Cornea: 0.5mm is all you get

David A. Wilkie DVM, MS, Diplomate ACVO
Professor
The Ohio State University
Wilkie.1@osu.edu

Ulcerative Keratitis

- Most ulcers are simple and heal in 24-72 hours, often DESPITE what the Veterinarian does
- When they fail to do so:
  - Did I miss the etiology?
  - Is it infected?
  - Have I done a culture/cytology?
  - What drugs are being used?
  - Is it time to discuss surgery?

0.5-0.6 mm
**Anatomy/Physiology - Cornea**

- 4 Layers of the Cornea
  - Epithelium
  - Stroma
  - Descemet's membrane
  - Endothelium

**Cornea Epithelium**

- 8-15 cell layers thick
- 7 day turnover

**Diagnostic tests for corneal abnormalities**

- Examination
- Finoff
- Biomicroscopy
- Culture
- Schirmer tear test
- Fluorescein dye
- Cytology
Diagnostic tests for corneal abnormalities

- Examination
- Finoff
- Biomicroscopy

Getting Old?
Loupes
You get what you pay for

Diagnostic tests for corneal abnormalities
- Examination
- Finoff
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- Culture
Diagnostic tests for corneal abnormalities

- Examination
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Cytology

www.microbrush.com
Diagnostic tests for corneal abnormalities

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Diagnostic tests for corneal abnormalities

- Examination
- Finoff
- Biomicroscopy
- Culture
- Schirmer tear test
- Fluorescein dye test
- Cytology
- Biopsy and histopathology
Ulcerative Keratitis

- Ascertain the etiology of the lesion.
- Examine the eye for:
  - eyelid abnormality

  Entropion

  Trichiasis
Ulcerative Keratitis

- Ascertain the etiology of the lesion.
- Examine the eye for:
  - eyelid abnormality
  - adherent hair

Ectopic cilia
Ulcerative Keratitis

- Ascertain the etiology of the lesion.
- Examine the eye for:
  - eyelid abnormality
  - adherent hair
  - foreign body
  - tear deficiency
  - STT
  - TBUT
  - infectious causes
**Ulcereative Keratitis**
- Complete history
- Duration
- Previous therapy (especially corticosteroids)

**Superficial Corneal Ulcer**
- Generally extremely painful
- Heal within 72 hours when the cause has been removed.

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Superficial Corneal Ulcer

- Generally extremely painful
- Heal within 72 hours when the cause has been removed.
- If the ulcer has not resolved in 3 to 5 days:
  - cause is still present
  - ulcer is infected
  - indolent ulcer is present

Indolent Ulcer

- Boxer ulcer, Recurrent erosion
Indolent Ulcer

- Hallmark features:
  - Superficial
  - Nonpainful to mildly painful
  - Loose or redundant epithelial borders
  - Usually middle aged to older dogs
  - Chronic in nature
  - Predisposed breeds - boxers
Grid Keratotomy

- Algerbrush diamond burr
Diamond Burr Debridement

Algerbrush; Alger Equipment Company, Lago Vista, TX, USA

Outcome

- SK - 100% healed after single procedure
- GK - 88% healed after single procedure
- Debridement - 63% healed after single procedure

Management of spontaneous chronic corneal epithelial defects (SCCEDs) in dogs with diamond burr debridement and placement of a bandage contact lens

Mylene A. Godtig, Amber L. Labelet* and Carlie R. Breaux*

Results The median time to first recheck examination was 7 days (IQR 7–9 days) with 26 (70%) of cases healed at this examination. The mean time to second recheck examination was 15.5 ± 5.5 days with 37 (92.3%) healed by this examination. The median time to final recheck examination was 19 days (IQR 18–15.5 days) with a range of 18–52 days. All cases resolved by the third and final recheck examination. A second DDBD/BCL was performed in 5/40 (12.5%) of cases. The BCL retention rate was 95% over all examination time points. No case required a keratectomy or other surgical intervention to achieve healing. The only complication observed was one case of suspected bacterial keratitis post-DDBD/BCL.

Conclusions Results suggest that DDBD/BCL is safe and effective for treatment of canine SCCED.
Indolent Ulcer

- Treatment:
  - Client education is essential
  - Remove loose, redundant epithelium
  - Gently break the basement membrane with 25g needle (Grid keratotomy)
  - Diamond burr
  - Topical tetracycline - 50% reduced time to heal
  - Recheck every 7-14 days.

