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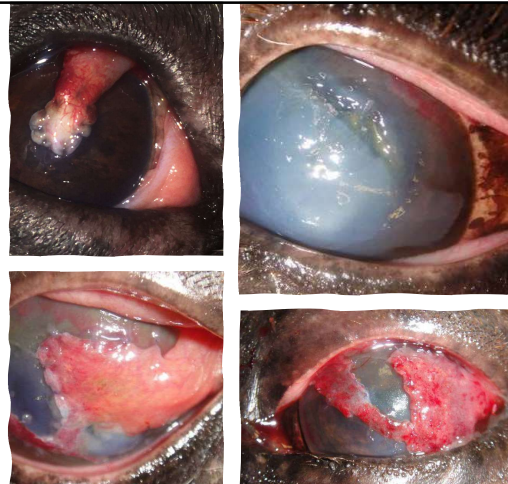
Therapy for Melting Ulcers

- Infection
 - Topical antibiotics(eg. Ofloxacin 0.3%)
 - Administer topically q1-2 hours
 - Careful with ointments
 - Systemic antibiotics (eg. Doxycycline 5-10mg/kg)
- Anticollagenase
 - Serum, Acetylcystine 4%, EDTA 1.5%, (Doxycycline)
 - Administer topically q1-2hrs
- Uveitis: Systemic anti-inflammatories
 - I prefer steroids when ever possible, but NSAIDs will help
- Pain: Topical (Atropine 1% PRN)

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Therapy for Melting Ulcers

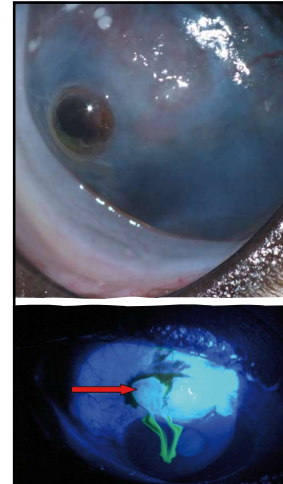
- Surgery is recommended if there is 50% or greater stromal loss at presentation, or if there is continued melting after 24 hours of medical therapy
 - Conjunctival or amnionic graft
 - 6-0 Suture is the largest that should be used 7-0 or 8-0 if sutures will be placed in the cornea



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What if it perforates?

- Not all perforated globes should be enucleated.
- The uveal tissue and fibrin can seal some perforations
- Check for aqueous leakage: Seidels test
- Perforated globes are at higher risk for uveitis and endophthalmitis



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Feline Herpes Virus

- Nearly all cats have been exposed as kittens
 - Newly exposed adult cats can become very sick
 - Very severe infections can lead to symblepharon
- After the initial infection the virus becomes dormant in the trigeminal nerve
- Stress triggers recrudescence
- Flareups are typically unilateral
 - The same eye is affected each time
 - May cause conjunctivitis and/or ulcerative keratitis
- Most mild flareups don't require any treatment
- Don't bother testing for it



Feline Herpes Virus

- Dogs get inflammatory conjunctivitis
 - Allergies, KCS, episcleritis etc
- Cats get infectious conjunctivitis
 - Herpes, Chlamydophila, Mycoplasma
 - **Don't use topical steroids in cats !**
 - Unless you have a very good reason
 - Steroids will make the eye look better short term, but will make things worse in the long run



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Feline Herpes Medications

- Famciclovir
 - There are many varying opinions on Famvir dosing
 - Personally, I start with:
 - 45-90 mg/kg PO once daily for 3 days, then stop for 4
 - I repeat this as needed. If no improvement I increase the frequency/duration
 - Some recommend up to 90mg/kg TID for 3 weeks
- Idoxuridine 0.1%
 - 1 drop QID at a minimum....
- Cidofovir 0.5%
 - 1 drop BID
- Lubricating drops and Topical antibiotic

What should I stock
in my pharmacy?



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Antibiotics (abbreviated list...will change over time)

- Triple Antibiotic
 - Neomycin Polymyxin Bacitracin ointment
 - Neomycin Polymyxin Gramicidin drops
 - CATS....(J Feline Med Surg 2011 Oct 13 (10) 744-51,Hume-smith et al)
 - Report of 61 anaphylaxis cases between 1993-2010, *85% survived.
 - Polymyxin B
 - Most reactions were within 10min of the first administration
- Tobramycin 0.3%
- Ofloxacin 0.3%

- Gentamicin 0.3% (can be epithelial toxic over time)

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Anti-Collagenase

- Acetylcysteine 4%
 - Check your states compounding laws...
 - Make in Refresh Liquagel drops
 - Take 3.2ml from the 15ml bottle and add 3.2ml Acetylcysteine 20% soln
 - Make in Ofloxacin
 - Add 1 ml Acetylcysteine 20% soln to a 5ml bottle of ofloxacin
- Serum
 - May have variable levels of anti-collagenase activity between patients
 - Irritating for 10-15% of patients
 - Needs to be stored in the fridge and only good for 1 week unless frozen
 - You can cross species (i.e. use horse serum on dogs), but increased risk of irritation

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Anti-inflammatories

- Ketorolac 0.5%
- Diclofenac 0.1%
- Flurbiprofen 0.03%
 - Topical NSAIDS delay healing

- Carprofen (2.2mg/kg PO BID)
- Meloxicam (0.1mg/kg PO once daily)
- Onsiar...limited to 3 days, which isn't always enough
- Galliprant...doesn't control uveitis well

- Oral Prednisone (0.5mg/kg PO BID on a tapering dose)...careful in cats.

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Antifungal (all off label)

- Itraconazole 1%
 - 1 drop QID
- Voriconazole 1%
 - 1 drop QID
- Silver Sulfadiazine
 - Small amount QID...label does specifically say "Avoid contact with the eye"
- Miconazole (Monistat 7)
 - Apply QID

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Miscellaneous

- Lubricating eye drops
 - Optixcare, Remend, Refresh Liquagel, Genteal etc,
 - Many products with what I consider to be exaggerated claims, but they do help comfort and may speed healing.
- Sodium Chloride 5% (Muro 128)
 - For significant corneal edema
- Dilute Betadine (1:50)
- EDTA 1.5%
 - For calcium based corneal dystrophy

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Questions?

Remember to **download the CE certificate** in the handouts panel of the webinar control panel.

NOTE: CE certificate not available for watching the recording.

Questions about CE?
events@heska.com

Questions about topic?
tarnold@dvm.com

Thank you for joining us!



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