Spontaneous and Surgical Trauma to the Eye

Richard R Dubielzig
Ocular Trauma
Expulsive Choroidal Hemorrhage
Sudden Loss of Intraocular Pressure
Early Cellular Events after Trauma

One Day Trauma
3 Day Trauma
Lens Epithelial Cell Proliferation after a Porcupine Quill Injury
Lens epithelial cell proliferation and migration

Porcupine quill injury
Porcupine quill injury

Lens epithelial cell proliferation and migration
Lens Epithelial Cell Proliferation & Migration
Lens Epithelial Cell Proliferation & Migration on Tapetum
Scleral Rupture
Blunt Trauma

• In a series of 52 dogs
  – 6 Boston Terrier, 5 Yorkies, 4 Shih Tzu, 2 Labs
  – 11 less than 3 years old, 13 more that 10 years old

• In a series of 80 Cats
  – 56 DSH, 11 DLH
  – 15 less than 3 years old, 29 more than 10 years old
Fibrosis Internal to the Choroid
Endophthalmitis or Panophthalmitis
Breeds in 954 Canine Cases

- Shih Tzu...........120
- Labs..................71
- Lhasa Apso...........25
- Dachshund...........10
- Boston Terrier......41
- Golden Retriever...17
- German Shepherd...20

AKC Most Popular Breeds in USA

1. Labrador retrievers 154,616
2. Golden retrievers 56,124
3. German shepherds 46,963
4. Beagles 44,610
5. Dachshunds 42,571
6. Yorkshire terriers 37,277
7. Boxers 34,340
8. Poodles 33,917
9. Chihuahuas 28,466
10. Shih Tzus 28,294
Endophthalmitis
“Volcanoes” in the subretinal space, extending from the choriocapillaris
Endophthalmitis with Foreign Body
68 cases in dogs
Large Breed dogs are over-represented
Plant foreign body the most common by far
Plant Foreign Bodies
Stick in the Eye
Septic Implantation Syndrome
139 in dogs & 36 in cats

- Syndrome features
  - Suppurative endophthalmitis
  - Fibrous posterior synechia
  - Lens capsule rupture with a suppurative infiltrate into the lens
  - Bacterial colonies in the lens protein away from the neutrophils, less often, fungi
- No particular breed
- 56/139 dogs less than 6 years-old
- 18 of 36 cats less than 6 years-old
- 37 dogs more than 10 years-old and 9 cats more than 10
Septic Implantation Syndrome (10 cases)
Lens capsule rupture with a suppurative infiltrate into the lens
Gram+ Bacteria
2 examples of Mixed Bacteria

Mycotic
Septic Implantation Syndrome is Caused by a Cat Scratch Until Proven Otherwise
Blunt Trauma to the Retina

12 hours After Blunt Trauma
Retinal Effects of Blunt Trauma

24 Hours
Retinal Effects of Blunt Trauma
Retinal Effects of Blunt Trauma
Proptosis

- 97 cases in dogs
  - 18 Shih Tzu, 10 Pekingese, 8 Yorkies
  - 48 less than 6 years and 19 more than 10

- 2 cases in cats
Proptosis
Typical Lesions Seen

- Muscle tearing
- Episcleral fibrosis
- Optic nerve necrosis
  - First pure necrosis
  - Second Gitter cells and malacia
  - Finally fibrosis and atrophy
- Extension of the conjunctival epithelium toward or beyond the equator
- Hair in the episclera
- Corneal desiccation
Optic Nerve Trauma/Proptosis
3 Day Optic Nerve Necrosis
Optic Nerve Malasia, Gitter Cells
End-stage Fibrosis of the Optic Nerve (Trichrome Stain)
Exposure of the cornea

Corneal Desiccation
Episcleral Fibrosis

Sclera
Contusion Glaucoma/
Angle Recession Glaucoma

- **41 cases in dogs**
  - No particular breed
  - 13 less than 6 years-old
  - 17 greater than 10 years-old
- **204 cases in cats**
  - 141 DSH, 23 DLH, 10 Siamese
  - 29 less than 6 years-old
  - 101 greater than 10 years-old
Acute Traumatic Cyclodialysis