Tetracycline and Refractory Ulcers *in vivo*

<table>
<thead>
<tr>
<th>Clinic A: Treatment with Topical Tetracycline</th>
<th>Clinic B: Treatment with Topical Tobramycin</th>
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<tr>
<td>![Graph 1]</td>
<td>![Graph 2]</td>
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Clinic A: Treatment with Topical Tetracycline

- Healed by 14 days
- >30 days Healing/Surgery

Clinic B: Treatment with Topical Tobramycin

- Healed by 14 days
- >30 days Healing/Surgery

Chandler H, Colitz CMH 2005

Indolent Ulcer

- Treatment:
  - ± Contact lens:
    - 15mm diameter, thin, soft bandage lens
    - >8mm base curve
    - Activet
    - ± Antibiotics
Indolent Ulcer

- Classic dendritic ulcer
- No URT signs

Adult cat - herpes
Herpes

- **Diagnosis**
  - dendritic or punctate superficial corneal ulcers
  - pathognomonic for herpes keratitis

Herpes felis

- 70% of cats infected with herpes virus will become carriers
- recurrent conjunctivitis/keratitis
- stress and immunosuppression will predispose to recurrence
  - FeLV
  - FIV
  - Other
Herpes felis

**Diagnosis:**
- History - previous stress?

**Treatment:**
- Antiviral agents topically
  - Idoxuridine - Stoxil, Herplex
  - Trifluorothymidine - Viroptic
  - q2-4 hr
  - Cidofovir 0.8%
  - Q12 hr

- Antivirals - Systemic
  - Famciclovir
    - Variable doses listed
    - 65 mg/cat divided daily
    - New data suggests 40 mg/kg PO
    - 90 mg/kg PO TID
Herpes felis

- **Treatment:**
  - L-lysine, 280-800 mg/day PO
  
  - Interferon
    - 30 units PO 7 days on/7 days off and repeat
    - 3,000 - 6,000 units/ml topically
**Herpes felis**
- Intranasal vaccine

**Midstromal Corneal Ulcer**
- Managed medically
- Associated anterior uveitis
- Cytology
- Culture/Sensitivity

**Midstromal Corneal Ulcer**
- Treatment:
  - Topical antibiotics
  - Broad spectrum, every 2-6 hours
  - Neomycin-bacitracin-polymyxin
  - Gentamicin (poor choice)
  - Ciprofloxacin
  - Levofloxacin
  - Gatifloxacin
Midstromal Corneal Ulcer

- Treatment:
  - 1% Atropine
  - as needed to dilate the pupil, but not more than 4x/day

NO Corticosteroids Topically!!!!

Midstromal Corneal Ulcer

- Treatment:
  - Surgery if progressive
  - Desmetocoele
  - Melting/collagenase ulcer
  - Acute eruptive keratopathy
  - feline
Deep/Desmetocele Corneal Ulcer
- Fluorescein negative centrally

Melting Corneal Ulcer
- Enzymatic breakdown of the cornea
Melting Corneal Ulcer

- Surgery often indicated
- Debridement of the melting portion

Melting Corneal Ulcer

- Treatment:
  - As for deep ulcers, but more aggressive.
  - Antibiotics are administered every 1-2 hours
  - Ofloxacin
  - Levofloxacin
  - Gatifloxacin
  - Anticollagense
  - Serum
  - Tetracycline - topical, systemic
  + Surgery

Acute Eruptive Keratopathy

Possible association with systemic immunosuppression
Acute Bullous Keratopathy

- Retrospective MSU/Ohio State
- 14 cats from 2000-2008
- 12/14 with systemic disease
- 10/14 on systemic immunosuppressive therapy
  - 9/10 -prednisolone (1-2 mg/kg q 12-24h)
  - 9/9 on concurrent cyclosporine (1.5-7 mg/kg q 12-24h)
- 19/28 eyes developed ABK
- 13/19 eyes remain sighted


Acute Eruptive Bullous Keratopathy

Descemet’s membrane rupture

Treatment with conjunctival graft or 3rd eyelid flap
Acute Eruptive Bullous Keratopathy

4 hr preop

1 hr preop

4 wk Post-op

4 wk Post-op

Zeiss Operating Microscope

Zeiss 4x Loupes
Superficial Keratectomy

- Thickness of the normal canine cornea is 0.4-0.7mm
- #64 Beaver blade/Desmarres corneal dissector
Superficial Keratectomy

Avoid tension in this direction

Feline Sequestrum Corneal-Conjunctival Graft
Superficial Keratectomy

Sequestrum
May spontaneously slough
Conjunctival autografts

- Advancement, hood, bridge, pedicle, and complete conjunctival graft
- Bulbar vs palpebral conjunctiva

Indications:
- Deep non-perforating corneal ulcers that have failed to respond to medical therapy
- Descemetocoele
- Mycotic keratitis
- Bullous keratopathy
- Recurrent erosions
- Stromal abscessation
- Keratomalacia
Conjunctival Graft
Corneal-Conjunctival Graft
Limbal melanoma – excision plus BioSIS®

Limbal melanoma – excision plus diode laser
Corneal Trauma

- Perforation / Laceration
- Sharp Corneal Trauma
- Blunt Corneal Trauma

Corneal Trauma

- Sharp Trauma

Corneal Trauma

- Blunt Trauma
Positive Seidel Test - Canine

Magnification
Epinephrine
Viscoelastic
8-0 to 9-0 suture
Microsurgical instruments
Cat Claw Perforating with Lens capsule tear
Cat Claw Perforating with Iris prolapse Phacoanaphylaxis

Blunt trauma

Blunt vs Sharp