Clinical & Pathological Correlations in Ocular Disease

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JSCVO
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Case 1
4 Year-Old Domestic Shorthaired Cat

- Presented in 1995 after blunt trauma with intraocular hemorrhage
- Three months later there was a cataract
- Represented in 2005 with an opaque white eye
Case 1

Dr. Kerry Ketting

Original Presentation

3 Months Later

10 Years Later
Feline Post-traumatic Sarcoma (PTS)

234/2766 (8.45% of feline ocular tumors)

- Spindle cell variant
  - 149 cases
  - Lens epithelial origin
- Round cell variant
  - 54 cases
  - Variant of lymphoma
- Osteosarcoma/Chondrosarcoma
  - 26 OSA/5 Chondrosarcoma cases
  - Unknown cell of origin
Reasons to believe PTS is related to trauma

• Lens capsule rupture
• History of trauma or abnormal eye
• Time between trauma and tumor
  – Between 2 months and 15 years
Spindle Cell PTS
Early Spindle Cell Variant PTS
8.5% of traumatized feline globes removed prophylactically have early PTS
Tumor Distribution, Spindle Cell Variant

Diffuse Distribution Around the Inner Lining of the Globe
PAS+ Basement Membrane Matrix Deposition Mimics Lens Capsule
Cellular Features of Spindle Cell PTS

Collagen 4

Vimentin

αA Crystallin
Invasion of the Optic Nerve
Follow-up Spindle Cell Variant

- Cases which have extended beyond the sclera have a bad prognosis
  - Local recurrence
  - Extension towards the brain
- Cases removed within the sclera have a good prognosis
- 8.5% of traumatized globes removed prophylactically have early PTS
Round Cell Variant PTS
56 cases
Round Cell Variant PTS

Retina
Immunophenotype is Complex but Suggests a B-Cell Lymphoma
Feline Post-traumatic Osteosarcoma
30 Cases

PTS Osteosarcoma
Feline Post-traumatic Osteosarcoma
Case 2

Ten Year-Old Siberian Husky Dog

- Diagnosed with glaucoma
- Blue eye
- Mass effect in iris
- No response to treatment
- Enucleation
Case 2
Spindle Cell Tumors of Blue-Eyed Dogs
57 Cases (0.86% of Tumors)
Spindle Cell Tumor of Blue-Eyed Dogs…59 Cases
(0.86% of Canine Ocular Neoplasia)

• Median age = 8.3 years
  (Range = 4.5 – 12 years)
• Gender equal
• Laterality equal
• Siberian Husky, Australian Shepherd, Border Collie and other breeds with blue or partly-blue eye
Delicate Spindle Cell Tumor Suggesting a Peripheral Nerve Sheath Tumor
Spindle Cell Tumor of Blue-Eyed Dogs

GFAP
Distribution of GFAP+ Cells in the Uvea of Blue-Eyed Dogs
Case 3

11 Year-Old Spayed Female Pug Dog

- Chronic history of dry eye
- Treated with cyclosporin and then tacrolimus
- Developed a raised irregular axial opacity
Case 3
Canine Corneal Squamous Cell Carcinoma (SCC)

• 97 cases of canine SCC in the COPLOW collection from a total of 6341 tumors in dogs
• 32 cases of corneal SCC (30 of which are included in this report)
Corneal Squamous Cell Carcinomas Diagnosed at COPLow
Clinical Appearance of Corneal SCC
Breeds affected (n = 30)

- Pug … 8 cases
- Bulldog … 5 cases
- Boxer … 2 cases
- Shih-tzu … 2 cases
- Greyhound … 2 cases
- Pekinese … 2 cases
- Border Collie… 2 cases
- Other … 7 cases
Risk Factors

• 21 of 21 had superficial chronic corneal inflammatory disease most often diagnosed as keratoconjunctivitis sicca

• Treatment information
  – Cyclosporin alone … 10 cases
  – Tacrolimus alone … 4 cases
  – Combination of both drugs … 6 cases
  – Other drugs or unknown … 5 cases
Morphology

Superficial central corneal malignant transformation
Morphology

Superficial keratectomy is adequate treatment in most cases.
Morphology
Follow-up (n = 23)