Limbal Sclera

Iris

Acute Traumatic Cyclodialysis
Anterior Chamber Collapse Syndrome/Early life Trauma
Early-life Trauma
Anterior Chamber Collapse Syndrome
Early-life Trauma
Anterior Chamber Collapse Syndrome

69 cases in the COPLOW archive

Species break down:
- 24 feline
- 40 canine
- 1 primate (rhesus)
- 1 marsupial (wallaby)
- 1 Avian (chicken)
- 1 Bovine (Holstein)
- 1 Equine (Arabian horse)
Early-life Trauma
Anterior Chamber Collapse Syndrome

69 cases in the COPLOW archive

Ages at Enucleation:
Less than one year: 28
> 0.4: 4
> 0.6: 12
> 0.8: 9
0.8 to 1 year: 3
One to two years: 19
Two to three years: 8
Greater than 3 years: 14
Range = 4 to 12 years
Early-life Trauma
Anterior Chamber Collapse Syndrome
Symptoms Breakdown: n=70
  Glaucoma: 54
  Buphthalmic: 42
  Both eyes effected: 3
Early-life Trauma
Anterior Chamber Collapse Syndrome

History

Always/ since birth/congenital: 26
Known injury 15
  8 under 1 month of age
  4 under 1 year of age
  1 under 2 years of age
Since acquired: 10
  4 acquired under 6 months of age
  1 acquired at 4.5 years
Early-life Trauma
Anterior Chamber Collapse Syndrome

Canine Early-life Trauma / Anterior Chamber Collapse Syndrome
Early-life Trauma
Anterior Chamber Collapse Syndrome
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Early-life Trauma
Anterior Chamber Collapse
Early-life Trauma
Anterior Chamber Collapse Syndrome
Early-life Trauma

Anterior Chamber Collapse

[Image of a histological section]
Histologic Effects of Surgical & Non-Surgical Ocular Interventions

Orbital Conjunctival Cyst after Enucleation Surgery
Intraocular Injection
Intraocular injection sites
Vitreous prolapse following intraocular aspiration
Corneal Surgical Incision Sites
Corneal Surgical Incision Site - anterior synechia
Wound Healing Problems
Laser Photocoagulation - ciliary body of blue-eyed dog
Nerve and Vessel Necrosis
Laser Retinopexy

Lens

Optic Nerve
Retinal Morphology Immediately after Retinopexy to Repair 2 Week-old Detachment
Laser Surgical Wound
Complications Due to Silicone Oil
The morphology of eyes enucleated due to complications following phacoemulsification
Dehiscence of the Surgical Wound and/or Epithelial Downgrowth
Complications following Phacoemulsification

- The most frequent histopathological abnormalities detected were:
  - Endophthalmitis, shortly after surgery
  - Glaucoma, delayed onset
    - Retinal detachment and neovascular glaucoma
    - Posterior synechia
    - Lens epithelial membranes
- The most frequent clinical abnormalities reported were:
  - Glaucoma (86%)
  - Uveitis (82%)
Post-operative Glaucoma
Exposure of Lens Protein -- Phacoclastic Uveitis
Endothelial and Descemet’s Changes
Doubling of Descemet’s Membrane
Lens epithelial membranes (LEMs)
Lens epithelial membranes (LEMs)
Lens fiber regrowth (LFR)

- 28% of cases
- etiology of posterior capsular opacification (PCO)/LFR
- role of IOLs
Lens Fiber Regrowth
Soemmering’s Ring Cataract
Five Problem Areas Identified

- PIFVMs
- Lens Fiber Regrowth
- Lens Epithelial Membranes
- Endophthalmitis
  - Dehiscence
  - Lens Protein Exposure
- Health of the Corneal Endothelium & Descemet’s
Gonioimplant, Ahmed Valve

Uncomplicated

Dehiscence and Exposure

Epithelial Ingrowth
Intrascleral Prosthesis
The expected appearance of a “healthy” scleral shell
Intrascleral Prosthesis Failures

• 62 in Dogs
  – 23 because of tumors
  – 12 because of epithelial downgrowth
  – 30 because of corneal degeneration
  – 28 had severe inflammation
• 11 in Cats
  – 9 because of tumors
    • 8 melanoma, 1 post-traumatic sarcoma
Tumors

Canine LSA

Feline FDIM

Canine Melanoma

Canine LSA
Epithelial Down Growth