- Follow-up interval 5 days to 31 months
- Only one dog had recurrent disease because of dirty deep margins
Conclusions
Canine Corneal Squamous Cell Carcinoma

- The number of submissions is increasing
- Previous superficial inflammation is a strong risk factor
- The Pug and Bulldog are over-represented
- Relationship to cyclosporin &/or tacrolimus
- The disease remains superficial and is treatable with keratectomy
2 Cases of Toxoplasma Keratoconjunctivitis in Dogs being Treated with Cyclosporin and/or Tacrolimus
Case 4

4 Year-Old Domestic Shorthaired Cat

- Glaucoma and Buphthalmos in the Left eye
- Intraocular hemorrhage
- The right eye is normal
Feline Neovascular Vitreoretinopathy Syndrome
Feline Neovascular Vitreoretinopathy Syndrome

- 14 cases out of 5972 feline submissions (0.23%)
- 9 cases less than 1 year old
- 4 cases between 1 and 2 years old
- 1 case 4 years and 11 months
- All cases presented with glaucoma
- 12/14 retinal detachment
- 14/14 Preiridal fibrovascular membranes
- Most have a normal fellow eye
  - One case with avascular retina in the other eye
Central Retinal Neovascular Membranes Extending into the Vitreous
Central Retinal Neovascular Membranes Extending into the Vitreous
Profound Disorganized Retinal Gliosis

Avascular Gliotic Peripheral Retina

GFAP
Immunohistochemistry

Laminin

Smooth Muscle Actin
Avascular Retina in the Second Eye from One Affected Cat

The view is distorted by cataract
Case 5
Seven year-old female Cocker Spaniel

- History of primary glaucoma in the right eye leading to series of unsuccessful and expensive treatments ultimately leading to failure and enucleation.
- Red painful left eye 2 years later.
- The second eye was blind at the time of evaluation by the ophthalmologist 24 hours after the start of signs.
- Enucleation was elected and performed 36 hours after the signs began.
Primary Glaucoma
The Normal Canine Iridocorneal Angle
Goniodygenesis
Normal Pressure

Normotensive Basset Hound with Goniodygenesis
Goniodygenesis
Goniodygenesis with Glaucoma
What is Canine Primary Glaucoma?

- Sudden onset of painful, red, often blind eye with very high pressures
- The response to treatment is variable, but severe cases are blind from the start.
- Very poor success rate with any treatment protocols tried
- Females affected more than males
- Enucleation is a common outcome
  - When dealing with the second eye, enucleation is often chosen very early (24 hours from the first signs of disease)
Early and Later Optic Nerve and Retina

Kerry Ketring images
The Early Effects of Canine Primary Glaucoma on the Optic Nerve and the Retina

Two day glaucoma, Canine
The Retina in Primary Glaucoma

One Day Glaucoma
“Red Dead” Ganglion Cells
“Red Dead” Ganglion Cells

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Retinal CD 18+ Phagocytes
2 to 4 day Glaucoma (Canine)

Four Day Glaucoma
2 to 4 day Glaucoma
TUNEL for Apoptosis

TUNEL+ not seen before day 2 - 3
2 to 4 day Glaucoma
The Optic Nerve in Primary Glaucoma

30 hour Glaucoma
Optic Nerve 2 to 4 Days
4 day Optic Nerve Head Phagocytosis/Malacia
5 day Canine Glaucoma
Optic Nerve CD18+ Phagocytes
CD18 on 4 - 5 day Glaucoma Optic Nerve
Chronic Glaucoma
Timeline for Canine Primary Glaucoma

• The dog is born with Goniodysgenesis. More clock hours affected increase the chance of becoming affected with glaucoma.

• There is a gradual process by which the corneoscleral trabecular meshwork atrophies.

• Ganglion cells decrease, perhaps due to bouts of undetected glaucoma.

• Increasing number of phagocytic cells in the retina and optic nerve head.
Timeline for Canine Primary Glaucoma

• Suddenly the eye becomes red and painful.
  • Some catastrophic event happens about 2 days before the owner notices the problem.
• Early, there is a wave of ganglion cell death and necrosis of the optic nerve head tissue.
• At 2 or 3 days there are regional waves of apoptosis
• By 7 days there is deep cupping of the optic nerve head and regional, full-thickness, retinal atrophy with tapetal sparing.